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ЗМІСТ

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SMALL MODULAR REACTORS (SMRS) AS THE FUTURE OF NUCLEAR POWER IN UKRAINE
(МАЛІ МОДУЛЬНІ РЕАКТОРИ (SMR) ЯК МАЙБУТНЄ АТОМНОЇ ЕНЕРГЕТИКИ УКРАЇНИ)

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У статті обґрунтовано впровадження малих модульних реакторів (SMR) як стратегічного рішення для відновлення енергосистеми України, що втратила понад 70% потужностей через війну. Розглянуто переваги та недоліки технології, описано технічні особливості SMR.

Ключові слова: *атомна енергетика, малі модульні реактори, енергетична стійкість, пасивна безпека, енергосистема України.*

This article describes why small modular reactors (SMRs) can be a practical and forward-looking solution for rebuilding Ukraine's energy system after the war, which resulted in the loss of more than 70% of its generating capacity.

Keywords: *nuclear power, small modular reactors (SMRs), energy security, passive safety systems, Ukraine's power sector.*

The energy infrastructure of Ukraine was historically designed as a cornerstone of the Soviet Integrated Power System, characterized by massive, centralized nodes and a sprawling high-voltage network. While this model allowed for high efficiency in peacetime, the full-scale invasion of 2022 exposed its fundamental vulnerability to kinetic and hybrid warfare. By early 2024, the Ukrainian Power System (UES) had lost approximately 42 GW of its generation capacity due to destruction or occupation, representing nearly 71% of its pre-war total. The loss of the Zaporizhzhia Nuclear Power Plant, the largest in Europe, placed an unprecedented burden on the remaining three operating plants—Rivne, South Ukraine, and Khmelnitsky—which now supply over 75% of the nation's electricity [1-2].

In this context, the pursuit of Small Modular Reactors (SMRs) is not merely a technological upgrade but a strategic survival mechanism. The transition from a few massive targets to a decentralized network of smaller, flexible, and inherently safe units aligns with the modern military

doctrine of distributed resilience. SMRs, defined as reactors with a power capacity of up to 300 MW per module, offer a radical departure from the traditional nuclear model.

The deployment of small modular reactor technology in a country experiencing war involves a special balance between strategic advantages and technical and economic implementation challenges. One of the main advantages is the increased resilience of the energy system due to the decentralized placement of such reactors. Unlike large centralized power plants, small modular reactors can be distributed across the country, making them much harder to target with missile or drone attacks, since the destruction of one module does not lead to a complete regional power outage. Most modern designs use passive safety systems based on natural physical processes such as gravity and natural convection rather than active pumping systems. This is especially important in situations where external power supply may be lost, as reactor units can maintain a safe state for several days without human intervention [2].

Small modular reactors can also ensure grid stability because they are capable of operating in island mode, supplying local microgrids, hospitals, or industrial facilities even when the main national infrastructure is damaged. Another important prospect is their use for industrial decarbonization, as these reactors can generate high-temperature process heat required for the modernization of heavy industry, including the production of clean steel and hydrogen synthesis, which is significant for future integration into European markets [2-3].

At the same time, SMR implementation faces serious challenges. Early-stage costs are higher than for large reactors, and competitiveness depends on mass production that has not yet been achieved. Ukraine's regulatory system, designed for VVER-type reactors, requires reform, while many SMR designs remain in the demonstration stage, creating reliability risks. In addition, large-scale workforce retraining will be necessary.

The shift toward SMR technology reflects a new approach to nuclear safety and economics compared to traditional Generation III+ reactors such as the VVER-1000. While conventional plants generate 1,000–1,600 MWe and depend on active safety systems requiring external power, SMRs produce 10–300 MWe per module and rely on passive safety features based on natural physical processes, allowing them to remain safe during blackouts. They also require less land, can be built in 3–5 years instead of up to 15, support regional 110–330 kV grids, and offer longer refueling intervals.

The deployment of SMRs in Ukraine is not just an energy decision, but a strategic step toward resilience and sovereignty. With proper regulatory reform and international support, they could play a central role in the country's long-term energy independence and reconstruction.

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LINGUISTIC POLITENESS IN ENGLISH-LANGUAGE COMMUNICATION OF HOTEL STAFF WITH TOURISTS FROM DIFFERENT CULTURAL BACKGROUNDS

(МОВНА ВВІЧЛИВІСТЬ В АНГЛОМОВНІЙ КОМУНІКАЦІЇ ГОТЕЛЬНОГО ПЕРСОНАЛУ З ТУРИСТАМИ З РІЗНИХ КУЛЬТУРНИХ СЕРЕДОВИЩ)

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У статті розглянуто особливості мовної ввічливості в англомовній комунікації готельного персоналу з туристами, які представляють різні культурні середовища. Проаналізовано стратегії ввічливості, їх лінгвістичне вираження та вплив на якість міжкультурного обслуговування у готельній галузі.

Ключові слова*: мовна ввічливість, міжкультурна комунікація, готельний персонал, англійська мова, туристи.*

The article examines the features of linguistic politeness in English-language communication between hotel staff and tourists representing different cultural backgrounds. Politeness strategies, their linguistic expression and influence on the quality of intercultural service in the hotel industry are analyzed.

Keywords*: linguistic politeness, intercultural communication, hotel staff, English language, tourists.*

The hotel industry is one of the most communicatively intensive sectors of the service sphere, where the quality of verbal interaction between staff and guests directly determines customer satisfaction and the reputation of the establishment. English, functioning as the global language of international communication, serves as the primary tool of interaction in hotel environments among representatives of diverse cultures [2]. Effective service, however, requires not only language proficiency but also a deep understanding of culturally conditioned politeness norms and the communicative expectations of tourists.

Linguistic politeness in the context of hotel service is realized through a system of strategies aimed at preserving the positive face of the interlocutor and establishing harmonious communicative interaction. Research indicates that receptionists and other staff actively employ positive and negative politeness strategies in typical situations such as greeting guests, offering assistance, and resolving problematic issues [1]. In particular, the use of mitigating expressions, forms of address, conditional verb constructions, and other linguistic devices enables staff to demonstrate respect for guests regardless of their cultural background.

Particular attention should be paid to the phenomenon of explicitness — the deliberate elaboration and specification characteristic of service interactions conducted in English as a lingua franca. Hotel staff consciously employ more expanded formulations, avoid ambiguity, and actively seek clarification in order to prevent misunderstandings — a practice of special importance in intercultural communication contexts where guests' language proficiency may vary considerably [3]. This approach contributes to more effective service delivery and reduces the risk of communicative breakdowns.

The pragmatic dimension of linguistic politeness is also evident in the nature of directive speech acts used by staff when providing instructions, making requests, or offering recommendations to tourists. Analysis of directives in hotel communication situations demonstrates that the choice of a specific politeness strategy is determined by the cultural context, the status relationships between communication participants, and the anticipated response of the interlocutor [4]. A mismatch between the cultural norms of staff and guest may lead to misunderstandings or a perceived lack of respect, even when the language used is grammatically correct.

Therefore, linguistic politeness constitutes an integral component of the professional competence of hotel staff. English as a means of intercultural communication in the tourism and hospitality industry demands from professionals not merely linguistic knowledge, but also the conscious application of culturally adapted politeness strategies [2]. Directions for further research include the investigation of specific linguistic politeness markers across different cultural groups of tourists and the development of practical recommendations for hotel staff training.

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RABIES IN DOMESTIC ANIMALS: MODERN METHODS OF PREVENTION

(СКАЗ У ДОМАШНІХ ТВАРИН: СУЧАСНІ МЕТОДИ ПРОФІЛАКТИКИ)

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У публікації розглянуто проблему сказу у домашніх тварин та сучасні методи його профілактики. Проаналізовано основні шляхи передачі вірусу, клінічні ознаки захворювання та ефективність профілактичних заходів, зокрема вакцинації. Встановлено, що профілактика сказу є ключовим елементом у забезпеченні здоров'я тварин і безпеки людей.

Ключові слова: *сказ, домашні тварини, вірус, вакцинація, профілактика, зооноз.*

The publication examines rabies in domestic animals and modern methods of its prevention. The main routes of virus transmission, clinical signs of the disease, and effectiveness of preventive measures, particularly vaccination, were analyzed. It was determined that rabies prevention is a key component in ensuring animal health and human safety.

Keywords: *rabies, domestic animals, virus, vaccination, prevention, zoonosis.*

Rabies is a fatal viral zoonotic disease that affects the central nervous system of mammals, including domestic animals and humans. It remains a significant global public health problem, causing tens of thousands of deaths annually, particularly in Africa and Asia. Once clinical signs of rabies appear, the disease is almost always fatal without prompt post-exposure prophylaxis [1].

Rabies is caused by viruses in the genus Lyssavirus of the family Rhabdoviridae. The virus is neurotropic, meaning it specifically targets nerve tissue, and it is usually transmitted through the saliva of an infected animal, most commonly via bites or scratches. In over 98–99% of human and animal rabies cases worldwide, transmission results from the bite of an infected dog [2].

After a bite, the rabies virus replicates in muscle tissue near the wound site, then travels along peripheral nerves to the central nervous system (CNS), where it multiplies rapidly. As the virus spreads, it causes acute inflammation of the brain and spinal cord (encephalitis). The incubation period in domestic animals typically ranges from 3 weeks up to several months, depending on factors such as bite location, viral load, and host health status. Once clinical signs develop, animals often die within a few days to a week [3].

In many low- and middle-income countries, domestic dogs are the principal reservoir and primary source of human and animal rabies infections, accounting for the majority of cases. Cats and livestock such as cattle and horses are also susceptible when exposed to infected animals.

Additional rabies reservoirs include wildlife species (e.g., bats, foxes, raccoons) depending on the region. Rabies is present worldwide with the exception of a few rabies-free countries that maintain strict control measures [1, 2].

Clinical manifestations in infected animals result from progressive encephalitis. Early signs may be non-specific (e.g., behavioral changes, lethargy, ataxia), but as the disease advances, animals may show excessive salivation, aggression or unusual friendliness, disorientation, paralysis, difficulty swallowing, and seizures. Rabies in animals characteristically leads to death shortly after clinical signs appear [4].

Definitive diagnosis of rabies in animals requires laboratory testing of nervous tissue (usually post-mortem). There are no reliable diagnostic tests to confirm rabies infection in living animals before clinical signs appear. Therefore, in suspected exposures, veterinarians and public health officials often rely on a combination of clinical observations and epidemiologic history to decide on management and prevention strategies [1].

Vaccination of domestic animals (especially dogs, cats, and ferrets) is the most effective way to prevent rabies transmission. Rabies vaccines stimulate the immune system to produce protective antibodies. Animals are considered immunized 28 days after initial vaccination or immediately after a booster. Maintaining high vaccination coverage in domestic animal populations is essential for controlling rabies at its source and reducing human and animal cases [2, 3].

When a domestic animal is potentially exposed to rabies, appropriate management depends on its vaccination status. Vaccinated animals may require a booster and close observation for signs of rabies for a specified period, while unvaccinated animals may be quarantined or euthanized depending on local public health regulations. For humans exposed to rabies, post-exposure prophylaxis (PEP) — including wound care, vaccination, and immune globulin — should be administered promptly to prevent disease progression [1].

Effective rabies control requires integrated public health efforts, including mass dog vaccination campaigns, surveillance systems, public education about bite prevention and responsible pet ownership, and accessible PEP for humans. These strategies are critical to reducing rabies incidence and preventing human deaths, aligning with global initiatives to eliminate dog-mediated human rabies [1,2].

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THE ROLE OF AN AGRICULTURAL ENGINEER IN MODERN AGRICULTURE

(РОЛЬ АГРОІНЖЕНЕРА В СУЧАСНОМУ СІЛЬСЬКОМУ ГОСПОДАРСТВІ)

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У статті подано інформацію про роль інженера-сільськогосподарника в сучасному аграрному виробництві, його значення для розвитку технологій, підвищення ефективності сільського господарства, забезпечення продовольчої безпеки та адаптації до змін клімату. Розглянуто вплив інженерних рішень на сталий розвиток аграрного сектору, управління водними ресурсами, автоматизацію процесів та впровадження інноваційних технологій.

Ключові слова: *агроінженерія, сталий розвиток, продовольча безпека, технології, водні ресурси.*

The article provides information about the role of agricultural engineers in modern farming, their importance in developing technologies, improving agricultural efficiency, ensuring food security, and adapting to climate change. It explores how engineering solutions contribute to

sustainable development, water resource management, automation, and the implementation of innovative technologies.

Keywords: *agricultural engineering, sustainable development, food security, technologies, water resources.*

Agricultural engineers are at the center of a major transformation in farming. Modern agriculture is increasingly shaped by technological advancements and the demand for sustainability. Engineers in this field apply innovations such as precision agriculture and advanced machinery to optimize crop yields, reduce waste, and promote environmental stewardship. Their work ensures that farming is not only more productive but also more environmentally responsible.

Agricultural engineering is an interdisciplinary field that combines mechanical, civil, electrical, food science, environmental, and chemical engineering with agricultural knowledge. This integration allows engineers to design and improve machinery for planting, cultivating, harvesting, and processing crops. They also focus on irrigation systems, soil conservation, and post-harvest processing. By merging engineering principles with agricultural practices, they help farms become more efficient while protecting natural resources.

One of the most important roles of agricultural engineers today is solving pressing problems in farming. They develop solutions to optimize irrigation systems, enhance crop yields, and ensure sustainable food production. Their innovations address challenges such as water scarcity, soil degradation, and the need to feed a growing global population. In this way, agricultural engineers directly contribute to food security and long-term sustainability.

Sustainable agricultural engineering integrates scientific research, technological advancements, and practical applications to create eco-friendly farming systems. Engineers work on renewable energy use, soil science, plant biotechnology, water management, and pest control. These efforts reduce environmental impact while maintaining high productivity. By applying sustainability metrics and resource conservation approaches, agricultural engineers help farms adapt to climate change and protect ecosystems.

Modern agricultural technologies, such as biotechnology, smart irrigation, automation, vertical farming, and artificial intelligence, are also part of the engineer's toolkit. These innovations improve land use efficiency and productivity while addressing global challenges like climate change and food security. Agricultural engineers are responsible for implementing and managing these technologies, ensuring they are practical and beneficial for farmers.

Food security is one of the most urgent challenges of our time. Agricultural engineers play a vital role in ensuring reliable access to nutritious food by innovating farming techniques. They improve crop yields, optimize water usage, and minimize environmental impact. They also develop resilient crop varieties that can withstand climate change and enhance food preservation and storage techniques, reducing post-harvest losses. These contributions strengthen global food systems and make them more robust against crises.

Climate change adaptation is another critical responsibility of agricultural engineers. Rising temperatures, unpredictable rainfall, and extreme weather events threaten farming worldwide. Engineers design climate-smart solutions such as improved irrigation systems, soil conservation methods, and renewable energy integration. Their work helps farmers adapt to changing conditions while maintaining productivity and protecting ecosystems.

Water management is a cornerstone of agricultural engineering. Efficient irrigation systems are essential for maintaining crop health and conserving water resources, especially in regions prone to drought. Agricultural engineers design sustainable water management practices that balance productivity with environmental protection. By developing advanced irrigation technologies, they help farmers use water more efficiently and reduce stress on natural resources.

The role of agricultural engineers in modern agriculture is multifaceted and essential. They combine engineering knowledge with agricultural science to improve efficiency, sustainability, and productivity. From designing advanced machinery and irrigation systems to implementing biotechnology and renewable energy, agricultural engineers are shaping the future of farming. Their contributions ensure that agriculture can meet the demands of a growing population while protecting the environment and adapting to climate change.

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RENEWABLE ENERGY IN UKRAINE
(ВІДНОВЛЮВАНА ЕНЕРГЕТИКА В УКРАЇНІ)

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У статті подана інформація про сучасний стан відновлюваної енергетики в Україні, її стійкість в умовах воєнного стану, технологічні аспекти впровадження систем накопичення енергії та потенціал водневої енергетики для інтеграції в європейський енергетичний простір.

Ключові слова: *відновлювана енергетика, децентралізація, сонячна генерація, системи накопичення енергії (BESS), зелений водень.*

The article provides information about the current state of renewable energy in Ukraine, its resilience during martial law, technological aspects of implementing energy storage systems, and the potential of hydrogen energy for integration into the European energy landscape.

Keywords: *renewable energy, decentralization, solar generation, battery energy storage systems (BESS), green hydrogen.*

The global energy landscape is undergoing a fundamental transformation, driven by the dual imperatives of decarbonization and national energy security. For Ukraine, this transition has evolved from a long-term environmental goal into an immediate matter of national sovereignty and survival. As we stand in 2026, the Ukrainian power sector is at a historic crossroads. The traditional model of large, centralized thermal and nuclear power plants, while still providing a base load, is increasingly supplemented and protected by a decentralized "green" infrastructure. This report aims to analyze the current state of renewable energy sources (RES) in Ukraine, the engineering challenges of their integration, and the strategic roadmap for the nation's post-war energy recovery. The transition to renewable energy is not merely a trend; it is a technical necessity. Fossil fuel assets are aging, and the carbon border adjustment mechanisms (CBAM) of the European Union make traditional energy exports less competitive. Therefore, for an electrical engineer in Ukraine today, the primary task is to design a grid that is flexible, resilient, and carbon-neutral.

Before the full-scale invasion in 2022, Ukraine was among the fastest-growing renewable energy markets in Eastern Europe. The "Green Tariff" policy had incentivized the installation of over 9 GW of renewable capacity, dominated by large-scale solar farms in the southern regions and

wind parks along the Azov and Black Sea coasts. However, the conflict resulted in the temporary loss or destruction of nearly 80% of wind power capacity and 30% of solar installations.

By the beginning of 2026, the recovery process has shown remarkable results. Ukraine has pivoted from "mega-projects" to "distributed generation." In 2025 alone, over 1.2 GW of new solar capacity was added, but notably, more than 60% of this was in the form of small-to-medium industrial and domestic rooftop systems. This shift is crucial for an electrical engineer because distributed generation reduces the vulnerability of the entire system to single-point failures. Current data indicates that the share of renewables in the total generation mix has climbed back to approximately 18%, with a strategic goal of reaching 27% by 2030.

Solar photovoltaics (PV) remains the most accessible technology for rapid deployment. The technical potential for solar in Ukraine is vast, with solar irradiation levels in the south comparable to parts of Northern Italy. However, the engineering focus has changed. We are seeing a massive move toward the "Prosumer" model (Producer + Consumer). From a technical perspective, the integration of thousands of small PV inverters into the low-voltage and medium-voltage grids presents significant challenges for frequency and voltage regulation. Modern smart inverters are now being utilized to provide reactive power support, helping to stabilize the local grid. Furthermore, the implementation of Net Billing systems has provided the economic framework necessary for businesses to invest in their own generation, ensuring that energy is consumed close to where it is produced, thereby minimizing transmission losses.

Wind energy represents the "muscle" of the Ukrainian renewable sector. Onshore wind farms in Western Ukraine and the liberated territories of the South are being rebuilt with larger, more efficient turbines. Modern 5-6 MW turbines are now standard, featuring higher hub heights to capture more consistent wind speeds.

The future, however, lies in offshore wind potential in the Black Sea. Preliminary engineering assessments suggest that Ukraine could host up to 250 GW of offshore wind capacity in the long term. This would not only satisfy domestic demand but also turn Ukraine into a major energy exporter to Central Europe. The main engineering hurdle here is the development of the offshore substation infrastructure and the high-voltage direct current (HVDC) lines required to transport this energy over long distances with minimal loss.

For any power engineer, the "elephant in the room" regarding renewables is intermittency—the sun does not always shine, and the wind does not always blow. To maintain the balance between generation and consumption, Ukraine is aggressively deploying Battery Energy Storage Systems

(BESS).In 2025, several pilot projects were successfully scaled. These include lithium-ion and flow-battery installations capable of providing primary frequency response. For instance, a 20 MW battery can respond to grid fluctuations within milliseconds, a task that traditional thermal plants perform much more slowly and inefficiently. The integration of BESS is the "glue" that allows a high-RES grid to function without constant risk of blackouts. As we move toward 2030, the goal is to have at least 1-2 GW of dedicated storage capacity integrated into the Ukrenergo dispatch system. Ukraine's status as an agricultural powerhouse provides a unique advantage in bioenergy. Biogas and biomethane production from agricultural waste are currently experiencing a boom. Unlike wind and solar, bioenergy is a "dispatchable" renewable source, meaning it can be turned on or off as needed. Engineering developments in biomethane purification have allowed Ukraine to start injecting "green gas" directly into the existing gas transmission system. This is a double win: it reduces reliance on imported natural gas and provides a carbon-neutral fuel for heavy industry and heating. By 2026, several dozen biomethane plants have been commissioned, primarily in the Poltava, Cherkasy, and Vinnytsia regions, creating a decentralized network of "green fuel" hubs.

One of the most ambitious engineering projects for the next decade is the "Green Hydrogen Corridor." By using excess electricity from wind and solar farms during periods of low demand, Ukraine can power electrolyzers to split water into oxygen and hydrogen. Green hydrogen is seen as the key to decarbonizing sectors that cannot be easily electrified, such as steel manufacturing and heavy transport. Ukraine's existing gas pipeline infrastructure is currently being tested and retrofitted to transport hydrogen blends to the European Union. This places Ukrainian electrical and gas engineers at the forefront of a global energy revolution, requiring new standards for materials science and pipeline safety.

A "green" grid is a digital grid. The transition to RES requires the implementation of Smart Grid technologies, including Advanced Metering Infrastructure (AMI) and Wide Area Monitoring Systems (WAMS). These systems allow grid operators to visualize power flows in real-time and respond to anomalies instantly.

However, digitalization brings the challenge of cyber security. Protecting the SCADA systems of renewable energy plants from cyber-attacks is now a core part of an energy engineer's curriculum. The Ukrainian grid has become a global "testbed" for resilient energy architecture, proving that a decentralized, software-defined grid is much harder to disable than a traditional one.

The reconstruction of Ukraine's energy sector is perhaps the most significant engineering challenge of our century. We are not just rebuilding what was lost; we are leapfrogging decades of

outdated technology to build the most modern, flexible, and green grid in Europe. For us, as students and future engineers, this represents an unparalleled opportunity. The skills required—ranging from power electronics and battery management to data science and international energy law—will be the foundation of our careers. The path to 2050 and climate neutrality is difficult, but the foundation laid in 2025-2026 ensures that Ukraine will emerge as a leader in the global green transition. Our energy independence is the ultimate guarantee of our national freedom.

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УДК 811.111

PROSPECTS OF STUDYING “COMPUTER SCIENCE” AT MYKOLAYIV NATIONAL AGRARIAN UNIVERSITY: COMBINATION IT AND THE AGRICULTURAL SECTOR
(ПЕРСПЕКТИВИ НАВЧАННЯ ЗА СПЕЦІАЛЬНІСТЮ «КОМП'ЮТЕРНІ НАУКИ» В МИКОЛАЇВСЬКОМУ НАЦІОНАЛЬНОМУ АГРАРНОМУ УНІВЕРСИТЕТІ: ПОЄДНАННЯ ІТ ТА АГРОСФЕРИ)

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Обґрунтування актуальності та перспектив вивчення комп'ютерних наук (на базі Миколаївського національного аграрного університету). Аналіз ролі сучасних інформаційних технологій, штучного інтелекту та розробки програмного забезпечення у розвитку агропромислового комплексу (AgriTech).

Ключові слова: *комп'ютерні науки, AgriTech, штучний інтелект, розробка програмного забезпечення, аграрний університет.*

Justification of the relevance and prospects of studying computer science at Mykolayiv national agrarian university. The role of modern information technologies, artificial intelligence, and software development in the advancement of the agricultural sector (AgriTech) is analyzed.

Keywords: *computer science, AgriTech, artificial intelligence, software development, agrarian university.*

The rapid digitalization of all economic sectors has transformed traditional industries, with agriculture being one of the most prominent examples. Today, the agricultural sector relies heavily on high-tech solutions.

Therefore, pursuing a degree in Computer Science at a specialized institution like an agrarian university provides a unique educational environment. It allows students to apply theoretical programming skills and algorithms to solve real-world problems in one of the most vital industries globally.

Studying Computer Science in this context goes beyond basic coding. It involves integrating advanced technologies into agricultural processes, forming the foundation of the rapidly growing "AgriTech" (Agricultural Technology) sector [2].

Students learn how to develop robust web and software applications – utilizing powerful programming languages like Java or JavaScript – that are specifically tailored for farm management, resource tracking, and smart logistics. This interdisciplinary approach gives graduates a significant competitive edge, as they understand both the complex IT infrastructure and the specific needs of modern agribusinesses.

Furthermore, modern agriculture generates massive amounts of data every day. The implementation of artificial intelligence, including local large language models (LLMs) and machine learning algorithms, allows for advanced data analysis, crop yield prediction, and automated decision-making [3].

By experimenting with AI models, cloud technologies, and big data processing during their studies, students can create innovative solutions for precision agriculture, automated machinery control, and climate change adaptation [1].

In conclusion, studying Computer Science at Mykolayiv national agrarian university offers excellent career prospects. Graduates become not only proficient IT specialists but also highly sought-after niche experts capable of driving the digital transformation of the agricultural sector.

The fusion of cutting-edge technology and agrarian sciences ensures that students are well-prepared for the high-demand jobs of the future, successfully bridging the gap between traditional farming and the modern digital era.

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РОЛЬ ГОТЕЛІВ У РОЗВИТКУ РЕГІОНАЛЬНОГО ТУРИЗМУ (THE ROLE OF HOTELS IN THE DEVELOPMENT OF REGIONAL TOURISM)

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У роботі розкрито значення готельного господарства як ключового елемента туристичної інфраструктури та чинника розвитку регіонального туризму. Обґрунтовано роль готелів у формуванні туристичної привабливості територій, стимулюванні економічного зростання, створенні робочих місць і розвитку малого та середнього бізнесу.

Проаналізовано взаємозв'язок між рівнем готельних послуг і туристичними потоками, а також вплив сезонності на діяльність закладів розміщення. Підкреслено значення співпраці готелів з туристичними компаніями та місцевими виробниками для комплексного розвитку регіонів.

Ключові слова: *готельне господарство, туризм, регіональний розвиток, туристична інфраструктура, засоби розміщення, туристичний мультиплікатор, сезонність.*

The work reveals the importance of the hotel industry as a key element of tourism infrastructure and a factor in the development of regional tourism. The role of hotels in shaping the tourist attractiveness of territories, stimulating economic growth, creating jobs and developing small and medium-sized businesses is substantiated. The relationship between the level of hotel services and tourist flows is analyzed, as well as the impact of seasonality on the activities of accommodation establishments. The importance of cooperation between hotels with tourism companies and local producers for the comprehensive development of regions is emphasized.

Keywords: *hotel industry, tourism, regional development, tourist infrastructure, accommodation facilities, tourist multiplier, seasonality.*

In the current conditions of the formation of a market economy, international tourism is one of the promising areas of development of Ukraine and its regions. For the economy of Ukraine with rich tourist and recreational centers - the Black Sea and Azov coasts, the Carpathians and unique cities that combine the authenticity of antiquity and the spirit of modernity, the importance of international tourism is difficult to overestimate. First of all, tourism is an area with a rapid turnover of capital, which requires relatively few investments. In addition, it acts as an effective way to modernize infrastructure and contributes to the creation of new jobs at both the national and regional levels.

In modern conditions, there is a need to study the factors that influence the development of tourism in Ukraine, in particular those that contribute to its growth or hinder progress. One of the key industries that directly affects international inbound tourism is the hotel industry. It has a direct impact on the decision-making of foreign tourists regarding the choice of Ukrainian cities for a visit. In this regard, the development of the hotel sector remains a priority object of research both at the national and regional levels.

In the modern world, the hotel business has gradually acquired an industrial character and has become an important component of the economy, which contributes to significant foreign exchange earnings due to the development of international tourism. Hotel services occupy a significant position in the tourism industry, since they affect the overall quality of services for travelers. Therefore, studying the role of hotel services in modern tourism, identifying current trends and predicting future changes, as well as analyzing past miscalculations and developing new management strategies to expand the range of services is an extremely important and relevant issue [1].

Accommodation facilities, which include hotels, guest houses, hostels and other facilities, are the foundation of tourism infrastructure. Their role is not limited only to providing accommodation for tourists - they form the first impression of the area visited by the guest. That is why the hotel industry plays a crucial role in the development of tourism.

Cooperation between tourism and accommodation establishments is manifested in various areas of activity. Hotels are actively involved in the marketing of tourist destinations through cooperation with travel companies, participation in exhibitions and fairs, as well as the creation of

special offers and tourist packages. Such initiatives contribute to an increase in the flow of visitors and the popularization of tourist routes [2].

Hotels are an important element of the tourist infrastructure, which play a key role in stimulating the development of the region. An increase in the number of quality hotels in a certain area helps to attract both national and international visitors. The presence of tourists leads to economic growth, as they spend money not only on accommodation, but also on meals in local establishments, participation in excursions and entertainment events, the purchase of souvenirs or locally produced goods, as well as on transport services. Such activity creates the so-called "tourism multiplier", when every hryvnia spent by a tourist generates additional income in various sectors of the local economy [3].

The seasonality of tourism significantly affects the functioning of the hotel business. During peak periods, demand for rooms increases significantly, which creates opportunities for raising prices and increasing profits. However, in the low season, hotels adapt their strategies, offering promotions and discounts to stimulate customer interest. Such a change in demand requires managers to be able to quickly respond to market fluctuations and promptly change business strategies [2].

In addition, hotels establish close cooperation with representatives of local businesses. Among their partners are food suppliers, furniture and textile manufacturers, craftsmen who create souvenirs, local manufacturers of cosmetics and household chemicals, as well as tour agencies and transport companies. Such interaction stimulates the development of small and medium-sized businesses in the region, which, in turn, contributes to raising the standard of living of the local population.

The increase in tourist arrivals is leading to improved service levels in restaurants, shops and transport. In addition, local authorities are implementing more security measures, including installing CCTV cameras, improving street lighting and increasing law enforcement [3].

Thus, hotels play a leading role in the development of regional tourism, as they provide basic conditions for tourists and form the first impression of the destination. The development of the hotel industry contributes to the growth of tourist flows, the activation of the local economy and the expansion of employment opportunities. The interaction of hotels with tourism enterprises and local businesses creates a multiplier effect for the regions. Taking into account seasonality and implementing flexible management strategies makes it possible to increase the efficiency of accommodation establishments and ensure the stable development of the tourism industry.

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DIE TRADITIONEN DEUTSCHER BIERGASTSTÄTTEN ALS BESTANDTEIL DER NATIONALEN GASTRONOMIEKULTUR

ТРАДИЦІЇ НІМЕЦЬКИХ ПИВНИХ РЕСТОРАНІВ ЯК СКЛАДОВА НАЦІОНАЛЬНОЇ ГАСТРОНОМІЧНОЇ КУЛЬТУРИ

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У статті розкрито роль традицій німецьких пивних ресторанів як складової національної гастрономічної культури. Охарактеризовано історичні витоки пивоваріння, вплив монастирських броварень, значення «закону про чистоту пива» та різноманіття сортів. Висвітлено сучасні тенденції розвитку пивної культури, пивного туризму та фестивального руху, а також особливості пивної кухні як елемента туристичної привабливості Німеччини.

Ключові слова: *німецька гастрономічна культура, пивні ресторани, пивоваріння, пивні традиції, пивний туризм, Октоберфест, пивна кухня.*

Der Artikel beleuchtet die Rolle der Traditionen deutscher Biergaststätten als Bestandteil der nationalen Gastronomiekultur. Er beschreibt die historischen Ursprünge des Brauens, den Einfluss der Klosterbrauereien, die Bedeutung des Reinheitsgebots und die Vielfalt der Biersorten. Aktuelle Trends in der Entwicklung der Bierkultur, des Biertourismus und der Festbewegung werden ebenso hervorgehoben wie die Besonderheiten der Bierküche als touristisches Angebot in Deutschland.

Schlüsselwörter: *Deutsche Gastronomiekultur, Biergaststätten, Brauen, Biertraditionen, Biertourismus, Oktoberfest, Bierküche*

Deutschland nimmt traditionell weltweit führende Positionen in der Bierproduktion und im Bierkonsum ein. Rund 1.300 Brauereien sind im Land aktiv und bieten eine breite Palette an Getränken, die typisch für die deutsche Kultur sind.

Bier spielt seit Jahrhunderten eine wichtige Rolle im Leben des Landes – von den heidnischen Ritualen der germanischen Stämme bis hin zur heutigen Kultur der Biergärten und jährlichen Feste. Das berühmteste davon, das Oktoberfest, ist zu einem Symbol und zur Hauptattraktion Münchens geworden und zieht Millionen von Touristen an. Biertourismus in Deutschland erfreut sich zunehmender Beliebtheit.

Spezielle Routen führen durch verschiedene Regionen des Landes und erschließen Reisenden die Welt der lokalen Brautraditionen. München beherbergt ein Biermuseum, in dem man die Geschichte des deutschen Bieres kennenlernen kann. Souvenirs rund ums Bier sowie exklusive Etiketten und originelle Werbematerialien sind oft wahre Kunstwerke und bei Besuchern sehr begehrt.

Die Bierindustrie in Deutschland reicht bis ins frühe Mittelalter zurück. Ursprünglich waren Klosterbrauereien für das Bierbrauen zuständig, und der Produktionsprozess lag ausschließlich in den Händen von Mönchen, die Meister ihres Fachs waren. Viele dieser Klosterbrauereien sind bis

heute in Betrieb, bewahren die Traditionen jahrhundertealter Generationen und bieten den authentischen Geschmack des Getränks.

Der Hauptwert des deutschen Bieres liegt in der Bewahrung jahrhundertealter Brautraditionen und der Vielfalt kleiner Familien- und Klosterbrauereien. Die meisten von ihnen befolgen das berühmte Reinheitsgebot, die älteste Lebensmittelverordnung der Welt, die bereits 1516 erlassen wurde. Laut diesem Gebot dürfen für die Bierherstellung nur drei Zutaten verwendet werden: Wasser, Hopfen und Malz.

Heute produziert Deutschland zwischen 5.000 und 6.000 Biersorten. Obwohl das traditionelle Pilsener am weitesten verbreitet ist, sinkt der Bierkonsum insgesamt. Gleichzeitig gewinnt Craft Beer, vertreten durch kleine, unabhängige Brauereien, immer mehr an Beliebtheit. Sie bieten überraschende Geschmacksexperimente und originelle Rezepte, die in der Brauwelt zum Trend werden.

Deutschland ist Gastgeber des größten Bierfestes, des Oktoberfests. Es besteht aus einem traditionellen Umzug der Münchner und bayerischen Brauereien und einem zweiwöchigen Fest auf der Theresienwiese in großen Festzelten, in denen Bier ausgeschenkt wird.

Deutschland gehört zu den wenigen Ländern, die die jahrhundertealte Tradition der Weizenbierherstellung bewahrt haben. Bei diesem Getränk wird das üblicherweise verwendete Gerstenmalz ganz oder teilweise durch Weizenmalz ersetzt. Weizenbier, auch „Weißbier“ genannt, ist ungefiltert und enthält die Hefepartikel des Gärprozesses sowie Weizenproteine, was dem Bier ein leicht trübes Aussehen verleiht.

Deutsches Bier ist für seine Vielfalt bekannt. Zu den beliebtesten Sorten gehören:

- Lager: Die am weitesten verbreitete Biersorte des Landes, gekennzeichnet durch einen milden Geschmack und eine leichte Bitterkeit.
- Weizenbier: Ein leichtes, erfrischendes Getränk mit fruchtigen und leicht würzigen Noten.
- Ale: Obwohl diese Biersorte in Deutschland weniger verbreitet ist als Lager, gibt es sie in zahlreichen Varianten, darunter Dunkel und Bockbier.

Jede Region des Landes hat ihre eigenen Biertraditionen und -sorten. Bayern beispielsweise ist berühmt für sein Weizenbier und seine dunklen Lagerbiere. Biergärten und -keller sind fester Bestandteil des kulturellen Lebens dieser Region und bieten Einheimischen und Besuchern eine gesellige Atmosphäre.

Die Bierküche spielt eine wichtige Rolle in der deutschen Kultur. Zu den traditionellen Biersnacks gehören Brezeln, Würstchen und Schnitzel sowie Gerichte wie Biersuppe und Bierstrudel. Bierdesserts runden das kulinarische Erlebnis ab. Bierrestaurants in Deutschland sind ein kulturelles Phänomen, das auf der jahrhundertealten Brautradition basiert. Sie sind ein wichtiger Bestandteil des nationalen Erbes und eine touristische Attraktion. Die Bewahrung klassischer Rezepte, die Vielfalt regionaler Biersorten und die Entwicklung moderner Konsum- und Präsentationsformen tragen zur internationalen Popularisierung der deutschen Gastronomie bei.

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DIGITAL INCLUSION AS A TOOL FOR MODERNIZING PUBLIC ADMINISTRATION (ЦИФРОВА ІНКЛЮЗІЯ ЯК ІНСТРУМЕНТ МОДЕРНІЗАЦІЇ ПУБЛІЧНОГО УПРАВЛІННЯ)

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У статті наводиться інформація щодо цифрової інклюзії як інструменту модернізації публічного управління, аналізу впливу цифрової нерівності на доступ особливих груп населення до державних сервісів, а також підкреслюється необхідність розвитку інфраструктури та підвищення рівня цифрової грамотності з метою забезпечення рівних прав громадян.

Ключові слова*: цифрова інклюзія, публічне управління, цифрова грамотність, електронні сервіси, цифрова нерівність.*

The article provides information on digital inclusion as a tool for modernizing public administration, analyzes the impact of digital inequality on the access of specific population groups to public services, and emphasizes the need to develop infrastructure and improve digital literacy in order to ensure equal rights for citizens.

Keywords*: digital inclusion, public administration, digital literacy, electronic services, digital inequality*

In the process of developing modern society, public administration is increasingly integrating with digital technologies, which are becoming the basis for effective interaction between the state and citizens. The use of electronic services and digital platforms today is not an additional element, but a necessary condition
for the modernization of management processes. However, in parallel with the introduction of innovations, the problem of digital inequality is becoming more acute, manifesting itself between citizens who have a sufficient level of digital literacy and access to modern tools, and those who, due to objective barriers, remain outside the realm of digital interaction. Socially vulnerable groups face particular difficulties in such conditions: the elderly, residents of remote rural areas, persons with disabilities, internally displaced citizens, and low-income families. Among the main factors contributing to the low level of involvement of these categories in digital integration, it is worth highlighting the underdeveloped infrastructure in rural areas, the low level of digital education, and the difficulty of using public electronic services without the help of others. As a result, a situation arises in which certain citizens are effectively restricted in the exercise of their rights and access to administrative services, which slows down the process of modernizing public administration and reduces its inclusiveness.

Important aspects of digital inclusion in public administration have been highlighted
by Ukrainian researchers such as A. Aliyev, M. Belikova, V. Namestnik, M. Pavlov, A. Pakki, A. Chechel, M. Angelin, V. Borisenko, A. Stasyshyn, M. Oliskevich, M. and others [1].

Digital inclusion is ensuring equal access for all citizens to digital technologies, electronic services, and information resources regardless of their social or demographic characteristics. According to the results of a survey of the Ukrainian population on digital literacy, conducted in 2023, it was found that only 56% of respondents have a basic level of digital literacy, and 44% have a level below basic.[2]. The greatest difficulties in accessing electronic services are observed among socially vulnerable groups: the elderly, persons with disabilities, internally displaced citizens, and residents of rural and remote areas.

In Ukraine, the digital transformation of public administration is being implemented through the integration of electronic services, such as the Diya portal and mobile app, which provide access to over 130 administrative services, including business registration, licensing, and social assistance. An important component is the Administrative Service Centers, which provide citizens with access to government services at the local level, as well as mobile ASCs and digital suitcases, which allow rural and remote areas to be covered. The lack of modern devices or unstable internet connections, especially in rural and remote areas, creates additional difficulties for using e-services. Fear of new technologies, distrust of online services, and lack of support from family or community can lead to avoidance of digital platforms. Persons with disabilities may face problems when using standard interfaces that do not take into account their specific needs.

Standard interfaces can be difficult for people with disabilities to understand and use, requiring the development of adapted solutions. For example, research shows that the integration of brain-computer interfaces into smart home technology can be beneficial for older people, but requires overcoming certain barriers, such as complexity of use and the need to adapt interfaces to the individual needs of users [3].

Therefore, overcoming digital inequality in public administration requires a comprehensive approach. Introduction of mobile and local access centers to electronic services in communities. Services should be adapted through inclusive design and simplified navigation, and volunteers and social workers should be involved to assist in the use of digital services. Subsidies and benefits for devices and the internet increase the accessibility of digital services for citizens. Conducting information campaigns on digital services, especially for the older generation, contributes to increasing the accessibility and inclusiveness of public administration.

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УДК 811.111

TAX SYSTEMS: UKRAINE VS GREAT BRITAIN

(ПОДАТКОВІ СИСТЕМИ: УКРАЇНА VS ВЕЛИКА БРИТАНІЯ)

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У роботі проведено порівняльний аналіз податкових систем України та Великої Британії крізь призму щоденної роботи бухгалтера. Розглянуто відмінності між прогресивною та фіксованою ставками оподаткування доходів фізичних осіб, специфіку податкового року та рівень цифровізації звітних процесів. Особливу увагу приділено концепції «особистої пільги» (Personal Allowance) у британському праві та спрощеній системі оподаткування в Україні. Визначено потенційні зони для взаємного запозичення досвіду: впровадження неоподатковуваного мінімуму в Україні та поглиблення цифровізації у Великій Британії.

Ключові слова: *Податкова система, ПДФО, бухгалтерський облік, HMRC, Personal Allowance, військовий збір, цифровізація, порівняльний аналіз.*

The paper provides a comparative analysis of the tax systems of Ukraine and the United Kingdom through the prism of the daily work of an accountant. The differences between progressive and fixed rates of personal income tax, the specifics of the tax year and the level of digitalization of reporting processes are considered. Particular attention is paid to the concept of "personal allowance" in British law and the simplified taxation system in Ukraine. Potential areas for mutual borrowing of experience are identified: the introduction of a non-taxable minimum in Ukraine and the dee.

Keywords*: Tax system, personal income tax, accounting, HMRC, Personal Allowance, military levy, digitalization, comparative analysis.pening of digitalization in the United Kingdom.*

Choosing a job in finance means understanding that money “speaks” different languages depending on the border you cross. For a modern accountant, it’s not just numbers, it’s the rules behind them. The tax systems of Ukraine and the UK are divided into two different worlds: the post-Soviet coded system and the British “common law” tradition. The systems under consideration, how they differ in practice and what an ordinary accountant has to deal with every day.

The main tax burden in Ukraine. The tax system of Ukraine is relatively young and is currently undergoing significant changes due to the innovation of electronic services and European involvement. The key is that the system is quite rigid. We have a fixed personal income tax rate (18%) plus military levy (1.5%). There is also a “Simplified” system - this is a unique feature. Many small businesses and IT professionals use a “single tax”, which is much easier to manage than the general system. For now, everything is strictly digitalized thanks to platforms such as M.E.Doc or Electronic Taxpayer's Office regarding reporting.

The tax environment in the UK is due to the fact that, The British system (managed by HMRC) is one of the oldest in the world. It is known for its complexity, but also for its "fair" thresholds. Key features Unlike Ukraine, the UK uses a progressive tax scale. This means that the more you earn, the higher the percentage you pay (from 0% to 45%). Personal Allowance is a "dream" for many Ukrainians. In the UK, you do not pay any income tax on the first £12,570 you earn in a year. But the concept of a fiscal year is a strange thing for us - their tax year starts on April 6, not January 1.

To compare the main tax systems of Ukraine and the UK, we will give examples from life. How would a junior accountant calculate taxes for an average salary? He would calculate it like this: Personal Income Tax (PIT). In Ukraine, if you earn 20,000 UAH, you immediately lose 19.5% (PIT + military levy). In Britain, if you earn £1,500 a month, most of this amount falls under the "personal allowance", so your real tax rate is much lower. The second thing an accountant in Ukraine takes into account is VAT (Value Added Tax). Both countries use it, the rates are 20%. However, in Britain there are many goods with a "zero rate" (books, children's clothing and most food products), which makes accounting in retail a little more complicated than in Ukraine.

From these considerations and observations, it can be said that the Ukrainian system is much easier for an accountant to calculate due to fixed rates - you don't need to think about "tax thresholds" again. However, the British system seems more flexible for citizens.

As a future tax professional, I believe that Ukraine should adopt the British idea of "personal allowance". This would significantly help people on low incomes. On the other hand, Britain could learn from Ukraine's digitalization (such as "Diya.City"), which makes paying taxes a one-two punch. Understanding these differences is critical for those who want to work in international finance or auditing.

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ULTRAMODERN AGROTECHNOLOGIES: THE PART OF AGTECH AND PRECISION AGRICULTURE IN SUSTAINABLE FARMING

(СУЧАСНІ АГРОТЕХНОЛОГІЇ РОЛЬ: AGTECH ТА ТОЧНОГО ЗЕМЛЕРОБСТВА У СТАЛОМУ ФЕРМЕРСТВІ)

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У статі розглядається вплив сучасних агротехнологій(AgTech) та систем точного землеробства на підвищення ефективності сільськогосподарського виробництва. Проаналізованоключові інновації, такі як використання дронів, IoT- сенсорів та штучного інтелекту, а також їх роль у забезпеченні сталого розвитку агросектору.
Ключові слова: *AgTech, точне землеробство, інновації в агросекторі, сталий розвиток, штучний інтелект, IoT.*

The abstract examines the impact of ultramodern agrotechnologies(AgTech) and perfection husbandry systems on adding the effectiveness of agrarian product. crucial inventions similar as the use of drones, IoT detectors, and artificial intelligence, as well as their part in icing the sustainable development of the agrarian sector, are anatomized.
Keywords: *AgTech, perfection husbandry, agrarian inventions, sustainable development, artificial intelligence, IoT.The agrarian sector is presently witnessing a profound paradigm shift driven by the rapid-fire integration of ultramodern Agrotechnologies(AgTech) and Precision Agriculture(PA).*

This digital metamorphosis is no longer simply a technological trend but a abecedarian necessity to meet the raising global demand for food while mollifying the adverse goods of climate change and resource reduction.

Precision husbandry leverages advanced technologies to observe, measure, and respond to inter- andintra-field variability in crops, icing that interventions are applied exactly where and when they're demanded [1].

One of the primary pillars of this ultramodern agrarian revolution is the Internet of effects(IoT). Smart detectors stationed across agrarian lands continuously collect grainy data regarding soil humidity situations, temperature, and nutrient composition. This real- time data inflow enables growers to transition from traditional, suspicion- grounded practices to largely precise, data- driven irrigation and fertilization strategies. Accordingly, this approach significantly reduces water consumption and chemical waste, optimizing the profitable effectiveness of the ranch. likewise, the deployment of Unmanned Aerial Vehicles(UA Vs) or drones, coupled with artificial intelligence(AI), has fully readdressed crop monitoring [2].

Drones equipped with multispectral imaging capabilities can fleetly overlook vast tracts of land to descry early signs of pest infestations, nutrient scarcities, or water stress long before they come visible to the mortal eye. Machine literacy algorithms process these massive datasets to induce prophetic models, allowing for targeted, localized interventions rather than mask chemical operations that harm the ecosystem.

In the environment of sustainable husbandry, AgTech provides the pivotal structure demanded to apply regenerative practices. By exercising Variable Rate Technology(VRT) and automated ministry, ultramodern granges can maximize yield affair per hectare while minimizing their carbon footmark, precluding soil declination, and conserving biodiversity.

In conclusion, the nonstop elaboration and relinquishment of AgTech and perfection husbandry are vital for the future of global food security. As these technologies come more accessible and integrated into diurnal husbandry operations, they will empower agrarian directors to make flexible, resource-effective, and largely sustainable food systems able of prostrating ultramodern profitable and ecological challenges [3].

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УДК 811.111

MODERN APPROACHES TO MANAGING THE MOTIVATION MECHANISM OF ENTERPRISE EMPLOYEES

(СУЧАСНІ ПІДХОДИ ДО УПРАВЛІННЯ МОТИВАЦІЙНИМ МЕХАНІЗМОМ ПРАЦІВНИКІВ ПІДПРИЄМСТВА)

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Досліджено сучасні підходи до управління мотиваційним механізмом працівників підприємства. Проаналізовано роль матеріальних та нематеріальних стимулів, а також значення внутрішніх і зовнішніх мотивів у забезпеченні ефективної трудової діяльності. Висвітлено короткострокові та довгострокові стимули, а також вплив атипових форм зайнятості на мотивацію персоналу. Окрему увагу приділено формуванню позитивних трудових відносин, підвищенню залученості та задоволеності працівників. Запропоновано напрями вдосконалення системи мотивації з урахуванням потреб персоналу та стратегічних цілей організації.

Ключові слова: *мотиваційний механізм, стимулювання персоналу, внутрішні та зовнішні мотиви, короткострокові та довгострокові стимули, атипові форми зайнятості, ефективність організації.*

The article examines modern approaches to managing the motivational mechanism of enterprise employees. It analyzes the role of material and non-material incentives, as well as the importance of internal and external motives in ensuring effective labor activity. Short-term and long-term incentives are highlighted, as well as the impact of atypical forms of employment on staff motivation. Particular attention is paid to the formation of positive labor relations, increasing employee engagement and satisfaction. Directions for improving the motivation system are proposed, taking into account the needs of staff and the strategic goals of the organization.

Keywords: *motivational mechanism, staff motivation, internal and external motives, short-term and long-term incentives, atypical forms of employment, organizational efficiency.*

In today's economic climate, companies face fierce competition and constant changes in the external environment. In such circumstances, the effectiveness of labor activity largely depends on how effectively the organization develops and applies motivational mechanisms. Employees seek not only stable wages, but also professional development, recognition, opportunities for self-fulfillment, and comfortable working conditions. Therefore, it is important for enterprises to implement modern approaches to motivation management, combining material and non-material incentives. An optimally structured motivational mechanism contributes to increased labor productivity, reduced staff turnover, and the formation of staff interest in achieving common goals.

The goal is to study modern approaches to managing the motivation mechanism of enterprise employees, determine their advantages and features of application, and outline opportunities for improving the motivation system, taking into account the needs of personnel and the strategic objectives of the organization.

Recently, permanent employees have increasingly been replaced by temporary or contract workers. This is due to employers' desire to reduce costs, including personnel costs. As a result, working conditions and employment duration become unstable, contributing to the spread of atypical forms of employment. One of these is temporary work, which does not provide employees with guarantees of stable employment: they can be transferred or dismissed at any time, especially if they are employed through an outsourcing company. The level of pay and social guarantees for such employees is usually lower, which creates a feeling of insecurity and reduces interest in the development of the enterprise. A modern approach to motivation must take into account changes in the nature of work and the growing role of innovation. Innovative work requires updated incentive methods capable of supporting the creative activity of staff. In the motivational mechanism, it is important to distinguish between internal motives, positive external incentives, and external negative factors that influence employee participation in innovation processes [1].

Effective management of staff motivation requires consideration of both short-term and long-term aspects of cooperation between the employee and the employer. This involves aligning the interests of the organization, its management, and the employees themselves to form a mutually beneficial working relationship. To this end, various incentives are used to maintain staff productivity and do not conflict with their internal values. Management should build an incentive system consisting of two components. Long-term incentives are focused on the professional and personal goals of the employee, as well as on the strategic goals of the enterprise. They help the employee realize their place in the organization and their prospects for development. Short-term incentives are aimed at the completion of specific tasks, plans, and projects, maintaining activity and discipline in current work [2].

Effective business operations are only possible with constant employee motivation, equal conditions, and a certain degree of freedom in performing professional tasks. Organizations strive to

retain productive employees because their contribution directly affects the company's competitiveness and success. To this end, it is important to build positive relationships with staff and direct their work towards achieving key goals. Modern enterprises are developing new approaches to improving efficiency, but not everyone realizes that it is employee motivation and satisfaction that determine the sustainability of an organization. Managers need to take into account the expectations of their staff, as a motivated and professional team is the foundation of productivity and quality of work. In this context, motivation is interpreted as an employee's willingness to make an effort to achieve the company's goals [3].

Thus, modern management of employee motivation mechanisms is a key factor in improving the efficiency of an enterprise. The use of balanced material and non-material incentives, consideration of internal and external motives, and a combination of short- and long-term approaches ensure staff engagement, professional development, and readiness for innovative activity. A motivated and satisfied employee becomes not only a resource but also an active partner in achieving the strategic goals of the organization.

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DIE ENTWICKLUNG DES HOTELGEWERBES IN DER MODERNEN WELT

РОЗВИТОК ГОТЕЛЬНОГО ГОСПОДАРСТВА У СУЧАСНОМУ СВІТІ

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У статті розглянуто основні етапи розвитку готельного господарства у сучасному світі, проаналізовано вплив глобалізації, цифровізації та зміни споживчих потреб на функціонування готельних підприємств. Визначено роль міжнародних готельних мереж у формуванні стандартів якості обслуговування, досліджено сучасні тенденції розвитку галузі, зокрема впровадження інноваційних технологій та принципів сталого розвитку. Обґрунтовано значення готельного бізнесу для економічного зростання та міжнародного туризму.

Ключові слова: *готельне господарство, глобалізація, цифровізація, міжнародні готельні мережі, сталий розвиток, туризм, інновації.*

Der Artikel untersucht die wichtigsten Entwicklungsphasen des Hotelgewerbes in der modernen Welt und analysiert den Einfluss von Globalisierung, Digitalisierung und veränderten Kundenbedürfnissen auf die Tätigkeit von Hotelunternehmen. Die Rolle internationaler Hotelketten bei der Gestaltung von Qualitätsstandards wird bestimmt. Darüber hinaus werden aktuelle Trends der Branche, insbesondere technologische Innovationen und nachhaltige Entwicklungskonzepte, betrachtet. Die wirtschaftliche Bedeutung der Hotellerie für das Wachstum des internationalen Tourismus wird begründet.

Schlüsselwörter: *Hotelgewerbe, Globalisierung, Digitalisierung, internationale Hotelketten, nachhaltige Entwicklung, Tourismus, Innovationen.*

Die Hotellerie gehört zu den dynamischsten Bereichen der globalen Wirtschaft. Sie entwickelt sich im engen Zusammenhang mit dem internationalen Tourismus, wirtschaftlichen Veränderungen und technologischen Innovationen. In der modernen Welt spielt das Hotelgewerbe eine zentrale Rolle bei der Gestaltung touristischer Infrastruktur und bei der Förderung internationaler Mobilität.

Die historische Entwicklung der Hotellerie begann mit einfachen Gasthäusern, die Reisenden Unterkunft boten. Mit der industriellen Revolution und der Entwicklung der Eisenbahn nahm die Reisetätigkeit stark zu, was zur Entstehung moderner Hotels führte [2]. Im 20. Jahrhundert wurde das Hotelgewerbe durch die Ausweitung des internationalen Tourismus und den Ausbau des Luftverkehrs weiter gestärkt.

Ein bedeutender Meilenstein in der Entwicklung war die Entstehung internationaler Hotelketten wie Hilton, Marriott und Accor. Diese Unternehmen etablierten weltweit einheitliche Servicestandards und verbesserten das Managementsystem in der Branche [1]. Die Globalisierung ermöglichte eine stärkere Vernetzung der Märkte und erleichterte Investitionen in neue Hotelprojekte.

Die Digitalisierung hat die Hotellerie grundlegend verändert. Online-Reservierungssysteme, elektronische Zahlungssysteme sowie digitale Marketingstrategien beeinflussen heute die gesamte Kundenkommunikation [3]. Moderne Hotels implementieren mobile Check-in- und Check-out-Systeme sowie intelligente Zimmertechnologien, um den Aufenthalt komfortabler zu gestalten [4]. Diese Innovationen tragen zur Effizienzsteigerung und Kostensenkung bei.

Gleichzeitig verändern sich die Erwartungen der Gäste. Moderne Reisende suchen nicht nur Unterkunft, sondern individuelle Erlebnisse und personalisierte Dienstleistungen. Boutique-Hotels, Design-Hotels und nachhaltige Unterkunftskonzepte gewinnen zunehmend an Bedeutung [4]. Nachhaltigkeit ist zu einem wichtigen Wettbewerbsfaktor geworden. Hotels reduzieren den Energieverbrauch, setzen umweltfreundliche Materialien ein und entwickeln Konzepte zur Ressourcenschonung [5].

Trotz positiver Entwicklungen steht das Hotelgewerbe vor Herausforderungen. Steigende Energiepreise, Fachkräftemangel und intensiver Wettbewerb, insbesondere durch Plattformen wie Airbnb, beeinflussen die Marktstruktur [1]. Unternehmen müssen daher flexible Strategien entwickeln, um ihre Wettbewerbsfähigkeit langfristig zu sichern.

Zusammenfassend lässt sich feststellen, dass sich das Hotelgewerbe in der modernen Welt kontinuierlich weiterentwickelt. Globalisierung, technologische Innovationen und

Nachhaltigkeitsstrategien prägen die Zukunft der Branche. Die Fähigkeit, sich an neue Marktbedingungen anzupassen, bleibt der wichtigste Erfolgsfaktor für Hotelunternehmen.

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ВПЛИВ ЦИФРОВИХ ТЕХНОЛОГІЙ НА РОЗВИТОК ГОТЕЛЬНО-РЕСТОРАННОГО БІЗНЕСУ
(THE IMPACT OF DIGITAL TECHNOLOGIES ON THE DEVELOPMENT OF THE HOTEL AND RESTAURANT BUSINESS)

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У тезах досліджено вплив цифрових технологій на розвиток готельно-ресторанного бізнесу. Проаналізовано основні види цифрових інновацій, їх переваги та вплив на якість обслуговування і конкурентоспроможність підприємств. Визначено значення цифрової трансформації для підвищення ефективності діяльності підприємств індустрії гостинності.

Ключові слова: *готельно-ресторанний бізнес, цифрові технології, інновації, індустрія гостинності, якість обслуговування, автоматизація, конкурентоспроможність.*

The theses examine the impact of digital technologies on the development of the hotel and restaurant business. The main types of digital innovations, their advantages, and their influence on service quality and competitiveness are analyzed. The importance of digital transformation for the hospitality industry is substantiated.

Keywords: *hospitality, hotel, restaurant, digital technologies, innovation, service, management.*

The hotel and restaurant business is an important part of the hospitality industry and plays a significant role in the modern economy. Today, the development of digital technologies has a strong impact on hospitality enterprises. Hotels and restaurants actively implement modern technologies to improve service quality and meet customer expectations. Digital transformation has become one of the key factors in the successful development of hospitality enterprises [1].

Modern guests expect fast service, convenience, and accessibility of services. Therefore, enterprises use digital tools to improve customer experience and increase efficiency. The use of technologies allows enterprises to optimize their activities and remain competitive in the market [2].

One of the most common technologies in the hotel business is the online booking system. This technology allows customers to reserve rooms using the Internet. It makes the booking process faster and more convenient. In addition, online systems help hotels manage reservations more effectively and reduce errors in their work [3].

Mobile technologies are also widely used in modern hotels. Many hotels offer mobile applications that allow guests to check in online, receive information, and order services. This improves service quality and increases customer satisfaction [4].

Automation systems play an important role in hotel management. These systems help manage guest information, payments, and room availability. As a result, hotels can improve efficiency and reduce manual work [4].

Digital technologies are also actively used in restaurants. One example is electronic menus. Customers can scan QR codes and view menus on their smartphones. This improves convenience and allows restaurants to update information quickly [5].

Another important innovation is online food ordering. Customers can order food through websites or mobile applications. This allows restaurants to attract more customers and increase profits [2].

Self-service technologies are also becoming popular. Customers can place orders and make payments independently using special devices. This improves service speed and reduces waiting time [4].

The use of digital technologies has many advantages. First, technologies improve service quality and customer satisfaction. Guests receive faster and more convenient services [1].

Second, technologies increase work efficiency and help reduce mistakes. This improves overall enterprise performance [3].

Third, digital technologies increase competitiveness. Modern customers prefer enterprises that use innovative solutions [2].

In addition, technologies help increase profits and improve the image of enterprises [4].

Digital technologies will continue to develop in the future. Artificial intelligence, automation, and contactless services will become more common. These technologies will help improve customer experience and service quality [1].

Digital transformation will remain an important factor in the development of the hotel and restaurant business.

Therefore, digital technologies play a very important role in the development of the hotel and restaurant business. They improve service quality, increase efficiency, and attract customers.

The use of modern technologies helps hospitality enterprises remain competitive and develop successfully. Digital transformation is necessary for the future development of the hospitality industry.

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THE IMPACT OF CORPORATE CULTURE ON TEAM EFFECTIVENESS

(ВПЛИВ КОРПОРАТИВНОЇ КУЛЬТУРИ НА ЕФЕКТИВНІСТЬ КОМАНДИ)

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Робота досліджує вплив корпоративної культури на ефективність команд. Показано, що позитивна культура, яка підтримує цінності, взаємоповагу та комунікацію, підвищує мотивацію, продуктивність та згуртованість команди. Надано рекомендації для формування сприятливого корпоративного клімату та підвищення результативності командної роботи.

Ключові слова: *корпоративна культура, ефективність команди, мотивація, згуртованість команди, лідерство, комунікація, продуктивність.*

The study examines the impact of corporate culture on team effectiveness. It demonstrates that a positive culture, which supports values, mutual respect, and communication, enhances motivation, productivity, and team cohesion. Recommendations are provided for creating a favorable corporate climate and improving team performance.

Keywords: *corporate culture, team effectiveness, motivation, team cohesion, leadership, communication, productivity.*

Corporate culture defines the values, norms, and behavior of employees within a company. An underdeveloped or negative culture can reduce motivation, communication, and team productivity. At the same time, a positive culture promotes cohesion, effective interaction, and goal achievement [3].

Corporate culture has long been recognized as a key factor influencing team effectiveness. Recent studies from 2023–2026 confirm that organizations that focus on developing a strong and supportive culture gain significant advantages in productivity and team alignment.

One of the most important aspects of culture is the promotion of mutual respect, transparency, and innovation. These values improve communication among employees, increase trust and motivation, and directly impact team performance. Empirical research conducted in 2024 showed that companies with an adaptive culture and a focus on employee development demonstrate higher productivity, greater innovation capacity, and higher employee satisfaction [1].

Leadership style also plays a crucial role. Transformational leadership helps shape corporate culture and uphold its values, which, in turn, enhances team effectiveness. Studies confirm that a culture of mutual support and trust positively affects employee motivation, participation in collaborative projects, and overall team performance.

At the same time, modern research emphasizes that corporate culture does not exist in isolation from other factors of effectiveness. Companies that focus on creating a constructive environment demonstrate better results not only in the short term but also in strategic development.

Therefore, an analysis of studies from 2023–2026 allows us to assert that corporate culture is not merely an element of internal organizational policy but a true strategic resource. A strong, supportive culture increases team effectiveness, fosters innovation, and ensures organizational competitiveness in the modern environment.

The aim of the study is to examine corporate culture and its influence on team productivity, interaction, and motivation.

The objectives of the study are: to analyze the main elements of corporate culture; to determine the relationship between corporate culture and team effectiveness; and to assess the role of values, norms, and corporate climate in team performance.

Let us imagine a team as a small living organism. Each employee is a separate cell, and corporate culture is its blood, flowing through every organ and determining how strong and healthy it is. When a company's culture supports mutual respect, openness, and a willingness to help one another, the team works like a well-oiled machine. People are motivated, ideas emerge easily, and complex tasks are solved collectively.

Conversely, in a team with a toxic or overly rigid culture, the atmosphere resembles stagnant water—tension prevails, people fear making mistakes, and even simple decisions are difficult to make. Ideas are lost, and effectiveness declines [2].

Thus, a strong corporate culture is not merely a set of rules or values on paper. It transforms a group of individual professionals into a true team capable of achieving great results and progressing toward success together.

In conclusion, corporate culture plays a key role in team effectiveness. It shapes shared values, norms, and behavioral rules that help people interact more harmoniously. When culture is positive, employees feel motivated and engaged, collaborate more easily, and experience fewer conflicts, which directly impacts team productivity. Conversely, a weak or negative culture can reduce effectiveness, cause misunderstandings, and increase staff turnover. Therefore, investing in the development of corporate culture becomes an essential component of any team's success.

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DIGITIZATION OF FINANCIAL AND ECONOMIC SECURITY OVERSIGHT PROCEDURES FOR SOCIO-ECONOMIC STRUCTURES AT VARIOUS FUNCTIONING TIERS
(ОЦИФРУВАННЯ ТЕХНОЛОГІЙ КЕРУВАННЯ ФІНАНСОВО-ЕКОНОМІЧНОЮ СТІЙКІСТЮ СОЦІАЛЬНО-ЕКОНОМІЧНИХ СИСТЕМ РІЗНИХ РІВНІВ ДІЯЛЬНОСТІ)

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Цифровізація є стратегічною необхідністю для забезпечення фінансово-економічної безпеки підприємств, оскільки вона підвищує їхню стійкість до криз, ефективність управління, прозорість фінансових процесів і конкурентоспроможність на рівні держави, регіонів та бізнесу.

***Ключові слова:** цифровізація, фінансова безпека, цифрова трансформація, цифрова зрілість, бізнес-процеси, управління на основі даних, управління ризиками, цифрова культура, інноваційне управління, сталий розвиток.*

Digitalization is a strategic necessity for ensuring the financial and economic security of enterprises, as it increases their resilience to crises, improves management efficiency, enhances the

transparency of financial processes, and strengthens competitiveness at the level of the state, regions, and businesses.

Keywords: *digitalization, financial security, digital transformation, digital maturity, business processes, data-driven management, risk management, digital culture, innovation management, sustainable development.*

The modern economic and political environment is characterized by a high level of instability and volatility , which leads to increased attention to the problems of financial security of enterprises as a key prerequisite for their sustainable functioning. In the context of global transformations, digital technologies cease to be just an innovative tool for optimizing business processes, and acquire the status of a critical factor in ensuring their viability.

Enterprises with a high level of digital maturity demonstrate a greater ability to withstand crisis phenomena and adapt faster to adverse environmental conditions. This confirms that digitalization opens up new opportunities in the field of financial management, risk forecasting and neutralization of potential threats and dangers. In this regard, the study of the role of digital technologies and tools in ensuring the financial security of business processes of enterprises, the identification of their advantages and limitations, as well as ways of effective adaptation to Ukrainian realities, becomes of particular importance. [1]

Digitalization involves the use of digital computer technologies to restructure a business so that all decisions are made based on the data received. It is impossible to digitize any one area of the organization. Digitalization permeates the entire organization, thereby achieving synergy of each of the areas on a single digital platform.

Today, it is appropriate to highlight the following areas of digital transformation of organizational management: digitalization of business processes; data-based management; customer experience management; value management of goods and services; management of digital culture and competencies; innovation management. Let us dwell on them in more detail. [2]

Digitalization of business processes of an industrial enterprise is the process of implementing technologies and information systems in order to improve the efficiency and optimization of production processes. This means that industrial enterprises use digital technologies to automate their processes and improve product quality. One of the key elements of digitalization of business processes is the implementation of a production management system, which allows for effective control over all stages of production.

Data-driven approach is a management strategy that relies on using data to make decisions. Instead of solving problems based on intuition or experience, companies that use this approach analyze large amounts of data to gain objective insight and make informed decisions.

Customer experience management is the set of processes that a company uses to track, control, and organize every interaction between a customer and an organization throughout the customer lifecycle. The goal of such management is to optimize the interaction from the customer's perspective and promote customer loyalty. To manage customer service quality, a company needs to create a customer-centric strategy that encompasses all interactions.

Managing the value of goods and services involves activities aimed at creating and maintaining a high level of quality that meets customer needs. It is a complex process that includes planning, control, management and comprehensive quality management, using a variety of assessment methods, from expert to sociological.

Digital culture and competency management is the process of developing employees' digital skills and creating an organizational culture that promotes the effective use of digital technologies to achieve organizational goals. This includes both training employees in the tools and creating an environment that encourages innovation, adaptation, and digital transformation.

Innovation management is an activity that involves planning, organizing, leading, motivating, and controlling the object of management through the development and application of a system of strategies (selected depending on the existing innovation potential of the enterprise and factors influencing the external environment), and which is aimed at achieving the set goal.

State policy to support the digital transformation of organizations and improve the efficiency of their management should cover the process of implementing technologies and forming a digital culture within organizations. The OECD suggests that the Ukrainian government pay attention to: improving the framework conditions for the digital economy (which involves expanding connectivity and developing physical infrastructure; ensuring competitive market conditions and clear regulation of the digitalization process); increasing the level of skills of the population to achieve successful digital transformation of business entities and society (empowering the population by developing skills relevant to the digital world; developing among organizations the skills necessary for making digital decisions); accelerating the digital transformation of organizations (understanding the role of single digital windows; developing and submitting digitalization plans for certain sectors that will help business entities in the process of digital transformation; providing organizations with a tool for self-assessment of digital maturity; supporting in identifying the necessary digital skills and providing opportunities for capacity building; providing financial support for digitalization ; developing the existing ecosystem for digital transformation). [3]

Therefore, the digitalization of financial and economic security management processes is not just a trend, but a strategic necessity for socio-economic systems of different levels of functioning. The introduction of modern digital technologies ensures the efficiency of information collection and analysis, transparency of financial transactions, automated risk control and an increased level of data protection. For the state, this means strengthening the fight against shadow schemes, corruption and cyber fraud , which directly affects economic stability and public trust. For regions, digital tools ensure the effective distribution of budget resources, the stability of social programs and control of financial flows.

At the enterprise level, digitalization contributes to cost reduction, reduction of human errors, implementation of automated internal audit systems, as well as forecasting of financial risks based on big data analytics. Taken together, this allows to increase competitiveness, investment attractiveness and resilience to economic threats. It is important that digital transformation opens up opportunities for creating a single information space between state structures, business and citizens, ensuring transparency and security of financial processes . Thus, digital technologies become the foundation of a modern system of financial and economic security, and their further implementation is the basis for sustainable development, increasing management efficiency, economic stability and social well-being.

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INTELLIGENT SYSTEMS FOR PLANNING AND OPTIMIZING MACHINERY AND TRACTOR FLEETS UNDER RESTRICTED AGRICULTURAL TIME FRAMES

(ІНТЕЛЕКТУАЛЬНІ СИСТЕМИ ПЛАНУВАННЯ ТА ОПТИМІЗАЦІЇ МАШИННО-ТРАКТОРНОГО ПАРКУ В УМОВАХ ОБМЕЖЕНИХ АГРОТЕХНІЧНИХ СТРОКІВ)

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У тезах проведено аналіз проблем планування роботи машинно-тракторного парку (МТП) в умовах кліматичних змін та скорочення агротехнічних строків. Розглянуто принципи побудови інтелектуальних систем підтримки прийняття рішень, що базуються на технологіях IoT, Big Data та Predictive Maintenance. Визначено переваги переходу від статичного планування до динамічних мультиагентних систем.

Ключові слова: *машинно-тракторний парк, інтелектуальні системи, оптимізація логістики, агротехнічні строки, Predictive Maintenance, точне землеробство.*

The article analyzes the efficiency of intelligent systems for planning and optimization of the machine-tractor fleet (MTF) under conditions of limited agrotechnical terms. The principles of operation of decision support systems based on IoT, Big Data, and Predictive Maintenance are considered. The advantages of transitioning from static planning to dynamic multi-agent systems for resource management are highlighted.

Keywords: *machine-tractor fleet, intelligent systems, logistics optimization, agrotechnical terms, Predictive Maintenance, precision agriculture.*

Modern agricultural production operates under highly unpredictable conditions, where timing is critical to efficiency. Global climate change is causing shifts in growing seasons, turning farm planning into a complex optimization task. Traditional methods of managing agricultural production based on fixed technology maps lose their effectiveness when unpredictable factors arise (heavy rains, equipment breakdowns).

This article analyzes the concept of an intelligent MTP management system that treats the machine fleet as a single cyber-physical system. The main objective of this system is to minimize overall costs and meet agronomic deadlines through dynamic resource reallocation.

The intellectualization of planning is based on the integration of data from various sources: machine telemetry (CAN bus), satellite monitoring of fields, and local weather stations. Unlike the

classic approach, where the route is set once per season, the intelligent system is capable of changing logistics in real time [1, c. 20].

The following table shows a comparative analysis of traditional and intelligent approaches to MTP management.

Table. Comparison of Management Approaches for International Business Relations

Parameter Traditional planning Intelligent system (AI/IoT)	Parameter Traditional planning Intelligent system (AI/IoT)	Parameter Traditional planning Intelligent system (AI/IoT)
Planning horizon Static (season/month) Dynamic (real time/day)	Planning horizon Static (season/month) Dynamic (real time/day)	Planning horizon Static (season/month) Dynamic (real time/day)
Response to failures Delayed (after the fact) Immediate (automatic correction)	Response to failures Delayed (after the fact) Immediate (automatic correction)	Response to failures Delayed (after the fact) Immediate (automatic correction)
Maintenance Scheduled and preventive Predictive (predictive maintenance)	Maintenance Scheduled and preventive Predictive (predictive maintenance)	Maintenance Scheduled and preventive Predictive (predictive maintenance)
Decision-making Manager/agronomist intuition Algorithmic optimization	Decision-making Manager/agronomist intuition Algorithmic optimization	Decision-making Manager/agronomist intuition Algorithmic optimization
Data use End-of-shift reports Real-time big data analysis	Data use End-of-shift reports Real-time big data analysis	Data use End-of-shift reports Real-time big data analysis

The Predictive Maintenance module is a key component of the system. Based on the analysis of vibrations, temperatures, and load histories, machine learning algorithms predict the probability of machine failure. This allows preventive repairs to be carried out and downtime to be avoided during critical phases of sowing or harvesting [3].

To solve the problem of route planning under time pressure, multi-agent technologies are used. Each tractor or combine harvester acts as an autonomous “agent” that interacts with others (e.g., grain transport trucks). The system automatically calculates the meeting point in the field for unloading en route, reducing unproductive travel by 15-20% [2].

The results of the analysis show that the introduction of intelligent systems not only saves fuel and lubricants, but also reduces crop losses by 10-12%, as technological windows are strictly adhered to. The digital transformation of MTP management is therefore a necessary prerequisite for the competitiveness of an agricultural enterprise.

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EFFIZIENZ VON BIO-INOKULANTEN IM SOJAANBAU: STRATEGISCHE ANSÄTZE FÜR EINE NACHHALTIGE LANDWIRTSCHAFT IN DER UKRAINE

ЕФЕКТИВНІСТЬ БІОІНОКУЛЯНТІВ У ВИРОЩУВАННІ СОЇ: СТРАТЕГІЧНІ ПІДХОДИ ДЛЯ СТАЛОГО ЗЕМЛЕРОБСТВА В УКРАЇНІ

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У статті показано, що застосування біоінокулянтів у вирощуванні сої дозволяє агробізнесу оптимізувати технологічні процеси та аналізувати біологічну активність ґрунтів для кращого розуміння ефективності азотфіксації та зниження потреби у дорогих мінеральних добривах. Симбіотичні механізми (Bradyrhizobium) відкривають нові горизонти для аграріїв у створенні глибокого зв'язку з принципами сталого землеробства. Переваги біологічної азотфіксації, покращення здоров'я ґрунту та підвищення врожайності резонують з цінностями сучасного екологічно свідомого агровиробництва. У статті розглянуто на практичному прикладі підтверджену ефективність (10–30% приросту) та світові тенденції застосування інокулянтів серед ключових аграрних регіонів, зокрема в Україні.

Ключові слова: *Інокулянти, соя (Glycine max L.), азотфіксація, Bradyrhizobium, біопрепарати, урожайність, стале землеробство.*

Der Artikel zeigt, dass der Einsatz von Bio-Inokulanten im Sojaanbau es Agrarunternehmen ermöglicht, technologische Prozesse zu optimieren und die biologische Aktivität der Böden zu analysieren, um die Effizienz der Stickstofffixierung besser zu verstehen und den Bedarf an teuren Mineraldüngern zu senken. Die symbiotischen Mechanismen (Bradyrhizobium) eröffnen Landwirten neue Horizonte bei der Etablierung einer tiefgreifenden Verbindung mit den Prinzipien der nachhaltigen Landwirtschaft. Die Vorteile der biologischen Stickstofffixierung, der Verbesserung der Bodengesundheit und der Ertragssteigerung resonieren mit den Werten der modernen, ökologisch bewussten Agrarproduktion. Anhand eines praktischen Beispiels werden in diesem Artikel die bestätigte Effizienz (10–30% Ertragssteigerung) und die globalen Anwendungstrends von Inokulanten in wichtigen Agrarregionen, insbesondere in der Ukraine, untersucht.

Schlüsselwörter: *Inokulanten, Soja (Glycine max L.), Stickstofffixierung, Bradyrhizobium, Bio-Präparate, Ertrag, nachhaltige Landwirtschaft.*

Inokulanten sind Bio-Präparate, die lebende Mikroorganismen enthalten. Diese sind in der Lage, eine Symbiose mit Pflanzen einzugehen und dadurch ihr Wachstum, ihre Entwicklung sowie ihren Ertrag zu fördern. Beim Sojaanbau (*Glycine max L.*) besteht die Hauptaufgabe der Inokulanten darin, den Prozess der biologischen Stickstofffixierung zu gewährleisten. Dadurch erhält die Pflanze Stickstoff in verfügbarer Form, was es ermöglicht, den Einsatz von mineralischen Düngemitteln zu reduzieren und die Produktionskosten in der Landwirtschaft zu senken. Die Grundlage für die Wirksamkeit von Inokulanten bildet die symbiotische Interaktion zwischen Bakterien der Gattung Bradyrhizobium und dem Wurzelsystem der Sojabohne. Die Bakterien dringen in das Wurzelgewebe ein und bilden Knöllchen, in denen die Fixierung des atmosphärischen Stickstoffs stattfindet. Der daraus resultierende Ammoniumstickstoff gelangt in die Pflanze und versorgt sie während der gesamten Vegetationsperiode mit Stickstoff.

Neben der zentralen Stickstofffixierung besitzen Inokulanten zusätzliche Funktionen, die die Widerstandsfähigkeit und Produktivität der Kultur erhöhen: Stimulierung des Wurzelwachstums, Verbesserung der Phosphoraufnahme, Produktion von Phytohormonen, Verbesserung der Bodenstruktur und Erhöhung der Pflanzenresistenz gegen Dürre und Temperaturschwankungen.

Aktuelle Studien belegen, dass die Inokulation von Soja den Ertrag um 10–30% steigert, abhängig von den Boden- und Klimabedingungen sowie der angewandten Saatgutbehandlungstechnologie. In Ländern wie Brasilien, Kanada, den USA und der Ukraine ist die Inokulation ein obligatorischer Bestandteil der Sojaanbautechnologie. Wissenschaftliche Arbeiten zeigen auch die Vorteile von Kombinationsansätzen auf, beispielsweise, dass der Einsatz von Bacillus subtilis-Stämmen in Kombination mit *Bradyrhizobium* den Sojaertrag unter Dürrebedingungen um 15–18% erhöht.

Die Wirksamkeit der Inokulation hängt von mehreren kritischen Faktoren ab, wie der Qualität des Präparats (Lebensfähigkeit der Stämme), den Applikationsmethoden (Behandlung des Saatguts unmittelbar vor der Aussaat) und der Kompatibilität mit anderen Pflanzenschutzmitteln. Nur bei Einhaltung dieser Bedingungen wird eine erfolgreiche Etablierung der Bakterien im Boden gewährleistet, insbesondere die Sicherstellung ausreichender Bodenfeuchtigkeit während der Aussaat. Eine Wiederholungsinokulation wird auf Feldern empfohlen, auf denen länger als 3 Jahre keine Soja angebaut wurde.

Die Soja-Inokulation ist ein wichtiges Element der modernen ökologischen Landwirtschaft. Sie ermöglicht nicht nur die Senkung der Kosten für mineralische Düngemittel, sondern trägt auch zur Steigerung der Bodenfruchtbarkeit bei. Bio-Inokulanten fördern die Verbesserung der Bodenstruktur, stimulieren das Wurzelwachstum und steigern den Ertrag auch unter Stressbedingungen. Für die Ukraine ist die Einführung moderner Inokulationstechnologien ein strategischer Ansatz zur Entwicklung einer nachhaltigen Landwirtschaft.

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УДК 811.111

THE ROLE OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING IN MODERN COMPUTER SCIENCE

(РОЛЬ ШТУЧНОГО ІНТЕЛЕКТУ ТА МАШИННОГО НАВЧАННЯ В СУЧАСНІЙ КОМП'ЮТЕРНІЙ НАУЦІ)

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The thesis analyzes artificial intelligence (AI) and machine learning (ML) as key drivers of modern computer science. It highlights the role of computational power, big data, and advanced algorithms in developing adaptive intelligent systems. The main ML approaches (supervised, unsupervised, reinforcement learning) and their applications in data analysis, natural language processing, and cybersecurity are outlined. The study also addresses ethical challenges, including data privacy and algorithmic bias, and emphasizes the need for responsible AI development.
Keywords: *artificial intelligence, machine learning, data analysis, natural language processing, automation, cybersecurity.*

У тезах розглянуто штучний інтелект і машинне навчання як ключові чинники розвитку комп'ютерної науки. Висвітлено роль обчислювальних ресурсів, великих даних і алгоритмів у створенні інтелектуальних систем.

Окреслено основні підходи машинного навчання та їх застосування. Звернено увагу на етичні проблеми, зокрема захист даних і алгоритмічну упередженість, а також на необхідність відповідального розвитку AI.

Ключові слова: *штучний інтелект, машинне навчання, аналіз даних, обробка природної мови, автоматизація, кібербезпека*

Modern computer science is one of the fastest developing fields of science and technology. Over the past few decades, computers have evolved from simple calculating machines into complex systems capable of solving a wide range of tasks in science, industry, medicine, education, and everyday life. One of the most important directions in the development of computer science today is artificial intelligence and machine learning. These technologies are transforming the way people interact with computers and are opening new possibilities for automation, analysis, and decision-making.

Artificial intelligence, often abbreviated as AI, refers to the ability of computer systems to perform tasks that normally require human intelligence. Such tasks include learning from experience, recognizing patterns, understanding natural language, solving problems, and making decisions. Machine learning is a subfield of artificial intelligence that focuses on creating algorithms that allow computers to learn from data without being explicitly programmed for every specific task. Instead of writing detailed instructions for every situation, developers design systems that can analyze data and improve their performance over time.

The development of artificial intelligence has become possible due to several technological factors. First, the rapid growth of computing power has allowed computers to process enormous amounts of information in a relatively short time. Modern processors, graphics processing units, and cloud computing systems provide the necessary computational resources to train complex machine learning models. Second, the amount of digital data available today has increased dramatically. Social networks, sensors, mobile devices, and online platforms generate massive volumes of data every second. This data serves as the foundation for training artificial intelligence systems. Third, advances in algorithms and mathematical methods have made it possible to build more accurate and efficient models.

Machine learning algorithms can generally be divided into several categories depending on the learning approach. One of the most common approaches is supervised learning. In supervised learning, the algorithm is trained using labeled data, meaning that each input example is associated with a correct output. For example, a machine learning model designed to recognize images of animals may be trained on thousands of pictures labeled as cats, dogs, or other animals. During training, the algorithm analyzes the patterns in the data and learns how to associate input features with the correct labels.

Another important approach is unsupervised learning. In this case, the algorithm works with unlabeled data and attempts to identify patterns or structures within the dataset. Unsupervised learning is often used for tasks such as clustering, anomaly detection, and data compression. For example, an algorithm might analyze customer data and automatically group users with similar behavior patterns. This

information can then be used for marketing strategies, recommendation systems, or product development.

A third approach is reinforcement learning, which is inspired by the way humans and animals learn through interaction with their environment. In reinforcement learning, an agent performs actions in a given environment and receives feedback in the form of rewards or penalties. Over time, the agent learns which actions lead to the best outcomes. Reinforcement learning has been successfully applied in robotics, game playing, and autonomous systems.

One of the most popular branches of machine learning today is deep learning. Deep learning uses artificial neural networks with multiple layers to model complex patterns in large datasets. Neural networks are inspired by the structure of the human brain and consist of interconnected nodes called neurons. Each neuron processes input signals and passes the results to other neurons in the network. By adjusting the weights of these connections during training, the network gradually learns how to perform specific tasks.

Deep learning has achieved remarkable success in areas such as image recognition, speech recognition, and natural language processing. For example, modern image recognition systems can identify objects in photographs with accuracy comparable to or even exceeding human performance. Similarly, speech recognition technologies have become widely used in virtual assistants, transcription services, and voice-controlled devices.

Natural language processing, often referred to as NLP, is another important field within artificial intelligence. NLP focuses on enabling computers to understand, interpret, and generate human language. This technology is used in machine translation, chatbots, sentiment analysis, and text summarization. Advances in natural language processing have made it possible to develop conversational systems that can interact with users in a natural and intuitive way.

Artificial intelligence is also playing a significant role in software development itself. Developers increasingly use AI-powered tools to write, test, and optimize code. Automated code generation systems can suggest improvements, detect errors, and help programmers work more efficiently. These tools are especially useful when working with large codebases where manual analysis would be extremely time-consuming.

Another important application of artificial intelligence is in data analysis and decision support systems. Organizations collect vast amounts of data about their operations, customers, and markets. Machine learning algorithms can analyze this data to identify trends, predict future outcomes, and support strategic decision-making. For example, companies may use predictive analytics to forecast product demand, detect fraud, or optimize supply chains.

Cybersecurity is another area where artificial intelligence has become increasingly important. As digital systems grow more complex, protecting them from cyber threats becomes more challenging. Machine learning algorithms can analyze network traffic, detect suspicious behavior, and identify potential security breaches in real time. By learning from previous attacks, AI systems can improve their ability to recognize new threats and protect critical infrastructure.

Artificial intelligence also has significant applications in healthcare. Machine learning models can analyze medical images, patient records, and genetic data to assist doctors in diagnosing diseases and planning treatments. For example, AI systems have been developed to detect early signs of cancer in medical scans with high accuracy. These technologies can help medical professionals make faster and more informed decisions, ultimately improving patient outcomes.

In the field of transportation, artificial intelligence is enabling the development of autonomous vehicles. Self-driving cars rely on a combination of sensors, computer vision systems, and machine learning algorithms to navigate roads safely. These vehicles must be able to detect objects, recognize traffic signals, and make complex driving decisions in real time. Although fully autonomous transportation is still under development, significant progress has been made in recent years.

Despite its many advantages, artificial intelligence also raises several important challenges and ethical concerns. One of the main issues is data privacy. AI systems often require large amounts of personal data to function effectively. Ensuring that this data is collected, stored, and used responsibly is essential to protect individuals' privacy rights.

Another challenge is algorithmic bias. Machine learning models learn from the data they are trained on. If the training data contains biases or inaccuracies, the resulting system may produce unfair or discriminatory outcomes. For example, biased training data could lead to inaccurate predictions in hiring systems, loan approvals, or law enforcement tools. Addressing these issues requires careful data selection, transparent algorithms, and continuous monitoring of AI systems.

The impact of artificial intelligence on employment is also widely discussed. Automation powered by AI may replace certain routine or repetitive jobs. At the same time, new opportunities are emerging in fields such as data science, machine learning engineering, and AI research. The challenge for society is to ensure that education systems and workforce training programs prepare people for these new roles.

Education itself is being transformed by artificial intelligence technologies. Intelligent tutoring systems can analyze students' learning behavior and adapt educational materials to their individual needs. Online learning platforms use recommendation algorithms to suggest courses and resources that match a learner's interests and abilities. As a result, education can become more personalized and accessible.

Another promising direction in computer science is the integration of artificial intelligence with the Internet of Things. The Internet of Things refers to networks of interconnected devices that collect and exchange data through the internet. These devices include sensors, smart appliances, wearable technology, and industrial equipment. By combining IoT with AI, it becomes possible to create intelligent systems capable of monitoring environments, predicting equipment failures, and optimizing resource usage.

Cloud computing has also played a crucial role in the development of artificial intelligence. Training large machine learning models requires significant computational resources that may not be available on personal computers. Cloud

platforms provide scalable infrastructure that allows researchers and companies to train complex models efficiently. In addition, cloud services often include pre-built AI tools and frameworks that simplify the development process.

Open-source software has greatly accelerated the progress of artificial intelligence research. Frameworks such as TensorFlow, PyTorch, and Scikit-learn provide powerful tools for building and training machine learning models. These frameworks are widely used by researchers, students, and developers around the world. The open-source community allows people to share knowledge, collaborate on projects, and contribute to technological innovation.

Another important aspect of modern computer science is the development of human-computer interaction. As artificial intelligence systems become more advanced, designing intuitive interfaces becomes increasingly important. Users should be able to interact with technology in a natural and efficient way. Voice interfaces, gesture recognition, and augmented reality are examples of technologies that improve human-computer interaction.

In addition to technical challenges, the future of artificial intelligence depends on responsible governance and regulation. Governments, international organizations, and technology companies must work together to establish ethical guidelines and standards for AI development. These regulations should encourage innovation while also protecting society from potential risks.

Research in artificial intelligence continues to expand into new directions. One promising area is explainable AI. Many advanced machine learning models operate as complex systems whose internal decision processes are difficult to interpret. Explainable AI aims to create models that can provide understandable explanations for their decisions. This transparency is particularly important in fields such as healthcare, finance, and law.

Another emerging field is artificial general intelligence, often referred to as AGI. While current AI systems are designed for specific tasks, AGI would represent a form of intelligence capable of performing any intellectual task that a human can do. Although this goal remains largely theoretical, researchers continue to explore the possibility of creating more flexible and adaptable intelligent systems.

In conclusion, artificial intelligence and machine learning have become central components of modern computer science. These technologies are transforming industries, improving decision-making, and enabling new forms of interaction between humans and machines. At the same time, they raise important ethical, social, and technical challenges that must be addressed responsibly. As research and development continue, artificial intelligence will likely play an even greater role in shaping the future of technology and society.

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SUSTAINABLE DEVELOPMENT OF HOTEL AND RESTAURANT ENTERPRISES IN UKRAINE

(СТАЛИЙ РОЗВИТОК ПІДПРИЄМСТВ ГОТЕЛЬНО-РЕСТОРАННОГО БІЗНЕСУ В УКРАЇНІ)

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У тезах розглянуто особливості впровадження принципів сталого розвитку в діяльність підприємств готельно-ресторанної сфери України. Проаналізовано екологічні, економічні та соціальні аспекти функціонування закладів гостинності в сучасних умовах. Обґрунтовано необхідність використання ресурсозберігаючих технологій та екологічно відповідального управління.
Ключові слова: *готельно-ресторанний бізнес, сталий розвиток, екологічні технології, енергоефективність, конкурентоспроможність.*

The theses examine the features of implementing sustainable development principles in the activities of hotel and restaurant enterprises in Ukraine. The environmental, economic and social aspects of hospitality enterprises functioning under modern conditions are analyzed. The necessity of introducing resource-saving technologies and environmentally responsible management is substantiated.
Keywords: *hotel and restaurant business, sustainable development, environmental technologies, energy efficiency, competitiveness.*

The hotel and restaurant business is one of the leading components of the service sector and plays an important role in the development of the national economy. In the context of increasing competition and growing consumer demands, the concept of sustainable development becomes especially relevant, as it ensures a balance between economic, social and environmental interests [1].

The environmental aspect of hospitality enterprises involves the implementation of energy-saving technologies, rational use of water resources, waste sorting and minimization, and reduction of plastic consumption [2]. Research confirms that benchmarking of resource consumption and environmental management practices significantly improve operational efficiency in hotels [2; 3]. The use of LED lighting, sensor-based energy management systems and modern energy-efficient equipment makes it possible to significantly reduce operating costs and minimize negative environmental impact.

The economic aspect of sustainable development consists in improving cost management efficiency, optimizing production processes, and implementing innovative service technologies and

digitalization of services [4]. Automated booking systems, electronic menus and CRM systems contribute to improving service quality and increasing customer loyalty.

The social component includes the creation of safe working conditions, professional development of staff, formation of a positive company image and social responsibility toward the community. Sustainable tourism development is also supported at the state level through legislative regulation and strategic planning [5].

Thus, the implementation of sustainable development principles in hotel and restaurant enterprises enhances their competitiveness, strengthens their reputation and ensures long-term stability in a market economy.

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ОСОБЛИВОСТІ ДІЛОВОГО ЛИСТУВАННЯ НІМЕЦЬКОЮ МОВОЮ В ТУРИСТИЧНІЙ СФЕРІ

(BESONDERHEITEN DER DEUTSCHEN GESCHÄFTSKORRESPONDENZ IM TOURISMUS)

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У статті розглянуто особливості ділового листування в туристичній сфері німецькою мовою. Проаналізовано основні жанри ділової кореспонденції, характерні для туристичної галузі, та виявлено їх структурні й мовні закономірності. Показано, що ділове листування в туризмі підпорядковується нормам стандарту DIN 5008 і водночас формує власний пласт галузевої термінології та усталених мовних формул. Розглянуто роль міжкультурного контексту в діловій комунікації між міжнародними туристичними партнерами.

Ключові слова: *ділове листування, туристична сфера, фахова мова, DIN 5008, жанри кореспонденції, міжкультурна комунікація, німецька мова.*

Der Artikel befasst sich mit den Besonderheiten der Geschäftskorrespondenz im Tourismusbereich in deutscher Sprache. Es werden die wichtigsten Textsorten der Geschäftskorrespondenz analysiert, die für die Tourismusbranche charakteristisch sind, sowie deren strukturelle und sprachliche Gesetzmäßigkeiten aufgezeigt. Es wird dargelegt, dass die

Geschäftskorrespondenz im Tourismus den Normen der DIN 5008 unterliegt und gleichzeitig eine eigene branchenspezifische Terminologie sowie feststehende Sprachformeln ausbildet. Die Bedeutung des interkulturellen Kontexts in der Geschäftskommunikation zwischen internationalen Tourismuspartnern wird beleuchtet.

Schlüsselwörter: *Geschäftskorrespondenz, Tourismusbereich, Fachsprache, DIN 5008, Textsorten der Korrespondenz, interkulturelle Kommunikation, deutsche Sprache.*

Die Tourismusbranche zählt zu jenen Bereichen, in denen die schriftliche Kommunikation eine besonders zentrale Rolle spielt. Anfragen, Buchungsbestätigungen, Angebote, Reklamationen und Antwortschreiben gehören zum täglichen Arbeitsalltag von Reiseveranstaltern und Reisebüros. Dabei folgt jede Textsorte der Geschäftskorrespondenz eigenen sprachlichen und strukturellen Regeln, deren Beherrschung ein Merkmal fachlicher Kompetenz ist [1].

Die Fachsprache des Tourismus wird in der modernen Linguistik intensiv erforscht. Baumann betont, dass die Tourismusbranche ein eigenständiges System von Textsorten ausbildet, das Merkmale der Gemein- und der Fachsprache verbindet. Charakteristisch für den touristischen Diskurs ist dabei das Zusammenspiel von Informativität, Überzeugungskraft und emotionaler Ansprache – je nach Textsorte und kommunikativer Situation [1]. Diesen Ansatz ergänzt Reuter, der auf die Bedeutung des kulturellen und institutionellen Kontexts für die Geschäftskommunikation im deutschsprachigen Umfeld hinweist [5].

Die Geschäftskorrespondenz im Tourismus unterliegt den Gestaltungsnormen der DIN 5008, welche die Anordnung von Adressblöcken, das Datum, die Betreffzeile sowie Anrede- und Grußformeln regelt. Unabhängig vom Brieftyp – ob Buchungsbestätigung, Reklamation oder Angebot – finden sich stets feststehende Sprachformeln: „Sehr geehrte Damen und Herren“ als standardisierte Anrede und „Mit freundlichen Grüßen“ als Abschlussformel. Genau diese Elemente verleihen dem Brief formalen Status und signalisieren dem Geschäftspartner die Einhaltung geschäftlicher Umgangsformen [2; 3].

Der Fachwortschatz der Geschäftskorrespondenz im Tourismus umfasst sowohl tourismusspezifische Begriffe (Buchungsbestätigung, Stornierung, Pauschalreise, Reiseveranstalter, Reisebüro) als auch allgemeinwirtschaftliche Terminologie (Angebot, Rechnung, Zahlung, Vertrag, Kulanz). Diese lexikalischen Einheiten treten in standardisierten Kontexten auf und bilden den phraseologischen Grundstock der Branchenkorrespondenz. Die kompetente und situationsgerechte Verwendung dieser Ausdrücke gilt als ein zentraler Indikator der sprachlichen Fachkompetenz im Tourismus [4; 6].

Der Aufbau eines Geschäftsbriefes im Tourismusbereich folgt dem allgemein akzeptierten Modell: Absender- und Empfängerangaben, Datum, Betreffzeile, Hauptteil mit klar formuliertem Anliegen sowie standardisierter Abschluss. Als Grundprinzipien gelten Prägnanz, Klarheit und Höflichkeit. Im internationalen Tourismusgeschäft, wo Kommunikationspartner aus unterschiedlichen Kulturkreisen aufeinandertreffen, kommt zusätzlich die Einhaltung interkultureller Höflichkeitsnormen als wesentliche Anforderung hinzu [5].

Zusammenfassend lässt sich festhalten, dass die Geschäftskorrespondenz im deutschsprachigen Tourismus ein vielschichtiges Kommunikationsphänomen darstellt, in dem allgemeine Briefnormen, branchenspezifische Fachsprache und interkulturelle Kommunikationsanforderungen zusammenwirken. Die Beherrschung dieser Textsorte erfordert

nicht nur sprachliches Wissen, sondern auch ein Verständnis für Genrekonventionen und den Kontext geschäftlicher Interaktion im Tourismus.

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THE INFLUENCE OF CURRENT HOTEL DESIGN TRENDS ON FORMING GUEST LOYALTY

(ВПЛИВ СУЧАСНИХ ТРЕНДІВ ГОТЕЛЬНОГО ДИЗАЙНУ НА ФОРМУВАННЯ ЛОЯЛЬНОСТІ ГОСТЕЙ)

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У статті розглянуто вплив сучасних тенденцій у дизайні готелів на формування лояльності гостей. Проаналізовано основні напрямки дизайну, зокрема екологічність, автентичність та інтеграцію цифрових технологій. Визначено, що дизайн-середовище виступає важливим чинником емоційного зв'язку з гостем, підвищення рівня його задоволеності та формування довгострокової прихильності до бренду.

Ключові слова: *дизайн готелю, лояльність клієнтів, екологічність, враження гостей, інновації в готелях.*

The article examines the influence of current trends in hotel design on guest loyalty. The main design trends are analyzed, in particular, environmental friendliness, authenticity, and the integration of digital technologies. It is determined that the design environment is an important factor in establishing an emotional connection with guests, increasing their satisfaction, and forming long-term brand loyalty.

Keywords: *hotel design, customer loyalty, sustainability, guest experience, hotel innovations.*

Today, competition in the hotel services market is fierce. To attract guests, it is no longer enough to simply offer a clean room and polite staff. People want to have vivid impressions and emotions

from their stay at a hotel. And this is where design comes to the fore—how the hotel looks, what the atmosphere is like, whether it is pleasant to be there. According to researchers, modern guests expect not just service, but a unique experience that will be remembered for a long time [1]. Therefore, design is becoming one of the main tools that helps to win customer loyalty.

One of the most noticeable trends in recent years is concern for the environment. Many hotels are starting to use energy-saving technologies, refusing to use plastic, and using natural materials in their interiors. Analysis shows that this is not just a fashionable trend, but a way to show guests that the hotel shares their values [2]. This is especially important for young people, who consciously choose "green" hotels, even if they are a little more expensive. It turns out that through design and environmental solutions, hotels build trust and loyalty among responsible travelers [3].
Another interesting point is the desire of hotels to be different from each other. Authenticity is now valued, when the design of a hotel reflects the culture and traditions of the area where it is located. For example, local materials may be used in the decoration, and elements of folk crafts or historical details may be used in the interior. This allows guests to immediately feel the atmosphere of the place and immerse themselves in it. Personally, I think that it is these details that are most memorable and make you want to come back again to relive these pleasant emotions.

Technology should not be overlooked either. Modern design is not only about beautiful pictures, but also about convenience. For example, when you can take a virtual "walk" through the room with VR glasses before checking in, or when everything in the room is controlled by a touch panel — lighting, temperature, curtains. Such things create the impression that the hotel cares about you and keeps up with the times. Studies confirm that the introduction of technologies that make the stay more comfortable has a positive effect on guest satisfaction [4].

So, modern hotel design is much more than just a nice renovation. It is a way to tell guests about your values (through environmental friendliness), give them a unique experience (through authenticity), and make their stay as comfortable as possible (through technology). All of this works together toward the main goal: guests remember the hotel, enjoy their stay, and want to come back again. In other words, design becomes a powerful loyalty management tool that works just as well as advertising or discounts.

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СИСТЕМА НАССР У ДІЯЛЬНОСТІ РЕСТОРАНУ (HACCP SYSTEM IN RESTAURANT OPERATIONS)

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У тезах досліджено впровадження системи НАССР (HACCP) у діяльність підприємств ресторанного господарства. Розкрито її значення як ефективного інструменту забезпечення безпечності харчових продуктів і підвищення якості послуг. Окреслено нормативно-правові вимоги щодо застосування системи в Україні та визначено її вплив на конкурентоспроможність і репутацію закладу.
Ключові слова: *HACCP, ресторанне господарство, безпечність харчових продуктів, система управління якістю, критичні контрольні точки.*

The thesis examines the implementation of the HACCP system in the activities of restaurant enterprises. Its significance as an effective tool for ensuring food safety and improving the quality of services is revealed. The regulatory requirements for the application of the system in Ukraine are outlined and its impact on the competitiveness and reputation of the institution is determined.
Keywords: *HACCP, restaurant industry, food safety, quality management system, critical control points.*

In modern realities, the restaurant business in Ukraine is demonstrating rapid development, and quality plays a key role in ensuring effective economic activity. This concept covers the interests of all participants in the national economy. For catering establishments, the quality of services and products is not only a guarantee, but also a decisive factor for maintaining competitiveness, stable functioning and effective development. From the consumer's side, increasing the level of quality is associated with the ability to meet their needs and protect their interests [3].

Improving quality management systems, popularizing the highest standards of culinary excellence and implementing modern approaches to service create the prerequisites for increasing the competitiveness of restaurant business establishments and improving their image. In order to effectively solve the task of improving the quality of services and products, it is necessary to conduct a detailed analysis of current problems that hinder progress in this area. This also involves the active implementation of effective management systems aimed at continuous improvement.

One of the most effective tools in this process is the application of the principles of the HACCP system in restaurant enterprises. This system allows for a high level of quality control of products and services, which has a positive impact on the overall efficiency of the institution.

HACCP (Hazard Analysis Critical Control Point) system is an international standard for reducing the risk of food safety [4]. HACCP involves the implementation of documented procedures at the enterprise that create conditions for safe preparation and quality assurance of food products. In particular, this concerns the aspects of planning the production, auxiliary and household premises of the enterprise, their technical condition, protection of food products from contamination and foreign impurities, ensuring the safety of materials and objects in contact with products. The procedures also include requirements for personnel health and hygiene, waste and

garbage management, pest prevention and control, labeling organization and other important aspects [2].

The main motivation for implementing the HACCP system in Ukraine is to increase the efficiency of quality management and ensure food safety. Today, it is one of the key tools that helps protect the reputation of public catering establishments. At the same time, this system has been successfully operating in the countries of the European Union and the United States of America for several decades.

The implementation of such a control system requires financial investments from restaurant owners and other catering establishments. However, in the long term, all stakeholders benefit from this implementation. For businesses, this means increased competitiveness, ensuring the production of products and dishes of the highest quality, which in turn contributes to increased customer trust. On the other hand, consumers gain greater confidence in the quality and safety of the food they consume in cafes, restaurants and bars [3].

The basic principles of food hygiene, set out in the Codex Alimentarius, developed by the Food and Agriculture Organization of the United Nations (FAO), form a solid basis for ensuring proper food safety. This document provides for the control of hygienic conditions at all stages of the food chain: from primary production to final consumption. It emphasizes the feasibility of applying the principles of the Hazard Analysis and Critical Control Points (HACCP) system as an effective approach to ensuring the safety of food products suitable for both human consumption and commercial needs [1].

Responsibility for failure to comply with procedures based on the HACCP principles is regulated by Article 65 of the Law of Ukraine "On State Control over Compliance with Legislation on Food, Feed, Animal By-products, Animal Health and Welfare". According to this norm, legal entities may be fined up to thirty non-taxable minimum incomes of citizens, which is 125 thousand hryvnias. For individual entrepreneurs, the fine is set at fifteen minimum wages. In the event that the violation is committed for the first time, the state inspector has the right to limit himself to issuing a prescription without drawing up a protocol [2].

Compliance with the principles of HACCP is mandatory according to the legislation of such countries as the European Union, the USA, Canada, Japan, New Zealand and other countries of the world. These countries identify the issues of food quality and safety as one of the key priorities.

Frequent outbreaks of foodborne illnesses highlight the importance of implementing changes in this area. HACCP offers an effective mechanism for consumer protection, as the system ensures control over food safety at all stages of the production chain – from cultivation to the table. It also makes it possible to identify critical points that affect food safety and organize their continuous control.

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МОДЕЛІ УПРАВЛІННЯ ГОТЕЛЬНИМИ МЕРЕЖАМИ У НІМЕЧЧИНІ

HOTELKETTENMANAGEMENTMODELLE IN DEUTSCHLAND

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У статті проаналізовано структуру готельного ринку Німеччини та основні моделі управління готельними мережами: власницьку, франчайзингову, контрактного управління й гібридні. Визначено їхні особливості та сфери застосування з урахуванням регіональних умов і туристичного попиту.

Ключові слова: *готельна індустрія, готельні мережі, моделі управління, франчайзинг, контрактне управління, індустрія гостинності, туристичний ринок Німеччини, конкурентоспроможність.*

Der Artikel analysiert die Struktur des deutschen Hotelmarktes und die wichtigsten Managementmodelle von Hotelketten: Eigentum, Franchising, Vertragsmanagement und Hybridmodelle. Ihre Merkmale und Anwendungsbereiche werden unter Berücksichtigung regionaler Gegebenheiten und der touristischen Nachfrage ermittelt.

Schlüsselwörter: *Hotelbranche, Hotelketten, Managementmodelle, Franchising, Vertragsmanagement, Gastgewerbe, deutscher Tourismusmarkt, Wettbewerbsfähigkeit*

Das moderne Hotelgewerbe zählt zu den dynamischsten Sektoren der Weltwirtschaft und beeinflusst maßgeblich die Entwicklung des internationalen Tourismus. Als Schlüsselkomponente der Tourismusbranche spielt der Hotelsektor insbesondere in Deutschland eine wichtige Rolle hinsichtlich des Umfangs der materiellen und finanziellen Ressourcen, der Anzahl der Beschäftigten sowie des Einkommensniveaus. Hoteldienstleistungen umfassen ein breites Spektrum an Angeboten für Reisende und sind ein entscheidender Faktor für die Entwicklungsperspektiven des deutschen Tourismussektors [1].

Die im Rahmen von Hoteldienstleistungen erbrachten Leistungen gehören zum soziokulturellen Segment und basieren auf den Prinzipien moderner Gastfreundschaft, was ihre Bedeutung für die Tourismusentwicklung unterstreicht. Dies wiederum erfordert eine professionelle Ausbildung des Personals, um in Deutschland einen qualitativ hochwertigen Tourismus- und Hotelservice zu gewährleisten.

Städtetourismus nimmt unter den Segmenten der deutschen Tourismusbranche eine führende Stellung ein und verzeichnet einen stetigen Anstieg der Reisezahlen sowohl von Inländern als auch von ausländischen Touristen. Hauptmotivation für solche Reisen ist die Teilnahme an Kultur- oder Sportveranstaltungen. Zahlreiche deutsche Städte behaupten seit vielen Jahren ihre Spitzenpositionen in der nationalen Tourismusstatistik. Dies wird durch ein breites Angebot an touristischen Dienstleistungen und vielfältige organisierte Veranstaltungen begünstigt, die Besucher anziehen. Immer mehr Touristen entscheiden sich für Kurztrips am Wochenende oder für Kurzurlaube, was die Beliebtheit des Städtetourismus im Einklang mit aktuellen Trends weiter steigert [3].

Das Gastgewerbe in Deutschland zeichnet sich, wie in den meisten wirtschaftlich entwickelten Ländern Westeuropas, durch eine große Vielfalt an Unterkünften aus. Neben großen internationalen Hotelketten spielen mittelständische und kleine Unternehmen, darunter auch Familienbetriebe, eine wichtige Rolle. Für Letztere dient die Erbringung touristischer Dienstleistungen oft als zusätzliche Einnahmequelle und trägt dazu bei, ihre Wettbewerbsfähigkeit im dynamischen Tourismus- und Hotelmarkt zu sichern.

Der deutsche Tourismusmarkt wird hauptsächlich von kleinen und mittleren Beherbergungsbetrieben repräsentiert, die zwar umsatztechnisch hinter Großbetrieben zurückbleiben, aber in bestimmten Regionen, insbesondere in Kleinstädten und ländlichen Gebieten, eine führende Rolle spielen.

Laut Berichten des Statistischen Bundesamtes werden Beherbergungsbetriebe berücksichtigt, die den Klassifizierungsstandards des Deutschen Tourismusverbandes (DTV) entsprechen. Dazu gehören:

- Hotels;
- Hotels-garni, die Übernachtung und Frühstück nach dem Konzept „Bed & Breakfast“ anbieten;
- Gasthöfe, die – meist in ländlichen Gebieten – Gastronomie mit Unterkunft verbinden;
- Pensionen, die sich auf Langzeitaufenthalte mit Verpflegung spezialisiert haben [2].

Betriebsarten wie Hotels, Hotels-garni und Pensionen gelten als klassische touristische Unterkünfte. Daneben sind aber auch andere Unterkunftsformen aktiv: Hostels, Touristenbasen, Ferienwohnungen, Sanatorien, Campingplätze, Ferienwohnungen und Landhäuser.

Die moderne Hotellerie zeichnet sich durch eine Vielzahl von Managementformen aus. Dazu gehören Alleinführung, Management, Franchising, Leasing und die Zusammenarbeit in Konsortien. Häufig beauftragen Hotelbetreiber professionelle Manager auf Basis von Managementverträgen.

Moderne Managementpraktiken im Hotelsektor gehen davon aus, dass Unternehmen nicht nur ihre eigenen Hotels führen, sondern auch die Geschäfte anderer Eigentümer managen. Ein Teil des Hoteleigentums ist in Form von Aktiengesellschaften vertreten: Aktionäre können sowohl eine Mehrheitsbeteiligung als auch einen Minderheitsanteil halten, eine Franchise vergeben oder Teil eines Konsortiums sein. Daneben gibt es Marktteilnehmer, die sich ausschließlich auf Management- oder Franchiseverträge spezialisiert haben [4].

Der deutsche Hotelmarkt ist aktuell durch hohen Wettbewerb, vielfältige Unterkunftsformate und die wachsende Bedeutung internationaler Hotelketten gekennzeichnet.

Unter diesen Bedingungen hängt die Effizienz des Hotelbetriebs maßgeblich vom gewählten Managementmodell ab, welches die Verteilung der Verantwortlichkeiten, die finanzielle Verantwortung und die Qualität der angebotenen Dienstleistungen bestimmt.

Eines der gängigsten Modelle ist das Eigentumsmodell. Hierbei besitzen Hotelketten die Immobilie und kontrollieren den gesamten Betrieb. In Deutschland wird dieser Ansatz vor allem von nationalen Ketten und familiengeführten Hotels genutzt, die eine gleichbleibende Servicequalität gewährleisten und ihre individuelle Identität bewahren möchten.

An zweiter Stelle steht das Franchisemodell. Hierbei betreiben unabhängige Hotelbesitzer ihre Hotels unter der Marke der Kette nach festgelegten Standards. Dieser Ansatz wird aktiv von internationalen Unternehmen wie Marriott International oder Accor eingesetzt. Mit diesem Modell lässt sich der Marktanteil schnell steigern, ohne dass hohe Investitionen in Immobilien nötig sind.

Ein weiteres gängiges Modell ist das Vertragsmanagement. Hierbei überträgt der Eigentümer die operative Leitung des Hotels an professionelle Betreiber. In deutschen Großstädten und Geschäftsvierteln ist dieses Modell besonders gefragt, da es für standardisierte Serviceleistungen sorgt und viele Touristen anzieht [3].

Erwähnenswert sind außerdem hybride Managementmodelle, die Merkmale von Eigentum, Franchising und Vertragsmanagement kombinieren. Sie zeichnen sich durch Flexibilität aus, die insbesondere für Regionen mit unterschiedlichen touristischen Schwerpunkten wichtig ist. Die Managementmodelle von Hotelketten in Deutschland entstehen somit im Spannungsfeld von Globalisierungstendenzen und lokalen Geschäftstraditionen. Der Einsatz unterschiedlicher Managementansätze trägt zur Steigerung der Wettbewerbsfähigkeit des Gastgewerbes und zu dessen nachhaltiger Entwicklung bei.

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THE IMPACT OF DIGITALIZATION ON THE DEVELOPMENT OF THE TOURISM INDUSTRY

(ВПЛИВ ЦИФРОВІЗАЦІЇ НА РОЗВИТОК ТУРИСТИЧНОЇ ІНДУСТРІЇ)

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У статті розглянуто вплив цифровізації на розвиток туристичної індустрії. Проаналізовано основні напрями цифрової трансформації, зокрема штучний інтелект, Big Data та онлайн-платформи. Визначено, що цифрові технології виступають ключовим чинником оптимізації бізнес-процесів, підвищення задоволеності туристів та формування конкурентних переваг галузі.

Ключові слова: *цифровізація, туризм, штучний інтелект, Big Data, OTA, VR/AR, блокчейн, онлайн-бронювання, цифрова трансформація.*

This article examines the impact of digitalization on the development of the tourism industry. The main directions of digital transformation, including artificial intelligence, Big Data, and online platforms, are analyzed. It is determined that digital technologies are a key factor in optimizing business processes, increasing tourist satisfaction, and forming competitive advantages for the industry.

Keywords: *digitalization, tourism, artificial intelligence, Big Data, OTA, VR/AR, blockchain, online booking, digital transformation.*

The tourism industry is undergoing a digital revolution, where artificial intelligence (AI), Big Data, the Internet of Things (IoT), virtual and augmented reality (VR/AR) are transforming all stages of a trip: from planning to the post-travel experience. According to research, online bookings account for 69% of the market, and mobile applications influence 80% of travelers' decisions. In Ukraine, the relevance is heightened by the priorities for 2026: the launch of the Unified Tourism Register (UTR) and collaborations such as that between TNTU and the NGO "Digitalization of Tourism and Culture." This is stimulating domestic tourism, streamlining routes, and increasing safety [1].

Digitalization operates on four levels: mega- (global platforms such as Booking.com), macro- (state policies), meso- (regional clusters), and micro- (enterprises). In Ukraine, obstacles—fragile infrastructure, cyber risks, and low digital literacy of SMEs—are slowing down the process, but they also open up opportunities for growth of 6% by 2033 [2].

The Positive Impact of Digital Technologies

Digital tools significantly enhance performance. Online platforms and OTAs (e.g., Booking.com) reduce costs by 30-40%, enable dynamic pricing and personalization, and AI-powered Google Travel Insights forecasts demand in real time. Mobile applications and GIS create dynamic routes and optimize traffic flow—in Ukraine, Visit Ukraine and Diia integrate these features for safe travel [3].

AI and chatbots automate 72% of inquiries, increasing loyalty, while VR/AR enable virtual tours, boosting conversion by 25%. Big Data and blockchain analyze behavior patterns (75% of travelers read reviews on social networks), ensure transparent payments and smart contracts. In 2026, Ukraine is expected to integrate open APIs for a unified ecosystem, which will strengthen the data hub, analytics, and quality monitoring [4].

Challenges of Digitalization

Despite the advantages, digitalization creates challenges. Cybersecurity suffers from an increase in attacks on OTAs, leading to loss of trust and penalties. The infrastructure gap due to weak 5G coverage in regions constrains VR/AR in rural areas. Insufficient digital literacy (40% of SMEs without AI tools) reduces competitiveness, and the fragmentation of regulations slows down the UTR [5].

So, digitalization is a powerful driver of the tourism industry's development, optimizing processes and increasing competitiveness despite existing challenges. In Ukraine, it will contribute to post-war recovery through the UTR and innovations, provided that security and infrastructure barriers are overcome. Growth prospects of up to 6% annually are realistic with the presence of public-private partnerships.

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DER EINFLUSS VON SOCIAL MEDIA AUF DEN TOURISMUS IN DEUTSCHLAND

(ВПЛИВ СОЦІАЛЬНИХ МЕРЕЖ НА ТУРИЗМ У НІМЕЧЧИНІ)

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У статті розглянуто вплив соціальних мереж на розвиток туризму в Німеччині. Проаналізовано основні аспекти цього впливу, включно з Instagram-туризмом, контентом, створеним користувачами, та маркетингом через інфлюенсерів. Зазначається, що соціальні платформи стали важливим інструментом для формування рішень мандрівників, покращення маркетингових стратегій туристичних організацій та вирішення питань, пов'язаних із сталим туризмом.

Ключові слова: *соціальні мережі, туризм Німеччини, Instagram-Туризм, користувацький контент (UGC), надмірний туризм, цифровізація туризму, маркетинг*

DMO, інфлюенсер-маркетинг, сталий туризм, національний парк Берхтесгаден, екологічні наслідки.

Der Artikel untersucht den Einfluss sozialer Medien auf die Entwicklung des Tourismus in Deutschland. Es werden die wichtigsten Aspekte dieses Einflusses analysiert, einschließlich Instagram-Tourismus, nutzergenerierten Inhalten (User Generated Content, UGC) und Influencer-Marketing. Es wird festgestellt, dass soziale Plattformen zu einem wichtigen Instrument für die Entscheidungsfindung von Reisenden, die Verbesserung der Marketingstrategien von Tourismusorganisationen (Destination Management Organizations, DMOs) und die Bewältigung von Fragen im Zusammenhang mit nachhaltigem Tourismus geworden sind.

Schlüsselwörter: *Soziale Medien, Deutschland tourismus, Instagram-Tourismus, nutzergenerierte Inhalte (UGC), Overtourismus (Übertourismus), Digitalisierung im Tourismus, DMO-Marketing, Influencer-Marketing, nachhaltiger Tourismus, Nationalpark Berchtesgaden, ökologische Auswirkungen.*

Soziale Medienplattformen entstanden ursprünglich als elektronische Treffpunkte zum Teilen von Inhalten, wo Nutzer Informationen erstellen, die wiederum Reiseentscheidungen beeinflussen. Instagram und Facebook verändern den Prozess der Reiseauswahl grundlegend und verwandeln Konsumenten zu Content-Erstellern. Analysen deuten auf einen Anstieg der Besucherzahlen in Deutschland auf bis zu 66 Millionen hin (78,8 % der Bevölkerung), wobei der Fokus auf visuellen Inhalten liegt, um die Entwicklung zu verstärken [1].

Plattformen wie Instagram fördern den «Instagram-Tourismus», bei dem Geotags und Hashtags Orte sichtbar machen. Im Nationalpark Berchtesgaden schafft Instagram Hotspots, wie zum Beispiel den Königsbachfall, und zieht durch viralen Inhalt Tausende von Reisenden an [1].

Positive Effekte auf den Deutschland tourismus. Soziale Netzwerke sind ein mächtiges Marketinginstrument für DMOs (Destinations management organisationen) in Deutschland. Laut Studien nutzen 53 % der deutschen Reisenden Instagram und TikTok für die Wahl ihrer Reiseziele, wie zum Beispiel den Eibsee in Bayern. Reiseunternehmen wie TUI und Thomas Cook setzen verstärkt auf Facebook und YouTube für die Kommunikation und stärken so die Kundenbindung.

UGC (nutzergenerierte Inhalte) produziert authentische Empfehlungen und erhöht die Sichtbarkeit von Orten. Eine Bitkom-Studie aus dem Jahr 2025 stellt fest, dass 64 % der Verbraucher Aktivitäten über soziale Medien auswählen, was die Reiseökonomie ankurbelt [2].

Negative Folgen und Herausforderungen. Die zunehmende Beliebtheit führt zu Phänomenen wie Overtourismus in empfindlichen Orten, beispielsweise in Nationalparks. Im Nationalpark Berchtesgaden zeigt sich, dass Instagram den Massenansturm verstärkt, was ökologische Probleme verursacht: Vermüllung, Erosion der Wanderwege. Studien weisen auf eine Diskrepanz zwischen der idealisierten Fotorealität und der tatsächlichen Situation hin, was bei Reisenden zu Enttäuschung führt.

Influencer-Marketing verstärkt den Druck und verwandelt "geheime" Orte in überfüllte Hotspots. Eine ARL-Studie (Weber, Leibrecht) analysiert die Digitalisierung, die den nachhaltigen Tourismus in Deutschland gefährdet [3].

Soziale Netzwerke transformieren den Tourismus in Deutschland grundlegend. Sie schaffen neue Wege für die Werbung und begeistern Reisende, führen jedoch gleichzeitig zu Overtourismus und ökologischen Gefahren. Für ein nachhaltiges Wachstum sollten DMOs ihren Fokus auf authentische Inhalte, Partnerschaften mit Mikro-Influencern und das Management von UGC legen. Ein

intelligenter Einsatz sozialer Medien muss das Gleichgewicht zwischen der Entwicklung des Sektors und der Bewahrung des natürlichen Gleichgewichts gewährleisten.

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GROWTH OF THE MARKET OF BIOPREPARATIONS AND THEIR EFFICIENCY

(ЗРОСТАННЯ РИНКУ БІОПРЕПАРАТІВ ТА ЇХНЯ ЕФЕКТИВНІСТЬ)

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У цій роботі розглядається динаміка світового та українського ринків біопрепаратів і їхня ефективність. Були розглянуті наукові статті та аналітичні видання.

Ключові слова: *біопрепарати, біодобрива, ринок аграрних біопрепаратів, ефективність, органічне землеробство, Україна, світовий контекст.*

This paper examines the dynamics of the global and Ukrainian markets of biopreparations and their efficiency. Scientific articles and analytical publications were reviewed.

Keywords: *biopreparations, biofertilizers, agricultural biopreparation market, efficiency, organic farming, Ukraine, global context.*

Biopreparations contribute to plant protection and increase soil fertility with minimal negative impact on the environment. Their application makes it possible to reduce dependence on chemical pesticides and mineral fertilizers, improve the environmental performance of agricultural production, and adapt to climate change [1, 2].

Currently, there is a growing demand worldwide for environmentally friendly food products, which stimulates the expansion of organic farming areas and increases the need for biopreparations.

In addition, the expansion of regulatory measures (for example, the EU target of 25% organic farmland by 2030) creates governmental and market incentives for the development of this sector [2].

According to analysts, the global biopesticides market grew by approximately 11% annually in 2018-2022. The biofertilizers market in 2024 is estimated at $2.70 billion, with an expected annual growth rate of about 12% to reach $4.78 billion by 2029, and it is projected to outpace the growth of the traditional agrochemical market [1, 2].

Numerous studies confirm the positive impact of biopreparations on yield and profitability. For example, in experiments with organic soybean cultivation in Ukraine, all variants of complex biopreparation use resulted in higher yields and profitability compared to the control [3].

However, the results depend on application conditions: temperature, humidity, timing and method of application, quality of strains and formulations, as well as crop rotation. Biopreparations have a narrow specificity of action and often a shorter duration of protective effect compared to chemical agents. Therefore, they should be used comprehensively in combination with several products and applied repeatedly [2].

Regarding Ukraine, until 2022 the Ukrainian biopreparations market demonstrated double-digit growth rates. At the same time, the share of biopreparations remained relatively small but was steadily increasing. The Russian aggression in 2022 significantly affected the market: the decline in demand amounted to at least 20-30% [4, 5].

In summary, it can be stated that biopreparations are becoming an integral part of modern agricultural technologies. They increase yields and are economically and reputationally beneficial, which explains why they are gradually replacing chemical products. The biopreparations market is also growing in Ukraine, although its growth rate has slowed due to the war. Gradual support from public policy and market incentives may make biopreparations the standard of agricultural production in the future.

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COMMON INFECTIOUS DISEASES OF DOGS AND CATS, DIAGNOSTIC METHODS AND TREATMENT
(ПОШИРЕНІ ІНФЕКЦІЙНІ ХВОРОБИ СОБАК І КОТІВ, МЕТОДИ ДІАГНОСТИКИ ТА ЛІКУВАННЯ)

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У публікації проведено огляд про найпоширеніші інфекційні захворювання котів та собак, про їх методи та лікування. Також було розкрито поняття про інфекційні захворювання про їх збудники, шляхи передачі, діагностика, лікування та профілактика.

Ключові слова: *інфекційні захворювання, собака, кіт , вірусні інфекції, грибкові інфекції, паразитарні інфекції, бактерії, антибіотики, лікування, діагностика*.

The publication provides an overview of the most common infectious diseases of cats and dogs, their diagnostic methods and treatment. It also covers the concept of infectious diseases, their pathogens, transmission routes, diagnostics, treatment, and prevention.

Keywords: *infectious diseases, dog, cat, viral infections, fungal infections, parasitic infections, bacteria, antibiotics, treatment, diagnostics.*

Infectious diseases in animals are illnesses caused by pathogens (bacteria, viruses, fungi, or parasites) that can affect animals and cause various clinical symptoms. They can be transmitted from animal to animal through contact with an infected environment or through insects or ticks. Let’s consider infectious diseases in dogs and cats [2].

Let’s analyse common infectious diseases of dogs:

1. Rabies: This is a viral disease that affects the nervous system. It is transmitted through a bite or contact with the saliva of an infected animal with an open wound or mucous membrane of other animals. The most effective method of prevention is animal vaccination. Confirmation of clinical symptoms, histological examination of the brain (post-mortem), PCR (polymerase chain reaction) to detect the virus. Rabies is a fatal disease, and there is no treatment. Prevention includes regular vaccination of animals [6].

2. Parvovirus Infection: A viral disease that causes diarrhea and vomiting. It is transmitted by airborne droplets. Effective prevention includes vaccination and hygiene. Clinical symptoms (vomiting, diarrhea), PCR, antigen testing (rapid tests). Treatment: infusion therapy to prevent dehydration, antibiotics to prevent secondary infections, antiemetic drugs [3].

3. Parainfluenza: This disease manifests itself with respiratory symptoms such as cough and runny nose. It is transmitted by airborne droplets. Clinical symptoms, serological tests for antibodies, PCR. Symptomatic treatment, including anti-inflammatory drugs and cough suppressants. Prevention includes vaccination [2].

4. Canine Distemper: Can cause inflammation of the respiratory tract and eyes, as well as neurological disorders. It is transmitted through saliva, urine, and airborne droplets [3]. Clinical symptoms, PCR, serological tests. Symptomatic treatment, antibiotics to prevent secondary infections, supportive therapy. Vaccination is the key method of prevention [4].

5. Viral Hepatitis: Caused by the parainfluenza virus. A serious disease that requires special treatment and care. It is transmitted by airborne droplets, insects, feces, and blood. Clinical symptoms, biochemical blood tests, serological tests, PCR. Treatment is upportive therapy, antiviral drugs, special care, and diet [3].

6. Leptospirosis: This is a bacterial disease transmitted through urine, milk, and meat of an infected animal. Serological tests, PCR, bacterial cultures. Treatment is Antibiotics (e.g., doxycycline, penicillins), supportive therapy [1].

7.Borrelia (Lyme Disease): Leads to joint inflammation, skin problems, and nervous system issues. It is transmitted by tick bites. Diagnosis: Serological tests for antibodies, clinical symptoms, PCR. Treatment is Antibiotics (doxycycline, amoxicillin), anti-inflammatory drugs [4].

8. Dermatophytosis: A fungal infection that manifests as patches of hair loss and is accompanied by severe itching. The cause of dermatophytosis in dogs is the spores of Microsporum canis or Trychophyton mentagrophytes, which penetrate the epithelium, hair follicles, and nail tissue. Diagnosis: Microscopic examination, fungal culture, Wood’s lamp. Treatment is antifungal drugs (topical or systemic), regular baths with antifungal shampoos [3].

9. Coccidioidomycosis: An infectious disease caused by the fungus Coccidioides immitis and its spores. Diagnosis: Clinical and epidemiological characteristics, chest X-ray, fungal culture, serological tests. Treatment: Fluconazole, Itraconazole, newer triazoles, Amphotericin B [3].

10. Coccidiosis: Accompanied by diarrhea, vomiting, and weight loss. Diagnosis: Stool analysis for the presence of oocysts, serological tests, PCR to detect parasite DNA. Treatment: Antibiotics such as sulfadiazine and trimethoprim, anti-inflammatory drugs to reduce symptoms, supportive therapy to prevent dehydration [2].

Let's analyse common infectious diseases of cats:

1. Feline Leukemia Virus (FeLV): A viral disease that weakens the immune system. It is transmitted through contact with infected animals. Diagnosis: Serological Tests: Detection of FeLV antigens using ELISA or immunochromatography. PCR (Polymerase Chain Reaction): Detection of the virus's DNA. Treatment is **s**upporting the cat's overall health, including proper nutrition and avoiding stress. Using antiviral drugs to reduce symptoms [8].

2. Feline Immunodeficiency Virus (FIV): A viral disease that also weakens the immune system. Prevention includes controlling contact with infected cats. Diagnosis: Serological Tests: Detection of FIV antibodies using ELISA or immunochromatography. Western Blot: Confirmation of doubtful results. Treatment is **s**upporting the cat's overall health, including proper nutrition and avoiding stress. Using antiviral drugs to reduce symptoms [1].

3. Feline Infectious Peritonitis (FIP): This is a severe, almost always fatal viral disease caused by a mutation of feline coronavirus (FCoV). It is transmitted through feces and airborne droplets [7]. Diagnosis: Clinical Symptoms: Observation of clinical symptoms. PCR: Detection of the virus's DNA. Serological Tests: Detection of antibodies to FCoV. Treatment: Using antiviral drugs to reduce symptoms. Supporting the cat's overall health [7].

4. Feline Infectious Anemia (FIA): This is a serious disease caused by mycoplasma bacteria that attack and destroy red blood cells in cats. Diagnosis: Serological Tests: Detection of antibodies to mycoplasma. PCR: Detection of mycoplasma DNA. Treatment: Using antibiotics such as doxycycline or penicillins. Supporting the cat's overall health [5].

We should take care of our pets, vaccinate them on time and prevent diseases.

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FOOD TECHNOLOGIES AND THEIR ROLE IN MODERN LIFE
(ХАРЧОВІ ТЕХНОЛОГІЇ ТА ЇХ РОЛЬ У СУЧАСНОМУ ЖИТТІ)

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У дослідженні проаналізовано сучасні харчові технології та їхню роль у повсякденному житті з акцентом саме на технологічних рішеннях, а не на соціально-економічних аспектах. Розглянуто інноваційні методи нетермічної обробки (високий гідростатичний тиск, імпульсні електричні поля, холодна плазма), біотехнологічні підходи (прецизійна ферментація, культивоване м'ясо), технології структуроутворення (3D-друк

харчових продуктів, високовологісна екструзія) та інтелектуальні системи пакування. Показано, що сучасні харчові технології функціонують як інтегровані виробничі системи, які поєднують фізичні, біологічні та цифрові процеси для забезпечення контролю якості, безпечності та функціональних властивостей продуктів. Підкреслено, що саме нові технології визначають напрям розвитку у XXI столітті.

***Ключові слова**: харчові технології, нетермічна обробка, імпульсні електричні поля, прецизійна ферментація, культивоване м'ясо, 3D-друк, інтелектуальне пакування.*

The study analyzes modern food technologies and their role in everyday life, with a specific focus on technological solutions rather than socio-economic aspects. Innovative non-thermal processing methods (high hydrostatic pressure, pulsed electric fields, cold plasma), biotechnological approaches (precision fermentation, cultivated meat), structuring technologies (3D food printing, high-moisture extrusion), and intelligent packaging systems are examined. It is shown that modern food technologies operate as integrated production systems that combine physical, biological, and digital processes to ensure quality control, safety, and functional properties of food products. It is emphasized that new technologies themselves determine the direction of development in the 21st century.

***Keywords:** food technologies, non-thermal processing, pulsed electric fields, precision fermentation, cultivated meat, 3D printing, intelligent packaging.*

Food technologies are practical engineering tools that turn raw biological materials into safe, stable, predictable foods. In modern life their influence is not only "more food", but better control: control of microbes, texture, nutrition delivery, shelf life, and even the shape of food. Below is an overview of technology families that strongly affect everyday products today and also represent the most innovative directions for the near future.

A first group is non-thermal or mild-thermal preservation, designed to keep fresh-like quality while reaching food safety targets. High-pressure processing (HPP) applies very high isostatic pressure (often 400–600 MPa) to packaged foods, disrupting microbial cells without the strong flavor changes of long heating. HPP is now common for refrigerated juices, deli meats, ready-to-eat meals and some seafood. From a technology perspective its value is "process after packaging": fewer recontamination steps and a clean-label approach, because pressure itself is the main hurdle [1]. Another method is pulsed electric fields (PEF). PEF delivers short high-voltage pulses that create electroporation in cell membranes. In solid foods this can be used as a pretreatment to improve mass transfer in drying, extraction, peeling, and freeze-thawing, reducing process time while changing texture in a controlled way [2]. PEF can also modify techno-functional properties of proteins (solubility, gelation behavior), which matters for dairy and plant-protein

formulations [3]. A newer decontamination tool is cold plasma, where reactive species generated at near-room temperature inactivate microorganisms on surfaces or in packed atmospheres. Reviews describe cold plasma not only for microbial reduction, but also for toxin mitigation and enzyme effects, making it a multi-purpose platform (still under scale-up and validation) [4].

A second major direction is advanced fermentation and bioprocessing. Classical fermentation supports yogurt, bread, cheese, and pickled products, but precision fermentation shifts the goal: microorganisms produce a specific target ingredient (for example a milk protein, an egg protein, a flavor molecule, or a functional enzyme) in controlled bioreactors. Reviews emphasize the combination of genome editing, fermentation scale-up, and downstream processing as a pipeline for food ingredients [5]. In practice this technology shows up as new functional proteins for emulsions or foams, improved flavor systems, and specialty nutrients that are hard to extract from crops. A closely related frontier is cultivated meat (cellular agriculture). Here the technological bottlenecks are robust cell lines, scalable bioreactors, and downstream steps like harvesting and structuring into tissue-like textures [6].

A third area is structuring and "digital manufacturing" of food. 3D food printing (additive manufacturing with edible pastes, gels, or powders) is moving from novelty to targeted applications: customized shapes, texture-modified meals (for dysphagia diets), and precise portioning. Reviews in food engineering highlight that a key bottleneck is material rheology: the "ink" must flow through a nozzle but also hold shape after deposition; therefore formulation and measurement are as important as the printer hardware [7]. In parallel, high-moisture extrusion remains a powerful structuring technology for plant-based meat analogues, creating fibrous textures by aligning proteins under shear and heat. Recent reviews discuss how extrusion can also be integrated with 3D/4D printing ideas to broaden texture design and product formats [8]. For daily life this means more consistent plant-based products and faster prototyping of new textures.

A fourth technology family is intelligent and active packaging. Packaging is no longer only a barrier; it can act as a sensing interface. Smart systems can indicate temperature abuse, oxygen exposure, or volatile amines from fish spoilage. Reviews cover gas indicators and sensor labels designed for deterioration gases, and the engineering problem is selecting sensors that work inside real packages with high humidity and variable temperatures [9]. Other work describes broader intelligent packaging for smart sensing, where colorimetric, electrochemical, and biosensing elements can be connected to digital logging and, in some concepts, to IoT networks [10]. In everyday use this supports safer consumption decisions, because the package can communicate real condition rather than only a printed date.

Across these directions, a common trend is integration: combining physical processing (pressure, electric fields, plasma), biological manufacturing (fermentation, cell culture), and data-

driven monitoring (sensors and automated control). The most innovative systems are hybrid: precision-fermentation ingredients can be formulated into extrusion or printing matrices, and sensor-based packaging can validate that mild processing achieved the intended stability. The result is a food system where “quality” is less a guess and more an engineered output. At the same time, these technologies still need validation for scale-up, reproducibility, and safety (especially for plasma chemistry and cultivated meat processes). Still, the direction is clear: modern technologies increasingly operate like advanced manufacturing, with measurable outputs and multiple feedback loops.

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УДК 811.112

DIE ROLLE DES GRÜNEN TOURISMUS BEI DER ENTWICKLUNG DER ERHOLUNGSGEBIETE IN DEUTSCHLAND

РОЛЬ ЗЕЛЕНОГО ТУРИЗМУ В РОЗВИТКУ РЕКРЕАЦІЙНИХ ТЕРИТОРІЙ НІМЕЧЧИНИ

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У статті показано, що зелений туризм є важливим чинником сталого розвитку рекреаційних територій Німеччини, сприяючи збереженню природних ресурсів, економічному зростанню регіонів та формуванню екологічної культури суспільства. Розглянуто основні напрями розвитку зеленого туризму, зокрема підтримку сільських територій, екологізацію туристичної інфраструктури та впровадження принципів сталого управління.

Ключові слова: *зелений туризм, рекреаційні території, сталий розвиток, екологічна свідомість, Німеччина.*

Der Artikel zeigt, dass der grüne Tourismus ein wichtiger Faktor für die nachhaltige Entwicklung der Erholungsgebiete Deutschlands ist, da er zum Schutz der natürlichen Ressourcen, zum wirtschaftlichen Wachstum der Regionen sowie zur Förderung des ökologischen Bewusstseins beiträgt. Die Hauptentwicklungsrichtungen des grünen Tourismus werden analysiert, insbesondere die Unterstützung ländlicher Räume, die Ökologisierung der touristischen Infrastruktur und die Umsetzung nachhaltiger Managementprinzipien.

Schlüsselwörter: *grüner Tourismus, Erholungsgebiete, nachhaltige Entwicklung, Umweltbewusstsein, Deutschland.*

In der heutigen globalisierten Welt gewinnt der nachhaltige Tourismus zunehmend an Bedeutung. Deutschland gilt als eines der führenden europäischen Länder im Bereich der

ökologischen Politik und der nachhaltigen Regionalentwicklung. In diesem Zusammenhang nimmt der grüne Tourismus eine besondere Stellung ein, da er wirtschaftliche Interessen mit ökologischer Verantwortung verbindet.

Die Erholungsgebiete Deutschlands zeichnen sich durch eine hohe landschaftliche Vielfalt aus. Nationalparks, Biosphärenreservate und Naturparks bilden die Grundlage für die Entwicklung umweltfreundlicher touristischer Angebote. Der grüne Tourismus trägt wesentlich zur Revitalisierung ländlicher Regionen bei, indem er neue Arbeitsplätze schafft und kleine regionale Betriebe unterstützt.

Ein zentrales Merkmal des grünen Tourismus ist die Orientierung an Prinzipien der Nachhaltigkeit. Dazu gehören der schonende Umgang mit natürlichen Ressourcen, die Förderung regionaler Produkte, die Nutzung erneuerbarer Energien sowie die Reduzierung von Umweltbelastungen. Durch diese Maßnahmen wird nicht nur die Umwelt geschützt, sondern auch die langfristige Wettbewerbsfähigkeit der touristischen Destinationen gesichert.

Darüber hinaus erfüllt der grüne Tourismus eine wichtige Bildungsfunktion. Er sensibilisiert Reisende für ökologische Probleme und fördert verantwortungsbewusstes Verhalten im Umgang mit der Natur. Somit wird ein Beitrag zur Entwicklung einer umweltorientierten Gesellschaft geleistet.

Somit spielt der grüne Tourismus eine bedeutende Rolle in der Entwicklung der Erholungsgebiete Deutschlands. Seine weitere Förderung erfordert eine systematische Zusammenarbeit zwischen Staat, lokalen Gemeinschaften und Tourismusunternehmen, die es ermöglicht, ein Gleichgewicht zwischen wirtschaftlicher Entwicklung und Umweltschutz zu gewährleisten.

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COMPARATIVE ANALYSIS OF CORN YIELDS IN UKRAINE AND SPAIN AND FACTORS INFLUENCING THEM

(ПОРІВНЯЛЬНИЙ АНАЛІЗ ВРОЖАЙНОСТІ КУКУРУДЗИ В УКРАЇНІ ТА ІСПАНІЇ ТА ФАКТОРИ ЇЇ ФОРМУВАННЯ)

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У статті розглянуто аналіз сучасного рівня врожайності кукурудзи в Україні та Іспанії, порівняння їх показників, а також визначення основних агрокліматичних, технологічних і соціально-економічних факторів, що впливають на формування врожаю. Проаналізовано виявлення резервів підвищення продуктивності кукурудзи в Україні на основі європейського досвіду вирощування.

Ключові слова: *Кукурудза, врожайність, Україна, Іспанія, агрокліматичні фактори, гібриди, удобрення, зрошення, технологія вирощування, продуктивність, зернові культури, аграрний сектор, кліматичні умови.*

This work shows the analyzis of the current level of corn yield in Ukraine and Spain, compare their indicators, and identify the main agroclimatic, technological, and socio-economic factors that influence crop formation. An additional goal is to identify reserves for increasing corn productivity in Ukraine based on European cultivation experience.

Keywords: *Corn, yield, Ukraine, Spain, agroclimatic factors, hybrids, fertilizers, irrigation, cultivation technology, productivity, grain crops, agricultural sector, climatic conditions.*

Corn is one of the most important grain crops in the world. It is used as food for humans, feed for livestock, and raw material for biofuels and industrial products. Ukraine is one of the world leaders in corn cultivation — in terms of area and gross crop yield, it consistently ranks among the top countries, while Spain is an important corn producer in the European Union, especially in the Iberian Peninsula.

1. In 2025, the average corn yield in Ukraine reached approximately 6.94 tons per hectare, which is one of the highest results in recent years, although the average usually fluctuates around 7 tons per hectare.[2]

2.Despite the positive dynamics, the actual yield in Ukraine is significantly lower than the genetic potential of modern hybrids, which under optimal conditions are capable of producing 12–16 t/ha.[1]

3.There is a huge gap between regions in Ukraine: in the north and west, yields reach up to 10.5 t/ha, while in the arid south, yields can fall to a critical 0.7 t/ha.[1]

4.Spain demonstrates impressive productivity — approximately $12.1/ha (as of 2024), which is almost twice the average Ukrainian figures and significantly exceeds the EU average (6.99 t/ha).[1]

5.The main advantage of Spain is the widespread use of irrigation systems, which mitigates the risks of summer droughts, while in Ukraine, moisture deficiency in the steppe zone remains the main limiting factor.[3]

6.High yields in Spain are maintained through the introduction of modern hybrids, in particular Bt corn, which is resistant to pests and minimizes crop losses.[3]

7.The difference in figures is due not only to climate, but also to the level of access to capital: European farmers have better access to modern technology, high-quality fertilizers, and plant protection products.[4]

8.Both countries are facing climate change and abnormal heat, but in Ukraine these factors have a stronger impact on the pollination and grain filling phases due to insufficient soil water supply.[4]

9.The foundation for a high yield is strict adherence to fertilization technology (nitrogen, phosphorus, potassium), since a deficiency of even one element sharply reduces crop productivity.[4]

10.The stability and high performance of farmers in the EU are largely ensured by state support programs and access to innovations, which allows for faster implementation of effective agricultural technologies.[3]

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MODERN TOOLS OF ANALYTICAL SUPPORT FOR MANAGEMENT DECISIONS (СУЧАСНІ ІНСТРУМЕНТИ АНАЛІТИЧНОЇ ПІДТРИМКИ УПРАВЛІНСЬКИХ РІШЕНЬ)

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У роботі розглядено сучасні інструменти аналітичного забезпечення управлінських рішень в умовах цифрової трансформації та глобалізації. Показано, що ефективність управління значною мірою залежить від якості збору, обробки та аналізу даних. Окреслено роль бізнес-аналітики, систем обробки великих даних, інструментів штучного інтелекту та машинного навчання, хмарних технологій і візуальної аналітики у формуванні науково обґрунтованих управлінських рішень. Зазначено, що використання цих інструментів сприяє мінімізації ризиків, підвищенню конкурентоспроможності та забезпеченню сталого розвитку організацій.

Ключові слова: *аналітична підтримка, управлінські рішення, бізнес-аналітика, великі дані, штучний інтелект, машинне навчання, хмарні технології, візуальна аналітика, цифрова трансформація, конкурентоспроможність.*

The paper considers modern analytical tools for management decisions in the context of digital transformation and globalization. It shows that management effectiveness largely depends

on the quality of data collection, processing, and analysis. The role of business analytics, big data processing systems, artificial intelligence and machine learning tools, cloud technologies, and visual analytics in the formation of scientifically sound management decisions is outlined. It is noted that the use of these tools contributes to risk minimization, increased competitiveness, and ensuring the sustainable development of organizations.

Keywords: *analytical support, management decisions, business analytics, big data, artificial intelligence, machine learning, cloud technologies, visual analytics, digital transformation, competitiveness.*

In today's conditions of rapid change, economic globalization, and digital technology development, the effectiveness of management decisions largely depends on the quality of analytical support. Organizations striving for sustainable development and competitiveness require not only intuitive or experience-based management approaches but also scientifically grounded tools for analysis, forecasting, and optimization. The use of such tools is particularly relevant in strategic, financial, marketing, and human resource management, where high-quality analytics serves as the key to minimizing risks and increasing the efficiency of an enterprise's operations.

Analytical support for management decisions is a set of methods, technologies, and software tools that enable the collection, processing, analysis, and visualization of data to prepare well-grounded managerial actions. Modern tools for such support combine methods of mathematical modeling, statistical analysis, econometrics, information technologies, and artificial intelligence. They make it possible not only to assess the current state of an organization but also to forecast future trends, which significantly improves the quality of decision-making [1, p. 39].

One of the key tools of analytical support is **business intelligence systems**. These systems allow data to be collected from various sources, integrated into a unified information environment, and presented in the form of dashboards, reports, and charts. Such systems provide a deep understanding of an enterprise's performance, help identify weaknesses, analyze process efficiency, and make decisions based on facts rather than assumptions.

Another important direction in the development of analytical tools **is big data processing.** The use of these technologies enables organizations to analyze unstructured data such as social media content, internet search queries, sensor information, and customer feedback. This allows for a deeper understanding of consumer behavior, optimization of marketing strategies, demand forecasting, and risk management [2, p. 78].

In recent years, **artificial intelligence (AI)** and **machine learning (ML)** tools have become increasingly widespread. They allow automation of analytical processes, creation of predictive models, and implementation of intelligent data analysis. For example, classification and clustering algorithms enable grouping customers by behavioral features; neural network systems can forecast financial indicators or risks; and natural language processing (NLP) technologies help analyze customer feedback and brand reputation. The use of AI significantly increases the accuracy of analytical insights and reduces the time required for data processing.

Cloud technologies have also gained increasing popularity in the field of analytics. Cloud solutions enable enterprises to reduce IT infrastructure costs, scale data processing, and ensure high-speed access to analytical information.

An important trend is the development of **visual analytics**, which promotes intuitive understanding of complex data through graphical elements. Thanks to interactive dashboards, managers can quickly identify problem areas, monitor key performance indicators in real time, and promptly respond to environmental changes [3, p. 171].

Thus**, modern tools of analytical support for management decisions** are a crucial component of effective organizational performance in the context of digital transformation and a highly competitive market. They provide managers with reliable, systematic, and timely information, enabling them to make well-founded managerial decisions, minimize risks, and improve management efficiency.

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INNOVATIVE APPROACHES TO INVOLVING YOUTH IN COMMUNITY PERSONNEL PROCESSES

ОРГАНІЗАЦІЙНІ ЗАСАДИ ФОРМУВАННЯ СИСТЕМИ МОТИВАЦІЇ ПРАЦІ В СІЛЬСЬКОМУ ГОСПОДАРСТВІ

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Досліджено теоретико-методичні засади формування системи мотивації праці у сільському господарстві України. Обґрунтовано значення ефективного використання трудових ресурсів з урахуванням сезонності аграрного виробництва та підвищених трудових навантажень. Проаналізовано вплив матеріальних і нематеріальних стимулів на продуктивність працівників і стабільність їх трудової активності. Висвітлено проблеми недостатнього рівня стимулювання персоналу та його вплив на плинність кадрів у галузі. Запропоновано напрями вдосконалення мотиваційної політики аграрних підприємств відповідно до стратегічних цілей і потреб персоналу.

Ключові слова: *мотивація праці, аграрний сектор, трудові ресурси, матеріальні та нематеріальні стимули, сезонність виробництва, плинність кадрів, ефективність підприємства.*

The theoretical and methodological foundations of forming a labour motivation system in Ukrainian agriculture have been studied. The importance of effective use of labour resources, taking into account the seasonality of agricultural production and increased workloads, has been substantiated. The impact of material and non-material incentives on employee productivity and

stability of their labour activity has been analysed. The problems of insufficient staff motivation and its impact on staff turnover in the industry are highlighted. Directions for improving the motivational policy of agricultural enterprises in accordance with strategic goals and staff needs are proposed.

Keywords: *labour motivation, agricultural sector, labour resources, material and non-material incentives, seasonality of production, staff turnover, enterprise efficiency.*

A significant amount of resources depends on the effective use of labour resources. One of the key issues is the formation of a labour motivation system, as well as specific agricultural production, seasonality and high quality of labour. Insufficient incentives lead to reduced productivity and a shortage of personnel.

By considering organisational tasks for the formation of a labour motivation system in agriculture, it is possible to increase the effectiveness of enterprises and their competitiveness.

Staff motivation is seen as an integrated system of incentives, which means the behavioural activity of practitioners and their focus on achieving organisational goals. In reality, these incentives are very insignificant, and some practitioners have stable productivity, which makes one think about the need to develop a comprehensive system of motivation. The motivational process requires consistency between 'need – motive – action' in accordance with the specified organisations and minimisation of barriers to the transition from potential readiness to actual activity. The main elements of motivational policy are the formation of a positive corporate life, the prevention of cultural conflicts, the reduction of staff turnover, and the preservation of emotional development. In this way, an indirect approach is taken, whereby the motive is focused on creating a favourable socio-psychological climate and therefore has individual goals.

Material motivation includes payments (earnings, bonuses, incentives) and non-monetary instruments (social benefits, money, gifts), with non-material reasons underlying payments, zero schedules, comfortable working conditions, and other financial services. incentives. The effective implementation of systemic motivations follows a step-by-step algorithm: communication with staff, consumption diagnostics, analysis of practices in organisations, development of own programmes and subsequent introduction with detailed information for specialists. The use of penalties as an element of material incentives is only permitted under conditions of transparency and fairness of the rules. A combined system that has both material and non-material incentives, i.e., the creation of one of the motives that influence efficiency and long-term progress, develops best. [1].

Labour motivation is a key factor in the efficiency of the agricultural sector of the economy. In particular, in the agricultural sector of Ukraine, where a significant part of the main financial

funds and labour resources are decentralised, work motivation is becoming increasingly important. The low level of wages is not the most significant factor, nor is it the real cause of the economic crisis, but without raising wages, it is impossible to protect the country's economy from crisis and ensure effective employment of the population. Reform of the agricultural sector of the economy has led to significant changes in land and property relations in the country, which also requires the creation of new organisational and legal forms of management that are capable of effectively combining and utilising all types of resources.[2].

The results of the study confirm that the effectiveness of an agricultural enterprise is largely determined by the quality of the labour motivation system. Taking into account the seasonality of production, the intensity of work and the real needs of employees is critical to maintaining productivity and staff stability. It has been established that one-sided approaches to incentives lose their effectiveness, while a combination of material and non-material tools creates a more sustainable motivational effect. The practical implementation of a comprehensive and transparent motivation policy can not only activate the work behaviour of personnel, but also strengthen the competitive position of agricultural enterprises in the long term.

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ANXIETY AND ITS IMPACT ON HUMAN BEHAVIOR (ТРИВОЖНІСТЬ І ЇЇ ВПЛИВ НА ПОВЕДІНКУ ЛЮДИНИ)

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У роботі розглянуто феномен тривожності як складного психоемоційного стану та його вплив на поведінку людини в різних життєвих ситуаціях. Проаналізовано основні підходи до розуміння тривожності в психології, її когнітивні, емоційні та поведінкові прояви. Особлива увагу приділено впливу тривожності на прийняття рішень, міжособистісну взаємодію, адаптацію до стресових умов та рівень соціального функціонування особистості. Наголошено, що помірний рівень тривожності може виконувати адаптивну функцію, тоді як хронічна або надмірна тривожність негативно впливає на психічне здоров'я та якість життя людини. Зроблено висновок про необхідність

своєчасного виявлення та психологічної корекції тривожних станів з метою збереження психоемоційного благополуччя особистості.

Ключові слова: *тривожність, поведінка людини, психоемоційний стан, стрес, адаптація, психічне здоров'я.*

The paper examines anxiety as a complex psycho-emotional state and analyzes its impact on human behavior in various life situations. The main psychological approaches to understanding anxiety, as well as its cognitive, emotional, and behavioral manifestations, are considered. Special attention is paid to the influence of anxiety on decision-making, interpersonal interaction, adaptation to stressful conditions, and the level of social functioning. It is emphasized that a moderate level of anxiety may serve an adaptive function, while chronic or excessive anxiety has a negative effect on mental health and overall quality of life. The study highlights the importance of timely identification and psychological intervention in anxiety-related conditions to maintain emotional well-being and psychological stability.

Keywords: *anxiety, human behavior, psycho-emotional state, stress, adaptation, mental health.*

Anxiety is a complex psychological phenomenon that plays a significant role in shaping human behavior, cognition, and emotional responses. In contemporary psychology, anxiety is understood not merely as a transient emotional state but as a multidimensional construct that includes emotional, cognitive, physiological, and behavioral components. While anxiety can serve adaptive functions by preparing an individual to respond to potential threats, its excessive or chronic manifestation often leads to maladaptive behavioral patterns and impaired functioning. From a psychological perspective, anxiety arises as a response to perceived danger, uncertainty, or internal conflict. Cognitive theories emphasize the role of distorted thinking patterns, such as catastrophizing, overgeneralization, and heightened threat perception, in the development and maintenance of anxiety. Individuals with elevated anxiety levels tend to interpret neutral or ambiguous stimuli as threatening, which significantly influences their behavioral reactions. This cognitive bias often results in avoidance behaviors, excessive reassurance-seeking, or compulsive control strategies aimed at reducing perceived risk.

The emotional component of anxiety is characterized by persistent feelings of fear, tension, and apprehension. These emotional states directly affect behavior by narrowing attentional focus and limiting flexibility in decision-making. Anxious individuals frequently demonstrate reduced tolerance for uncertainty, leading to impulsive decisions or, conversely, decision paralysis. In social contexts, anxiety can manifest as social withdrawal, difficulties in communication, fear of negative evaluation, and impaired interpersonal relationships. Over time, such behavioral patterns may contribute to social isolation and decreased quality of life. Physiologically, anxiety is associated with heightened activation of the autonomic nervous system, including increased heart rate, muscle tension, and hormonal stress responses. These physiological reactions reinforce behavioral avoidance, as individuals attempt to escape situations that trigger discomfort. The interaction between physiological arousal and cognitive appraisal creates a feedback loop in which bodily sensations are interpreted as signs of danger, further intensifying anxious behavior [1, p. 341].

Anxiety exerts a profound and multifaceted impact on human behavior by systematically altering cognitive processing, emotional control, and patterns of action. At the cognitive level, heightened anxiety leads to persistent hypervigilance and biased information processing, whereby neutral or ambiguous stimuli are interpreted as threatening. This distortion increases anticipatory fear and reduces an individual's capacity for rational risk assessment and flexible problem-solving. Emotionally, anxiety weakens self-regulation mechanisms, intensifying feelings of tension, insecurity, and fear, which in turn limit behavioral adaptability. From a behavioral perspective, these processes manifest in avoidance of challenging or uncertain situations, excessive reliance on safety behaviors, and reduced engagement in social and professional activities. Over time, such patterns contribute to decreased productivity, impaired interpersonal relationships, and lower overall quality of life. At the same time, when anxiety remains within moderate limits, it can

stimulate motivation, enhance attentional focus, and support adaptive responses to stress. Therefore, anxiety should be understood as a dynamic regulatory factor that can either facilitate or hinder human behavior depending on its intensity, duration, and the individual's psychological resilience and coping resources [2, p. 90].

An important aspect of anxiety's impact on behavior lies in its influence on learning and adaptation. Moderate levels of anxiety can enhance alertness, motivation, and performance, particularly in situations requiring concentration and rapid response. However, when anxiety exceeds an optimal threshold, it impairs attention, memory, and problem-solving abilities. Chronic anxiety disrupts adaptive coping mechanisms and increases the risk of maladaptive behaviors such as substance use, compulsive routines, or emotional suppression.

In the context of stress and environmental challenges, anxiety significantly affects coping strategies. Anxious individuals are more likely to rely on emotion-focused or avoidance-based coping rather than problem-focused strategies. This tendency limits effective stress management and contributes to long-term psychological vulnerability. Moreover, persistent anxiety has been linked to increased susceptibility to depressive disorders, burnout, and psychosomatic symptoms, highlighting its broad behavioral and health-related consequences [3, p. 103].

One of the problems associated with anxiety is its tendency to become chronic and maladaptive, leading to persistent avoidance behavior, impaired decision-making, emotional exhaustion, and reduced social functioning. Individuals experiencing prolonged anxiety often rely on ineffective coping strategies, such as emotional suppression or withdrawal, which further intensify psychological distress and limit personal and professional development. Additionally, insufficient awareness of anxiety symptoms and social stigma surrounding mental health issues hinder timely intervention. Effective solutions to these problems include early identification of anxiety-related symptoms, the development of emotional regulation skills, and the use of evidence-based psychological interventions aimed at cognitive restructuring and adaptive coping. Strengthening social support systems, promoting mental health education, and encouraging stress-management practices also play a crucial role in reducing the negative behavioral impact of anxiety and improving overall psychological well-being [4, p. 223].

In conclusion, anxiety exerts a profound influence on human behavior through its cognitive distortions, emotional intensity, physiological activation, and behavioral responses. While anxiety serves an essential adaptive role in signaling potential threats, its chronic or excessive presence undermines psychological resilience and functional behavior. Understanding the mechanisms through which anxiety affects behavior is crucial for developing effective psychological interventions aimed at enhancing emotional regulation, adaptive coping, and overall mental well-being.

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REBRANDING OF UKRAINIAN COMPANIES DURING MARTIAL LAW

(РЕБРЕНДИНГ УКРАЇНСЬКИХ КОМПАНІЙ В УМОВАХ ВОЄННОГО СТАНУ)

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The article examines the rebranding of Ukrainian companies under martial law as a tool for adapting to crisis conditions in the agro-industrial complex. The role of rebranding in restoring the tourism sector, audit firms, and retail networks through strategic repositioning, image transformation, and market adaptation is analyzed. Recommendations for integrating rebranding phases to enhance competitiveness and attract investments are proposed.
Keywords*: rebranding, martial law, Ukrainian companies, post-war reconstruction, digital marketing, agro-industrial complex, competitiveness.*

Розглянуто ребрендинг українських компаній в умовах воєнного стану як інструмент адаптації до кризових умов в агропромисловому комплексі. Проаналізовано роль ребрендингу у відновленні туристичної галузі, аудиторських фірм та ритейлерських мереж через стратегічне репозиціонування, трансформацію іміджу та адаптацію до ринку. Запропоновано рекомендації щодо інтеграції фаз ребрендингу для підвищення конкурентоспроможності та залучення інвестицій.
Ключові слова: *ребрендинг, воєнний стан, українські компанії, повоєнне відновлення, цифровий маркетинг, агропромисловий комплекс, конкурентоспроможність.*

In the context of martial law introduced in Ukraine since 2022, rebranding has become a critical strategy for companies to adapt to economic disruptions, security risks, and shifting consumer behaviors, particularly in the agro-industrial complex where supply chains for seeds, fertilizers, and machinery have been severely affected. Rebranding involves not only visual changes but also a comprehensive repositioning of business models to foster resilience and growth amid ongoing conflict. This process allows enterprises to rebuild trust, differentiate from competitors, and leverage digital tools for enhanced market presence. For agricultural firms, rebranding facilitates the transition from disrupted traditional operations to innovative online platforms, enabling them to maintain operations in safer regions and attract international partnerships. The necessity of rebranding under martial law stems from the need to address physical infrastructure losses, human capital migration, and financial constraints, transforming these challenges into opportunities for sustainable development.

One key aspect of rebranding in crisis conditions is evident in the tourism sector, where post-war reconstruction demands a geoeconomic approach to territorial integration and investment attraction. The conceptual principles of forming tourism geoeconomics emphasize a multi-phase strategy for recovery, starting with security restoration and infrastructure rebuilding, followed by rebranding and promotion through unique territorial offers. This includes shifting from mass tourism to intellectual, cultural, and ecological models, which create multiplicative effects in regional economies. In Ukraine, the war has led to a 40% loss in tourist reception potential and a 60% drop in flows, prompting the need for rebranding to form new brands based on cultural heritage and safe routes [1, с. 269]. The second phase focuses on marketing via platforms like Booking and Airbnb, developing thematic routes to rebuild international image from narratives of destruction to stories of resilience. Subsequent phases involve investment attraction through EU funds, World Bank, UNDP, and EBRD, with public-private partnerships and tax incentives. Projections indicate that by 2035, tourism's GDP share could rise from 2.1% to 5.0%, international

tourists from 3.5 million to 9.0 million, jobs from 120.7 thousand to 250.3 thousand, private investments from 0.8 billion to 3.5 billion USD, and tourist satisfaction from 65.4% to 90.7% [1, c. 271]. For agro-industrial companies, this model can be adapted to promote agritourism, rebranding farms as eco-friendly hubs integrated with regional clusters like "Green Carpathians" or "Podillya Heritage," enhancing competitiveness through green logistics and community involvement.

In the audit sector, rebranding under martial law addresses market instability, strategic shifts, new business directions, outdated brands, and heightened competition. The evolution of the audit services market from 2018 to 2022 showed expansion in offerings and professional competencies, but wartime conditions necessitated adaptation through process optimization and competitive strategies. A methodological approach to rebranding procedures includes brand auditing for competitiveness assessment, image transformation, and communication planning. This is crucial as the market depends on macroeconomic factors, state policies, legislative changes, business owner strategies, and consumer behaviors [2, c. 94]. Rebranding enhances firm stability, optimizes processes, and creates advantages in crisis, with practical recommendations for improving practices and ensuring quality services. For agro-industrial enterprises, audit rebranding can integrate with financial reporting adaptations, using digital tools to automate interactions and reduce costs, thereby supporting overall business resilience in volatile conditions.

Retail networks provide practical examples of rebranding during war, demonstrating how companies navigate challenges to achieve positive outcomes in traffic, sales, and loyalty. Despite the war accelerating expansions in safer regions and interrupting processes, rebranding emphasizes independence, care, and relevance. For instance, networks like Allo transitioned to a new name spelling and focused on innovation for Ukrainian buyers, resulting in clearer positioning. Other cases show rebranding positively influencing operations, with teams gaining momentum from clear strategies, impacting metrics and client satisfaction. Specific results include up to 45% traffic growth, 6% market share increase, 15% like-for-like sales rise, and improved Net Promoter Score [3]. In the agro-industrial context, retail rebranding for agricultural product sellers can involve digital marketplaces, where wartime adaptations like exclusive offers and personalized promotions stimulate quick purchases, fostering loyalty and contributing to sector development.

Thus, rebranding Ukrainian companies under martial law integrates strategic phases from security restoration to investment attraction, as seen in tourism geoeconomics, methodological approaches in auditing, and retail case studies. This process not only mitigates war-induced losses but also positions agro-industrial enterprises for post-war growth through digital innovation and emotional consumer engagement. Future prospects include combining rebranding with AI-driven analytics for behavior prediction, ensuring long-term sustainability and profitability in the sector.

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OPTIMIZATION OF BUSINESS PROCESSES IN A RESTAURANT ENTERPRISE (ОПТИМІЗАЦІЯ БІЗНЕС-ПРОЦЕСІВ У РЕСТОРАННОМУ ПІДПРИЄМСТВІ)

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У роботі проаналізовано особливості діяльності підприємств індустрії гостинності в умовах зростання конкуренції та ускладнення операційної діяльності. Обґрунтовано значення управління й оптимізації бізнес-процесів як стратегічного чинника підвищення ефективності ресторанного бізнесу. Визначено основні виклики у сфері управління запасами, операційними процесами, персоналом і фінансами.

Ключові слова: *індустрія гостинності, ресторанний бізнес, бізнес-процеси, процесний підхід, якість сервісу, конкурентоспроможність, адаптація.*

The paper analyzes the peculiarities of the activities of hospitality industry enterprises in the conditions of increasing competition and complexity of operational activities. The importance of business process management and optimization as a strategic factor in increasing the efficiency of the restaurant business is substantiated. The main challenges in the field of inventory management, operational processes, personnel and finance are identified.

Keywords: *hospitality industry, restaurant business, business processes, process approach, service quality, competitiveness, adaptation.*

The functioning of hospitality industry enterprises in modern conditions is characterized by increased competition, increased operational complexity, and increased consumer demands for stability and quality of service. For restaurant establishments, these challenges are associated with a significant dependence of work results on the human factor, an increase in the number of contact processes with customers, as well as the need to simultaneously ensure the efficiency of internal processes and create a positive customer experience. In such conditions, business process management becomes a matter of strategic importance.

In practice, many hospitality industry enterprises face the problem of fragmented management of operational and service activities. Business processes are often formed without proper formalization and regular system analysis, which leads to inconsistency of employee actions, variability in service quality, and reduced operational efficiency. The lack of a holistic approach to optimizing business processes leads to a predominantly reactive nature of management decisions, which does not contribute to the stable development of the enterprise [1].

Business process optimization management of hospitality industry enterprises should be considered as a holistic and continuous management process aimed at harmonizing operational activities with service quality standards and customer expectations. In the modern realities of the restaurant and hotel-restaurant business, the process approach becomes a key methodological basis for improving management efficiency. It allows you to move from disparate management of individual functions to integrated management of interconnected business processes, the main goal of which is to create service value [2].

The restaurant business, despite its attractiveness, remains one of the most competitive sectors. Statistics show that approximately 60% of new establishments cease operations within the

first year of operation. This trend is characteristic not only for Ukraine, but also for foreign establishments, where similar indicators are observed.

The main challenges for restaurant owners are the control and optimization of key aspects of the activity, including:

1. Inventory and inventory management - unpredictable demand creates the need to constantly find a balance between excess inventory and shortage of products. It is especially difficult to control products with a short shelf life, which require careful monitoring, since improper storage organization can lead to significant losses. Added to this are seasonal fluctuations in product prices, which complicate budgeting and negatively affect profitability.
2. Optimization of operational processes - the work of a restaurant involves performing a large number of tasks simultaneously: from processing orders to serving guests. This requires coordinated coordination and clear communication between staff.
3. Customer acquisition and retention — in today's competitive environment, restaurants are constantly looking for new ways to attract customers. But it's not enough to simply attract new customers — it's important to turn them into regular customers, as they generate the majority of a restaurant's revenue.
4. Online order management — year after year, more and more consumers are switching to an online ordering experience — a trend that is natural in the digital age.
5. Human resource planning and management — HR policy is an extremely important and at the same time complex aspect of restaurant operations. The lack of qualified employees, especially cooks and waiters, leads to difficulties in recruiting staff and chaos during peak hours. Overtime schedules often cause burnout and high staff turnover, which directly affects job stability.
6. Finance and expense management — restaurants often face unpredictable financial problems. These may include equipment malfunctions or sudden changes in product prices due to seasonal factors or terms of cooperation with suppliers [4].

Many representatives of the Ukrainian restaurant business are currently actively working to adapt to the new economic realities and the consequences of the war. One of the key areas of their activity is the introduction of new products to the market. In response to changes in the economy, establishments are increasingly focusing on services that meet the current needs of society. This includes supporting the military, ensuring the requirements of the rear, as well as providing food and accommodation services for specific groups of the population, which have become especially important in wartime.

In addition, enterprises are actively expanding their offers and adapting existing services to meet new customer requests. Among the popular trends is the implementation of the principles of corporate social responsibility. These include personnel development, support for the Armed Forces of Ukraine, providing discounts to military personnel and holding events to help refugees. Such initiatives are focused on ensuring the safety and psychological comfort of customers, which is critically important in difficult wartime.

The future success of the industry will depend on the ability of enterprises to effectively adapt to new realities. In business process management in the restaurant industry, this requires the development of strategies for optimizing operations - such as process automation, improving internal communication between departments and implementing modern technologies. To overcome modern challenges, it is important not only to update approaches to working with customers, but also to improve internal control mechanisms, which will allow maintaining the stability and competitiveness of the business even in an unstable economy. Flexibility in making management decisions, along with the ability to quickly respond to changes in demand and external environmental conditions, is no less important [3].

Therefore, in conditions of increasing competition and instability of the external environment, effective business process management is becoming a key condition for the successful operation of hospitality industry enterprises. A process approach and systematic optimization of operations allow improving the quality of service, the consistency of staff work and the adaptability of establishments to changes in demand. Flexibility of management decisions, the implementation of modern technologies and orientation to the needs of society ensure the competitiveness and stable development of the restaurant business.

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FEATURES OF ACCOUNTING FOR BIOLOGICAL ASSETS IN AGRICULTURAL ENTERPRISES

(ОСОБЛИВОСТІ БУХГАЛТЕРСЬКОГО ОБЛІКУ БІОЛОГІЧНИХ АКТИВІВ В АГРОПРОМИСЛОВИХ ПІДПРИЄМСТВАХ)

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У роботі досліджено особливості бухгалтерського обліку біологічних активів в агропромислових підприємствах України. Розкрито економічну сутність біологічних активів як специфічного об'єкта обліку, що характеризується біологічною трансформацією та залежністю від природно-кліматичних факторів.

Ключові слова: *біологічні активи, агропромислове підприємство, справедлива вартість, бухгалтерський облік, фінансова звітність.*

The paper examines the specific features of accounting for biological assets in agro-industrial enterprises of Ukraine. It reveals the economic nature of biological assets, their recognition, measurement and disclosure in financial statements.

Keywords: *biological assets, agro-industrial enterprise, fair value, accounting, financial reporting.*

The agro-industrial complex of Ukraine is a strategically important component of the national economy, as it ensures the food security of the state, generates a significant share of foreign exchange earnings and contributes to the development of rural areas. The specifics of the activities of agricultural enterprises determine the presence of special accounting objects - biological assets, which differ from other types of assets in constant biological transformation, dependence on natural and climatic conditions and seasonality of production processes.

According to the National Accounting Regulation (Standard) 30 "Biological Assets", a biological asset is an animal or plant that, in the process of biological transformations, is capable of producing agricultural products or additional biological assets. Biological transformation includes the processes of growth, reproduction, degradation and production of products that create added value and form future economic benefits of the enterprise. Recognition of biological assets in accounting is carried out provided that the enterprise controls the asset as a result of past events, there is a probability of obtaining future economic benefits and the value of the asset can be reliably determined[1].

Biological assets are classified into long-term and current assets depending on the period of their use. Long-term assets include perennial fruit-bearing plants and the main herd of productive livestock, while current assets include crops, young animals and other assets intended for sale or processing during the operating cycle. This classification affects the order in which assets are reflected in the balance sheet and the formation of financial results[2].

Particular attention should be paid to the valuation of biological assets. In the case of an active market, fair value is determined based on market prices. If there is no active market, enterprises may apply alternative valuation methods, in particular the analogue method, the calculation of discounted cash flows or expert valuation. Changes in fair value are recognized in income or expenses of the reporting period, which can lead to significant fluctuations in financial results, especially in conditions of unstable economic conditions[3].

In financial statements, biological assets are recorded as non-current or current assets depending on their useful life. Information on valuation methods, changes in fair value and associated risks are disclosed in the notes to the financial statements. Such detail increases the transparency of the company's activities and contributes to the formation of trust on the part of investors and creditors[4].

However, in practice, there are problematic aspects associated with the complexity of determining fair value, the lack of an active market for certain types of products, dependence on

natural and climatic factors and price instability. In addition, effective accounting requires a high level of professional training of accountants and the implementation of modern information systems. In the context of digitalization of the agricultural sector, the use of automated accounting programs that allow for rapid tracking of the biological transformation of assets and the generation of analytical information for management decisions is promising[5].

Thus, the accounting of biological assets has a number of specific features due to the nature of agricultural production. Its effective organization contributes to the formation of reliable financial information, increasing the investment attractiveness of agro-industrial enterprises and ensuring their sustainable development in the face of modern economic challenges.

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ADAPTATION OF CROP PRODUCTION TO CHRONIC MOISTURE DEFICIENCY AND EXTREME WEATHER CONDITIONS

(АДАПТАЦІЯ РОСЛИННИЦТВА ДО ХРОНІЧНОГО ДИФІЦИТУ ВОЛОГИ ТА ЕКСТРИМАЛЬНИХ ПОГОДНИХ УМОВ)

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В даній статті розглядається питання адаптації рослинництва до нестачі вологи, особливо у південних і центральних регіонів України. Розглядаються кліматичні умови, технології збереження вологи в грунті та використання с\г.

Ключові слова*: хронічний дефіцит вологи, екстремальні погодні коливання, посуха,адаптація рослинництва, збереження ґрунтової вологи, посухостійкі культури.*

This article discusses the adaptation of crop production to moisture deficiency, especially in the southern and central regions of Ukraine. It examines climatic conditions, technologies for preserving moisture in the soil, and the use of agricultural machinery.
Keywords: *chronic moisture deficit, extreme weather fluctuations, drought, crop adaptation, soil moisture conservation, drought-resistant crops.*

This topic is extremely relevant for Ukrainian agriculture . The choice of this topic is not accidental – it is dictated by the real challenges facing Ukrainian crop production today. According to analysts, 2025 was one of the driest years in the last decade: precipitation was only 80% of normal in many regions, and in the centre, east and south, it was even lower, at around 50%. This led to significant crop losses, particularly of sunflower and corn, which are key export crops. In 2026, the situation is complicated by extreme weather fluctuations: the late dry autumn of 2025 was followed by a harsh winter, with temperatures reaching -30°C without sufficient snow cover, threatening winter crops.

In regions such as Dnipropetrovsk Oblast (e.g., Kryvyi Rih), where the soil is steppe-type and there is a chronic moisture deficit, farmers are already forced to change their sowing strategies. Climate change is not an abstraction: droughts, frosts, uneven precipitation and 'dry thunderstorms' are becoming the norm, affecting yields and profitability. According to experts, without adaptation, losses could reach 30% of global agricultural production by 2050, and Ukraine, as an agrarian country, is particularly vulnerable [1].

Adaptation is a set of measures aimed at minimising risks and maximising the use of limited resources. Here are the key areas:

1. Changes in crop structure and crop selection. Farmers are abandoning moisture-loving spring crops (such as corn and soybeans) in favour of winter crops (wheat, rapeseed, barley), which make better use of autumn and winter moisture. In arid regions, such as the south and centre, there is growing interest in drought-resistant alternatives: sorghum, millet, chickpeas, safflower, and peas. For example, in the Odesa region, late drought-resistant crops are recommended for better use of summer rainfall. This allows for risk diversification: no more than 20–25% for a single crop [2].

2. Technologies for preserving moisture in the soil. Minimal or zero tillage (no-till) is becoming the standard for moisture retention – it reduces evaporation and breaks up the plough pan. Cover crops (mustard, radish, phacelia) serve as 'living mulch' in the autumn, accumulating moisture. Mulching with residues and deep loosening once every 3–4 years are also effective [3].

3. Development of irrigation and biological measures. Drip irrigation shows a 25–30% increase in yield in southern regions. The use of drought-resistant hybrids, amino acids, silicon and growth regulators stimulates the root system. Insurance of crops against drought and frost is becoming mandatory [4].

4. Long-term strategies. Integration of climate risks into planning: restoration of irrigation systems, investment in bioenergy from crop residues, and training for farmers. EU integration requires a focus on sustainability, which opens up grants for adaptation.

5. Precision farming and monitoring. The usy of drones, satellite imagery and moisture sensors allows fields to be zoned and fertilisers/plant protection products to be applied only where needed (Variable Rate Application). This saves resources and increases drought resistance. Agrometeorological stations help to predict risks [5].

These measures are already being implemented: in Central Ukraine, there is a 'renaissance' of winter crops, and in the South, crop rotations are being optimised.

In summary, adapting crop production to chronic moisture deficits and extreme weather conditions is not an option but a necessity for the survival of the Ukrainian agricultural sector in 2026. This topic was chosen because it directly affects food security, exports, and the well-being of farmers, especially in regions such as Dnipropetrovsk. I urge you to implement these strategies: from drought-resistant crops to precision technologies.

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УДК 811.111

EVOLUTION OF ENGINES
(ЕВОЛЮЦІЯ ДВИГУНІВ)

Соловйов Д.С. *– здобувач вищої освіти групи М1/1*

Науковий керівник *– Матвєєва А.Л., викладач кафедри іноземних мов МНАУ*

У статті розглянуто еволюцію двигунів, їх принцип роботи та різниця роботи моторів.

Ключові слова: *циліндр, запалювання, карбюратор, електрика, бензин, дизель, гібрид, турбокомпресор (турбонаддув), впорскувальна палива система зміни фаз газорозподілу, чотиритактний цикл*

The article discusses the evolution of engines, their operating principle, and the differences in engine operation.

Keywords: *cylinder, ignition, carburetor, electricity, gasoline, diesel, hybrid, turbocharger, fuel injection, Variable Valve Timing, four-stroke cycle*

An *engine* is a machine that converts an energy source into mechanical energy, often called work or movement. Engines are central to everyday machines, including automobiles, buses, and airplanes. Engines can broadly be divided into three types: thermal, electrical, and physical engines. Technically, engines rely on combustion and motors run on electricity, but the terms are often used interchangeably, and as electric vehicles continue to advance, motors are increasingly replacing

engines in the transportation industry. Both use energy to produce motion, but the chief difference in practical terms is that an engine contains its own fuel source, while a motor relies on an external source for its energy.

The evolution of car engines has progressed from cumbersome steam machines to high-efficiency internal combustion engines (ICE) and modern electric motors. Key milestones include the invention of Otto's four-stroke cycle (1876), the creation of the gasoline ICE by Daimler and Maybach (1885–1886), the transition to multi-cylinder designs, the development of diesel engines and turbocharging, and the current mass shift toward hybrid and electric power units.

The history of car engines dates back to the late 19th century when the internal combustion engine (ICE) was developed. The first practical automobile, Karl Benz's Motorwagen, introduced in 1885, was powered by a single-cylinder four-stroke engine. This marked the beginning of the ICE era, which revolutionized transportation.

Karl Benz meticulously developed the first automobile engine, taking detailed steps to ensure its success. His single-cylinder, four-stroke engine featured a horizontal flywheel and produced 0.75 horsepower. Despite initial scepticism, Benz's invention eventually gained acceptance and revolutionized transportation

Early engines were simple and mechanical, relying on basic carburettors for fuel delivery and manual ignition timing. The Ford Model T, introduced in 1908, popularized the mass production of automobiles and featured a 2.9-liter inline-four engine. This era saw the standardization of the four-stroke cycle, with engines becoming more reliable and accessible to produce.

The mid-20th century brought significant advancements, such as the introduction of overhead camshafts and multi-cylinder configurations. The V8 engine, popularized by American automakers in the 1950s, became synonymous with power and performance. Fuel injection systems began to replace carburettors, offering improved fuel delivery and efficiency.

The rise of V8 engines and the transition from carburetors to fuel injection systems allowed brands like Ferrari, Lamborghini, and Mercedes-Benz to push the boundaries of speed and luxury.

The next major step in evolution of the internal combustion engine is the turbocharger. This device is a small turbine powered by the engine's exhaust gases, which forces more compressed air into the combustion chamber. The turbine can force more air into the chamber than atmospheric pressure and therefore increases the power output and efficiency of the engine. Turbochargers were initially used for aircraft engines during the war, allowing planes to fly higher, further and much faster. So why not put one in a car?

In 1962 a rather open minded General Motors, looking to experiment with new technology, placed a turbocharger into the Oldsmobile Jetfire. However, for each tank of gas you also had to add a mixture of distilled water and methanol, cleverly named “Turbo Rocket Fluid”. This rather adventurous pursuit by GM was short-lived and the idea fizzled out before the 70’s.

The turbocharger became more common in automobiles following the 1977 Clean Air Act amendments. They became an important method of reducing fuel consumption and exhaust emissions. Today a turbocharger is present in almost every automobile, squeezing as much power as possible out of even the smallest engines, still letting you feel like your chasing the Luftwafe down the M4.

Next, hybrids. Hybrids are becoming a popular choice of today, combining the internal combustion engine with the electric motor. The basic principle is that different motors work better at different speeds. Electric motors are more efficient at producing torque and the combustion engine is better for maintianing high speed. Switching between the two systems can optimise the fuel efficiency of the vehicle.

As the 21st century approached, the industry faced a dual challenge: the need for performance and the urgent demand for environmental responsibility. This led to the widespread adoption of Variable Valve Timing (VVT) and Electronic Fuel Injection (EFI), technologies that optimized every drop of fuel.

Today, the combustion engine is at a crossroads. With global climate change concerns and the rise of electric vehicles (EVs), the industry is experiencing a significant shift. Modern combustion engines are more efficient than ever, with innovations such as variable valve timing, cylinder deactivation, and direct fuel injection. However, the pressure to reduce carbon footprints is undeniable.

Automakers are now investing heavily in research and development of not only more efficient combustion engines but also in electric and hydrogen fuel cell technologies. The future might lean heavily towards EVs, but the combustion engine is not bowing out just yet. It continues to be enhanced and used in hybrid systems, where it plays a vital role in extending the range and decreasing the environmental impact of vehicles.

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SMART FARMING UND KÜNSTLICHE INTELLIGENZ: DIE DIGITALE TRANSFORMATION DES AGRONOMBERUFS
РОЗУМНЕ ЗЕМЛЕРОБСТВО ТА ШТУЧНИЙ ІНТЕЛЕКТ: ЦИФРОВА ТРАНСФОРМАЦІЯ ПРОФЕСІЇ АГРОНОМА

Сомар Галина *– здобувачка вищої освіти групи А3.2*

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У статті аналізується, як системи на базі ШІ (дрони, датчики, Big Data) підвищують ефективність рослинництва. Сучасні агрономи використовують алгоритми для точного внесення добрив та раннього виявлення хвороб, що заощаджує ресурси. Розумне землеробство є ключем до глобальної продовольчої безпеки та захисту клімату. Розумне землеробство робить суттєвий внесок у захист довкілля. Завдяки технологіям "See & Spray" (бачу та оприскую), які за допомогою ШІ розпізнають бур'яни за мілісекунди, споживання гербіцидів різко знижується. Це зберігає мікрофлору ґрунту та підсилює дію біоінокулянтів.

Ключові слова: *Розумне землеробство, штучний інтелект, точне землеробство, агрономія, ефективність, Україна*

Der Artikel analysiert, wie KI-gestützte Systeme (Drohnen, Sensoren, Big Data) die Effizienz im Pflanzenbau steigern. Moderne Agronomen nutzen Algorithmen zur Präzisionsdüngung und Krankheitsfrüherkennung, was Ressourcen schont. Smart Farming ist der Schlüssel zur globalen Ernährungssicherheit und zum Klimaschutz. Smart Farming leistet einen wesentlichen Beitrag zum Umweltschutz. Durch "See & Spray"-Technologien, die Unkraut mittels KI in Millisekunden erkennen, wird der Herbizidverbrauch drastisch gesenkt. Dies schont die Bodenmikroflora und unterstützt die Wirkung von Bio-Inokulanten.

Schlüsselwörter: *Smart Farming, Künstliche Intelligenz, Präzisionslandwirtschaft, Agronomie, Effizienz, Ukraine*

Die Landwirtschaft 4.0 steht im Zeichen der Digitalisierung. Smart Farming integriert moderne Technologien wie das Internet der Dinge (IoT) und Künstliche Intelligenz (KI), um die landwirtschaftliche Produktion präziser und nachhaltiger zu gestalten.Ein zentrales Element ist die

Präzisionslandwirtschaft (Precision Farming). Mithilfe von Satellitenbildern und KI-Algorithmen kann ein Agronom den Zustand jedes einzelnen Quadratmeters eines Feldes überwachen.

Früherkennung: KI-Modelle erkennen Stresssymptome bei Pflanzen (z.B. Soja), noch bevor sie für das menschliche Auge sichtbar sind.Ressourcenmanagement: Drohnen steuern die punktgenaue Ausbringung von Wasser, Dünger und Pflanzenschutzmitteln. Dies reduziert den Einsatz von Chemikalien um bis zu 30–40%.Trotz der hohen Investitionskosten bietet Smart Farming langfristige Wettbewerbsvorteile. Für die Ukraine bietet die KI-Integration die Chance, die Erträge bei gleichzeitiger Kostensenkung zu stabilisieren, was besonders in Krisenzeiten strategisch wichtig ist.Der Agronom der Zukunft muss ein "Datenmanager" sein. Die Synergie zwischen biologischem Fachwissen und KI-Technologien ist die Basis für ein profitables und ökologisch bewusstes Agribusiness. Ein wichtiger Aspekt ist die Sicherheit. KI-Systeme können Gefahren auf dem Feld schneller erkennen als Menschen. Zudem verringert die Automatisierung den Kontakt des Personals mit gefährlichen Pestiziden, was den Arbeitsschutz verbessert.

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ORGANIZATION OF CUSTOMER SERVICE IN HOTEL RESTAURANT

(ОРГАНІЗАЦІЯ ОБСЛУГОВУВАННЯ ВІДВІДУВАЧІВ У РЕСТОРАНАХ ПРИ ГОТЕЛЯХ)

Стовба Н.С*. – здобувачка вищої освіти групи ГРС 3/1*
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У даній статті подана інформація про специфіку та стратегічні заходи з організації обслуговування відвідувачів у ресторанах при готелях. Розглянуто особливості взаємодії ресторанної служби з іншими підрозділами готельного комплексу, вплив міжнародних стандартів на якість сервісу та роль автоматизації у підвищенні ефективності роботи.

Ключові слова: *готельний ресторан, організація обслуговування, сервісні стандарти, якість послуг, гостинність.*

This article provides information on the specifics and strategic measures for organizing customer service in hotel restaurants. The features of the interaction of the restaurant service with other departments of the hotel complex, the influence of international standards on the quality of service and the role of automation in increasing work efficiency are considered.

Keywords: *hotel restaurant, service organization, service standards, service quality, hospitality.*

Catering in the hotel industry is a fundamental component of the service, which forms a holistic impression of the level of comfort and hospitality of the accommodation facility. The hotel restaurant operates under conditions of increased responsibility, since it satisfies the basic needs of the guest within a single living space. Unlike independent establishments, the hotel restaurant is integrated into the overall brand concept, which requires the identity of design, service and corporate ethics. The main task of the service organization is to create a multifunctional environment that is able to provide both quick breakfasts for business tourists and exquisite dinners for discerning clients, while maintaining high profitability and operational clarity.

Classification and variability of service methods

The foundation of the work is a combination of different service methods depending on the time of day and the needs of the contingent. Morning service is usually based on the "buffet" method (Buffet service), which requires staff to be skilled in managing visitor flows, quickly rotating dishes and maintaining the ideal aesthetics of the distribution line. In the daytime and evening, the priority shifts to the classic French, English or American service (A la carte), where the individual work of the waiter, knowledge of the wine list and sales techniques come to the fore. A separate niche is occupied by Room Service, which is the hallmark of high-class hotels and requires special equipment for transporting dishes while maintaining the temperature regime.

Coordination of departments and information support

Effective service is impossible without close interaction of the Food & Beverage (F&B) department with other hotel services. The reception and accommodation service transmits data on the hotel's occupancy, VIP guests, group composition and the presence of allergies or specific preferences. Modern organization involves the use of CRM systems that allow the waiter to recognize a regular guest and know his preferences even before the order is placed. Integration of restaurant programs with a general management system (PMS) allows for cashless payment according to the «charge to room» principle, which increases convenience for the guest and the average check of the establishment.

Standardization and personnel management

The quality of service in hotel restaurants is strictly regulated by internal standards (SOP – Standard Operating Procedures). They cover every stage: from greeting the guest during the first 30 seconds to the payment procedure. Special attention is paid to professional ethics and language training of staff, since the restaurant is a zone of intercultural communication. The organization of work involves a clear division of responsibilities between shift managers, hostesses, waiters and runners, which minimizes the waiting time for dishes and ensures uninterrupted service even during peak loads.

Current Trends: Personalization and Gastronomic Experience

Today, a hotel restaurant is no longer just a "breakfast place". The organization of service is increasingly focused on the concept of "destination dining" – creating a level of cuisine and service that attracts local residents, not just those staying at the hotel. This involves the introduction of local

products (farm-to-table), the organization of themed evenings, culinary master classes and the use of an open kitchen (show kitchen). An important aspect is the environmental friendliness of the service: the rejection of plastic, the rational use of resources and the minimization of food waste, which meets global standards of sustainable development.

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NACHHALTIGE ENTWICKLUNG IM HOTEL- UND GASTSTÄTTENGEWERBE DEUTSCHLANDS

СТАЛИЙ РОЗВИТОК У ГОТЕЛЬНО-РЕСТОРАННОМУ БІЗНЕСІ НІМЕЧЧИНИ

Стороженко Н.О. *– здобувач вищої освіти групи ГРС 2/1*

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У статті розглянуто особливості впровадження принципів сталого розвитку у готельно-ресторанному бізнесі Німеччини. Проаналізовано екологічні, економічні та соціальні аспекти функціонування підприємств індустрії гостинності. Визначено основні напрями екологізації готельно-ресторанних послуг та їх вплив на конкурентоспроможність галузі.

Ключові слова: *сталий розвиток, готельно-ресторанний бізнес, Німеччина, екологічна відповідальність, зелений туризм, ресурсозбереження.*

Der Artikel befasst sich mit den Besonderheiten der Umsetzung der Prinzipien der nachhaltigen Entwicklung im Hotel- und Gaststättengewerbe Deutschlands. Die ökologischen, wirtschaftlichen und sozialen Aspekte der Tätigkeit von Unternehmen der Hospitality-Branche werden analysiert. Die wichtigsten Richtungen der ökologischen Modernisierung sowie ihr Einfluss auf die Wettbewerbsfähigkeit des Sektors werden bestimmt.

Schlüsselwörter: *nachhaltige Entwicklung, Hotel- und Gaststättengewerbe, Deutschland, ökologische Verantwortung, grüner Tourismus, Ressourcenschonung.*

In den letzten Jahrzehnten gewinnt das Konzept der nachhaltigen Entwicklung in der Tourismus- und Hospitality-Branche zunehmend an Bedeutung. Besonders in Deutschland wird großer Wert auf Umweltbewusstsein, Energieeffizienz und soziale Verantwortung gelegt. Das Hotel- und Gaststättengewerbe spielt dabei eine zentrale Rolle, da es direkt mit Ressourcenverbrauch, Abfallproduktion und regionaler Wirtschaftsentwicklung verbunden ist.

Ein wichtiger Aspekt der nachhaltigen Entwicklung ist die ökologische Verantwortung. Viele deutsche Hotels setzen auf erneuerbare Energien, Wassersparsysteme und Mülltrennung. Die Einführung energieeffizienter Technologien, wie LED-Beleuchtung oder intelligenter Heizsysteme, trägt wesentlich zur Reduzierung des CO_2 -Ausstoßes bei. Zudem wird verstärkt auf regionale und saisonale Produkte in der Gastronomie geachtet, wodurch Transportkosten und Umweltbelastung verringert werden.

Auch der soziale Aspekt ist von großer Bedeutung. Nachhaltige Unternehmen investieren in faire Arbeitsbedingungen, Weiterbildung des Personals und die Unterstützung lokaler Gemeinschaften. Dadurch wird nicht nur die Servicequalität verbessert, sondern auch die langfristige Stabilität des Unternehmens gesichert.

Darüber hinaus wirkt sich nachhaltiges Management positiv auf das Image und die Wettbewerbsfähigkeit aus. Immer mehr Gäste bevorzugen umweltfreundliche Unterkünfte und Restaurants. Zertifizierungen und Umweltlabels dienen dabei als Qualitätsnachweis und stärken das Vertrauen der Verbraucher.

Somit kann festgestellt werden, dass nachhaltige Entwicklung im Hotel- und Gaststättengewerbe Deutschlands nicht nur ein ökologisches, sondern auch ein wirtschaftlich sinnvolles Konzept darstellt. Die weitere Entwicklung der Branche hängt wesentlich von der konsequenten Integration nachhaltiger Strategien in alle Managementbereiche ab.

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THE STATE AND PROSPECTS OF IRRIGATION DEVELOPMENT IN MYKOLAIV REGION AFTER THE DESTRUCTION OF THE KAKHOVKA HYDROELECTRIC POWER PLANT
(СТАН ТА ПЕРСПЕКТИВИ РОЗВИТКУ ЗРОШЕННЯ В МИКОЛАЇВСЬКІЙ ОБЛАСТІ ПІСЛЯ РУЙНУВАННЯ КАХОВСЬКОЇ ГЕС)

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У публікації порушено питання стану та перспектив розвитку зрошення в Миколаївській області після руйнування Каховська ГЕС. Розглянуто вплив втрати основного джерела водопостачання на аграрний сектор регіону, зокрема на продуктивність сільськогосподарських культур та структуру посівних площ. Проаналізовано сучасні наукові підходи до відновлення меліоративної інфраструктури, впровадження водозберігаючих технологій і формування стійкої системи водокористування в умовах кліматичних змін.

Ключові слова: *зрошення, меліорація, водні ресурси, Миколаївська область, аграрний сектор, посуха, водозберігаючі технології, руйнування Каховська ГЕС, зміни клімату, стале водокористування.*

The publication raises the issue of the state and prospects of irrigation development in the Mykolaiv region after the destruction of the Kakhovka Hydroelectric Power Plant. The impact of the loss of the main source of water supply on the agricultural sector of the region, in particular on crop productivity and the structure of cultivated areas, is considered. It analyses current scientific approaches to restoring irrigation infrastructure, introducing water-saving technologies, and forming a sustainable water use system in the context of climate change.

Keywords: *irrigation, land reclamation, water resources, Mykolaiv region, agricultural sector, drought, water-saving technologies, destruction of the Kakhovka Hydroelectric Power Plant, climate change, sustainable water use.*

The destruction of the Kakhovka Hydroelectric Power Plant in 2023 posed a major environmental and economic challenge for the southern regions of Ukraine. The consequences of this event are long-term and directly affect the transformation of the region's water and soil systems [1; 4]. For the Mykolaiv region, located within the Southern Steppe, the functioning of irrigated agriculture is a critically important factor for the stability of agricultural production.

The climate of the region is characterised by pronounced aridity, uneven distribution of precipitation throughout the year and high summer temperatures. According to scientific research, the lack of productive moisture in the soil during the growing season significantly limits the yield potential of crops without the use of artificial irrigation [3]. In this regard, land reclamation systems have long ensured stable yields and increased economic efficiency of production.

Until 2023, a significant part of the irrigation systems in southern Ukraine operated using water from the Kakhovka Reservoir. Irrigated areas yielded crops that were 1.5–2 times higher than those grown using rainwater farming methods and also contributed to the development of highly profitable crops [2]. The economic feasibility of irrigation is confirmed by research findings on the effectiveness of investments in land reclamation infrastructure [2].

After the destruction of the hydraulic structure, there was a sharp reduction in the availability of water resources for irrigation, which led to a decrease in irrigated areas and changes in crop structure. Scientific assessments indicate significant environmental and economic losses in the agricultural sector as a result of the loss of the reservoir [5]. In addition, the disruption of the hydrological regime has affected the interaction between surface and groundwater, creating additional risks of agricultural landscape degradation [1; 4].

In modern conditions, the introduction of water-saving technologies is becoming particularly relevant. Promising areas include the development of local drip irrigation systems, rational use of groundwater, modernisation of pumping equipment, and digitisation of irrigation management. Research in the field of land reclamation confirms the need for a comprehensive approach to water resource management and the adaptation of agricultural production to new climatic and hydrological conditions [3].

Thus, the destruction of the Kakhovka HPP caused significant transformations in the irrigated agriculture system of the Mykolaiv region. The further development of the region's agricultural sector will depend on the restoration of irrigation infrastructure, attracting investment and introducing innovative water management technologies. The formation of a sustainable water use model should become a strategic priority of regional agricultural policy [2; 5].

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УДК 811.112

ENTWICKLUNGSTRENDS DES AGRARSEKTORS DER UKRAINISCHEN WIRTSCHAFT IM KONTEXT DER ENTWICKLUNG DIGITALER MARKETINGAKTIVITÄTEN.

ТЕНДЕНЦІЇ РОЗВИТКУ АГРАРНОГО СЕКТОРУ ЕКОНОМІКИ УКРАЇНИ В КОНТЕКСТІ РОЗВИТКУ ДІЯЛЬНОСТІ ЦИФРОВОГО МАРКЕТИНГУ.

Тодоров В.В. *– здобувач вищої освіти групи АМП2/1*

Науковий керівник *– Пономаренко Н.Г.,кандидат педагогічних наук, доцент кафедри іноземних мов.*

У статті показано, що застосування цифрових технологій в агромаркетингу також дозволяє агробізнесу збирати та аналізувати великі обсяги даних для кращого розуміння ринкових тенденцій та споживацьких переваг . Соціальні медіа та контент-маркетинг відкривають нові горизонти для агробрендів у створенні глибокого зв'язку зі споживачами. Історії проекологічного виробництва, сталий розвиток та інновації в аграрній сфері резонують з цінностями сучасних споживачів. У статті розглянуто на практичному прикладі аналіз використання інтернет-маркетингу серед найбільших агропідприємств України.

Ключові слова: *цифровізація, реклама, рекламна компанія, аграрний сектор, цифрові технології, електронні торгові платформи, бренд, маркетингові стратегії, інтернет-маркетинг.*

Der Artikel zeigt, dass der Einsatz digitaler Technologien im Agrarmarketing es Agrarunternehmen ermöglicht, große Datenmengen zu sammeln und zu analysieren, um Markttrends und Verbraucherpräferenzen besser zu verstehen. Soziale Medien und Content-Marketing eröffnen Agrarmarken neue Möglichkeiten, eine enge Kundenbindung aufzubauen. Berichte über ökologische Produktion, nachhaltige Entwicklung und Innovation im Agrarsektor finden Anklang bei modernen Verbrauchern. Anhand eines praktischen Beispiels untersucht der Artikel die Nutzung von Internetmarketing bei den größten Agrarunternehmen der Ukraine.

Schlüsselwörter*: Digitalisierung, Werbung, Werbeagentur, Agrarsektor, digitale Technologien, elektronische Handelsplattformen, Marke, Marketingstrategien, Internetmarketing*

Der traditionell als konservativ geltende Agrarsektor befindet sich im Umbruch, angetrieben durch die digitale Transformation. Diese Transformation eröffnet Landwirten, Erzeugern und Lieferanten von Agrarprodukten zahlreiche Chancen. Digitales Marketing im Agrarsektor ist heute nicht nur ein Trend, sondern eine Notwendigkeit, bedingt durch die dynamischen Veränderungen im Konsumverhalten und den technologischen Fortschritt. Die erste und offensichtlichste Anwendung von digitalem Marketing im Agrarsektor ist die Digitalisierung des Handels. Elektronische Handelsplattformen und mobile Anwendungen ermöglichen es Landwirten, Märkte zu erreichen, die ihnen zuvor aufgrund geografischer oder logistischer Beschränkungen verschlossen waren. Dadurch entstehen neue Vertriebskanäle für Agrarprodukte, und Landwirte können durch die direkte Kommunikation mit Endverbrauchern bessere Preise erzielen. Der Einsatz

digitaler Technologien im Agrarmarketing ermöglicht es Agrarunternehmen außerdem, große Datenmengen zu sammeln und zu analysieren, um Markttrends und Verbraucherpräferenzen besser zu verstehen. Big Data und Analysen versetzen Landwirte in die Lage, die Nachfrage vorherzusagen, die Preisgestaltung zu optimieren und Risiken zu minimieren. Soziale Medien und Content-Marketing eröffnen Agrarmarken neue Horizonte für den Aufbau einer engen Kundenbindung. Geschichten über ökologische Produktion, nachhaltige Entwicklung und Innovationen im Agrarsektor finden Anklang bei modernen Konsumenten. Videomarketing und Blogs ermöglichen es, das „Gesicht" der Marke, ihre Werte und ihr Engagement für höchste Produktionsstandards zu präsentieren. Die Interaktivität und Personalisierung digitaler Kanäle tragen dazu bei, jeden Kunden individuell anzusprechen und Produkte und Dienstleistungen entsprechend seinen Bedürfnissen und bisherigen Käufen anzubieten. Dies stärkt nicht nur die Markentreue, sondern fördert auch Cross-Selling und steigert den Umsatz. Die Digitalisierung ermöglicht Präzisionslandwirtschaft, die Daten nutzt, um alle Prozesse – von der Aussaat bis zur Ernte – sowie Marketingstrategien zu optimieren. Der Einsatz von künstlicher Intelligenz für Bedarfsprognosen, Angebotsplanung und die Automatisierung von Werbekampagnen wird zu einem integralen Bestandteil der Marketingstrategien moderner Agrarunternehmen. Der Artikel liefert ein praktisches Beispiel für die Analyse des Internet-Marketings bei den größten Agrarunternehmen der Ukraine. Der Autor präsentiert die Ergebnisse einer Studie zu den Entwicklungstrends des ukrainischen Internetwerbemarktes im Jahr 2022. Im Kontext von Marketingaktivitäten identifiziert er mehrere Hauptbereiche des Internetmarketings. Der Autor belegt, dass jedes Unternehmen mithilfe einer Website seine Markenbekanntheit steigern, alle Informationen über seine Aktivitäten veröffentlichen und sein Image sowie seinen positiven Ruf unter den Akteuren des Agrarmarktes pflegen kann. All diese Ziele lassen sich jedoch nur erreichen, wenn die Website technisch und kommerziell optimiert ist und auf jeder Landingpage hochwertige und fachkundige Inhalte bietet. Auch die Optimierung der Benutzerfreundlichkeit spielt eine Schlüsselrolle, da sie die Interaktion der Besucher mit der Website beeinflusst und zur Steigerung der Conversion-Rate beiträgt. Nur unter diesen Bedingungen erzielt die Website gute Platzierungen in den Suchmaschinen, und das Agrarunternehmen kann sich gegenüber Wettbewerbern durchsetzen und bei Partnern, Kunden und Kontakten profilieren.

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USING DRONES (UAVS) FOR DIFFERENTIATED APPLICATION OF PESTICIDES AND FERTILIZERS
ВИКОРИСТАННЯ ДРОНІВ (БПЛА) ДЛЯ ДИФЕРЕНЦІЙОВАНОГО ВНЕСЕННЯ ЗЗР ТА ДОБРИВ

Тюріна П.С. *– здобувачка вищої освіти групи А1/1*
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У статті подана інформація про використання дронів (БПЛА) для точного внесення пестицидів і добрив. В наслідок чого зменшують використання хімікатів і підвищують ефективність робіт у точному землеробстві.
Ключові слова: *БПЛА, точне землеробство, пестициди, добрива.*

This paper explores the use of UAVs for precise application of pesticides and fertilizers. Drones improve accuracy, reduce chemical use, and increase operational efficiency in precision agriculture.
Keywords: *UAVs, precision agriculture; pesticides; fertilizers;*

The development of new technologies in agriculture, such as unmanned aerial vehicles (UAVs), has proven to be an efficient option for spraying various compounds on crops. UAVs significantly contribute to enhancing precision agriculture [1].

The practical effects of reducing pesticides, which, in some cases, have reached reduction of 30% compared to the recommended dose [2].

This practice of using drones in crops, known as precision agriculture, has brought numerous advantages to farmers reduced agrochemical use, the early detection of pests and diseases, and timely, targeted interventions [3].

Drones equipped with advanced spraying systems enable the precise application of agrochemicals, significantly reducing waste and preventing the contamination of non-target areas [4].

The implementation of UAV spraying operations has shown increases in operational productivity due to reduced labor requirements and faster field coverage [5].

Several researchers have dedicated efforts to developing technologies for improving automatic precision in pesticide spraying using agricultural drones, achieving more effective droplet deposition on the target and controlling pesticide drift.

Planning the feeding route and the GPS route for drone spraying is essential to ensure the efficient and precise application of the spraying solution, especially in complex environments or areas inaccessible to traditional machinery. Wind speed is a decisive factor during the spraying of agrochemicals by drones in the field. In 2019, the response surface methodology was used to evaluate and optimize the operating parameters of the drone, improving spray uniformity based on working height, operating speed, and spraying pressure. Variations in altitude can influence the roto's wind field strength. As the wind speed increases, so does the amount of detected drift, causing
agrochemical droplets to be carried away from the target, thereby increasing the risk of contamination in undesired areas.

Multiple experimental studies have consistently concluded that to minimize droplet drift, the maximum flight altitude should not exceed 2.5 m.

The droplet size from the centrifugal nozzle mounted directly below the rotor on a four-rotor UAV can change depending on the rotation speed, affecting spray patterns and deposition.

Sensors play a crucial role in precision agriculture by providing real-time data on soil

and plant conditions, allowing farmers to make informed decisions.

The integration of multiple sensors and technologies, along with GIS, enhances the accuracy and comprehensiveness of data, further optimizing precision agriculture practices.AI enables the analysis of large volumes of agricultural data, improving decision making and optimizing resources.

Challenges related to the standardization of operational parameters (height, speed, nozzle type, angle and flow rate, spray width, etc.) were identified as drones began to be used in crops.

UAVs with RTK-GPS systems have demonstrated substantial herbicide savings and improved accuracy in pesticide application compared to traditional broadcast methods [6].

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GENDER DIFFERENCES IN LEADERSHIP STRATEGY FORMATION AMONG UNIVERSITY STUDENTS UNDER MARTIAL LAW CONDITIONS

(ГЕНДЕРНІ ВІДМІННОСТІ У ФОРМУВАННІ ЛІДЕРСЬКИХ СТРАТЕГІЙ СЕРЕД СТУДЕНТСЬКОЇ МОЛОДІ В УМОВАХ ВОЄННОГО СТАНУ)

Успаська О. *– здобувач вищої освіти групи МЕН 4/1*

Науковий керівник: *Ганніченко Т.А., кандидат педагогічних наук, доцент кафедри іноземних мов МНАУ*

У роботі емпірично досліджено гендерні відмінності у формуванні лідерських стратегій серед студентів факультету менеджменту (n = 77) в умовах воєнного стану. Застосовано комплекс стандартизованих методик (Жариков-Крушельницький, модель К.

Левіна, Томас-Кілманн) та авторську анкету; міжгрупові відмінності перевірено за U-критерієм Манна-Уітні. Встановлено відсутність гендерного розриву у загальному лідерському потенціалі та виявлено відмінності у стилях і стратегіях поведінки: жінки більш однорідно орієнтовані на демократичний стиль і демонструють ширший репертуар конфліктних стратегій; чоловіки характеризуються полярністю виборів і вищою готовністю до ризику. Зафіксовано ефект соціальної бажаності у жіночій вибірці та гендерну конвергенцію у показниках громадської активності. За результатами дослідження розроблено та апробовано тренінгову програму «Лідерство без стереотипів», яка засвідчила статистично значуще підвищення гендерно рівних лідерських установок учасників (p < 0,001).

Ключові слова: *лідерство, гендерні відмінності, лідерські стратегії, студентська молодь, воєнний стан, адаптивне лідерство.*

The study empirically examines gender differences in leadership strategy formation among management faculty students (n = 77) under martial law in Ukraine. A multi-method design integrating the Zharikov-Krushelnitsky diagnostic, Lewin's leadership style inventory, the Thomas-Kilmann instrument, and an original questionnaire was employed; intergroup differences were assessed via the Mann-Whitney U test. Results indicate no significant gender gap in overall leadership potential while revealing pronounced differences in behavioural patterns: women showed stronger democratic orientation and a broader conflict-strategy repertoire; men demonstrated greater polarization and higher risk readiness. A social desirability effect was identified in the female subsample, and gender convergence was observed in civic leadership engagement. A training programme "Leadership Beyond Stereotypes" was developed and piloted, yielding statistically significant improvements in gender-equitable leadership attitudes among participants (p < 0.001).

Keywords: *leadership, gender differences, leadership strategies, university students, martial law, adaptive leadership.*

The ongoing armed conflict in Ukraine has created unprecedented socio-psychological conditions for leadership development among young people. University students (the future managerial cohort) are forming their leadership competencies under sustained stress, high uncertainty, and radical transformation of social roles. These conditions raise the question of whether gender remains a significant factor in leadership strategy selection when situational pressure overrides conventional behavioural scripts.

The theoretical framework of this study rests on three competing positions in gender leadership research. The *stabilist* perspective (Eagly, Carli) regards gender differences as relatively stable, rooted in socialisation and culturally prescribed role expectations. The *situativist* perspective (Bem, Potter) holds that such differences are largely context-dependent, amplified or neutralised by organisational demands and stress levels. The *situational-integrative* perspective posits that in conditions of prolonged crisis, both models converge: extreme context compels leaders of all genders to adopt elements of the opposite style. The present study treats sustained martial law as an empirical test case for these three positions, investigating which framework most accurately describes the actual leadership behaviour of Ukrainian students.

The wartime context has generated significant structural shifts in social participation relevant to leadership dynamics. With a substantial proportion of men mobilised to military service, women have assumed expanded roles in civilian governance, community management, and

organisational leadership – including within academic institutions and student movements. Simultaneously, Ukrainian youth of both genders have demonstrated markedly increased civic agency: growth in volunteering, community reconstruction initiatives, and student self-governance activity. These structural changes make the university campus a particularly relevant site for studying the renegotiation of gendered leadership roles under crisis conditions.

The present study investigated gender differences in leadership strategy formation among management faculty students (n = 77; 33 males, 44 females; age range 17-44) at Mykolaiv National Agrarian University. A multi-method design was employed, integrating the Zharikov-Krushelnitsky leadership ability diagnostic, Lewin's leadership style inventory, the Thomas-Kilmann Conflict Mode Instrument, and an original author's questionnaire. Intergroup differences were assessed using the Mann-Whitney U test ($U = 600.5$; $p = 0.136$).

Results revealed no statistically significant gender gap in overall leadership potential; however, descriptive statistics indicated substantive differences in behavioural patterns. Women demonstrated a markedly stronger orientation toward the democratic leadership style (70.5% vs. 50.0% among men) and a broader, more flexible repertoire of conflict-management strategies combining competition, collaboration, and compromise. Men showed greater polarization between directive and laissez-faire approaches alongside higher self-reported risk readiness (71%) and decisiveness (55%). A social desirability effect was identified within the female subsample: self-reported democratic preferences contrasted with directive behavioural choices on standardized scenarios, suggesting that wartime conditions stimulate women toward more assertive leadership patterns traditionally associated with masculine norms.

A notable zone of gender convergence was observed in social responsibility and civic leadership engagement: readiness for volunteering and community leadership was nearly identical across groups (males 63%, females 65%). This finding suggests that martial law functions as a unifying contextual factor, shifting leadership motivation from personal authority to collective agency regardless of gender.

A particularly significant finding concerns the formation of what may be termed an androgynous leadership model among the study participants. Under the conditions of prolonged wartime, traditional boundaries between "masculine" and "feminine" leadership patterns appear to dissolve: women in the sample demonstrated transformation toward more directive, assertive behaviour, traditionally associated with masculine norms, while retaining their characteristic orientation toward collaboration and compromise. This integration of instrumental decisiveness with relational flexibility constitutes a qualitatively new leadership profile that transcends conventional gender binaries and aligns with the demands of adaptive crisis leadership. The emergence of this model among future managers represents the primary original contribution of the present study.

Based on the empirical findings, a training programme “Leadership Beyond Stereotypes: Gender, Strategies and Crisis” was developed and piloted with 30 management students within the university's student self-governance activities. Pre-/post-assessment using the Wilcoxon signed-rank test confirmed statistically significant improvements in gender-equitable leadership attitudes (delta = +0.89; $p < 0.001$), with the largest gain recorded for trust in women as crisis leaders (delta = +1.00). These results confirm the practical relevance of stereotype-reduction interventions in higher education under wartime conditions.

The study concludes that gender influences preferred leadership style and conflict behaviour, yet does not determine overall leadership potential. Under martial law, both gender groups converge toward adaptive, mixed leadership strategies — consistent with the situational-

integrative perspective in gender leadership research. Differentiated practical recommendations were developed for both groups and for gender-diverse teams.

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THE ROLE OF MEAT IN FELINE NUTRITION

(РОЛЬ М'ЯСА У ХАРЧУВАННІ КОТІВ)

Хлань К.О. – *здобувачка вищої освіти групи ВМ4/1*

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У даній публікації розглянуто роль м'яса у харчуванні котів та його значення для їхнього здоров'я.

Ключові слова: *коти, м'ясний раціон, тваринний білок, таурин, амінокислоти, вітамін А, повноцінне харчування, здоров'я тварин.*

This publication examines the role of meat in feline nutrition and its importance for their health.

Keywords: *cats, meat-based diet, animal protein, taurine, amino acids, vitamin A, balanced nutrition, animal health.*

Nutrition is one of the most important factors determining the health, vitality, and longevity of domestic animals. This is especially true for cats, which have evolved as obligate carnivores - animals that require meat to meet all their biological and metabolic needs. This fact determines the characteristics of their diet and makes meat a central component of their complete nutritional regimen [1].

Cats differ from many other mammals in that their digestive system and metabolism are adapted to digesting and absorbing animal proteins and fats rather than plant foods. Cats have virtually no enzymes for effectively breaking down carbohydrates, and their digestive system is optimized for high-protein, low-carbohydrate diets [2].

In particular, cats have a high need for animal proteins because they are unable to synthesize sufficient amounts of certain amino acids that are not present or are present in insufficient quantities in plant foods.

One of the key characteristics of feline metabolism is the need for essential amino acids, such as: taurine - necessary for normal heart function, vision, and reproductive system. Cats are practically unable to synthesize it on their own, so a deficiency leads to serious pathologies (e.g., dilated cardiomyopathy and retinal degeneration). Arginine, methionine, cysteine, and other amino acids - a deficiency of these can cause disturbances in detoxification, immune function, and protein metabolism [3, 4].

Plant proteins do not provide sufficient amounts of these amino acids in a biologically available form, so completely plant-based diets for cats cannot provide adequate protein supply.

Fats and other nutrients play a key role in meeting the physiological needs of cats as obligate carnivores. Animal-derived lipids are the main source of energy, participate in the formation of cell membranes, hormone synthesis, and maintenance of normal skin and coat condition. Of particular importance is arachidonic acid, an essential fatty acid that cats cannot synthesize from plant precursors, so it must be obtained from meat products. In addition, cats need preformed vitamin A because they cannot efficiently convert beta-carotene from plant sources into the active form of retinol. A sufficient intake of animal fats and fat-soluble vitamins ensures the normal functioning of the immune, nervous, and reproductive systems, confirming the need to include high-quality meat components in the diet of cats [5].

Insufficient meat content in a cat’s diet can lead to serious metabolic disorders and a deficiency of essential nutrients. In particular, taurine deficiency is associated with the development of dilated cardiomyopathy and retinal degeneration, while a deficiency of essential amino acids and fatty acids negatively affects the immune system, reproductive function, and overall protein metabolism. A prolonged reduction in the proportion of animal protein in the diet can also lead to deterioration in coat quality, weight loss, and an increased risk of chronic diseases, confirming the critical need for adequate meat provision in cat nutrition [4].

Thus, a meat-based diet for cats is not simply recommended, but fundamentally essential given their evolutionary biology, physiological needs, and metabolic characteristics. Ensuring adequate levels of high-quality meat and animal protein in their daily diet is key to maintaining optimal health in cats.

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CROSS-CULTURAL MANAGEMENT IN EUROPEAN COMPANIES (МІЖКУЛЬТУРНИЙ МЕНЕДЖМЕНТ У ЄВРОПЕЙСЬКИХ КОМПАНІЯХ)

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У тексті статті розглядається концепція крос-культурного менеджменту в контексті сучасного європейського бізнес-середовища. Аналізується ключові виклики, що виникають через культурні розбіжності всередині команд, та практичні кейси провідних компаній (L`Oréal, Spotify, SAP). Дослідження базується на фундаментальних моделях культурних вимірів та інтелекту.

Ключові слова: *Крос-культурний менеджмент, європейські компанії, культурний інтелект (CQ), інклюзивність, комунікаційні бар'єри, управління персоналом.*

The article examines the role of cross-cultural management in European companies. It highlights the impact of cultural diversity on organizational performance and explores practical methods for integrating different cultural perspectives into corporate strategy. Key elements such as cultural intelligence and adaptive leadership are identified as vital for success in the unified European market.

Keywords: *Cross-cultural management, European companies, cultural intelligence, inclusivity, communication barriers, HR management.*

Modern European companies operate in a unique environment characterized by deep economic integration alongside significant cultural diversity. Cross-cultural management has evolved from a secondary HR function into a strategic necessity. Unlike traditional domestic management, it requires leaders to navigate

varying communication styles, work ethics, and decision-making processes inherent to different European regions [2].

Cultural friction often arises from differences in «high-context» versus «low-context» communication and varying attitudes toward hierarchy. For example, Scandinavian «flat» organizational structures may clash with centralized Southern European models, a phenomenon deeply rooted in national cultural dimensions [1]. Effective managers must bridge these gaps to prevent workplace misunderstandings and maintain high morale [5].

The effective of cross-cultural strategies is best illustrated through the experiences of major European corporations:

- L`Oréal (France)- The "Cultural Polyglots" Strategy. L`Oreal actively recruits managers with multicultural backgrounds to act as "cultural bridges". This approach leverages high Cultural Intelligence (CQ) to adapt global products to local European markets effectively [4].

- Spotify (Sweden)- The "Squad" Model and Autonomy. Spotify exported the Swedish value of flat hierarchy and consensus. By allowing small, autonomous teams to operate with their own internal sub-cultures while remaining aligned with the central European headquarters, they successfully navigate various national business norms [3].

-SAP (Germany)- Bridging Engineering Precision with Global Agility. By implementing mandatory intercultural sensitivity training, SAP transformed it`s structured German roots an inclusive environment that values both precision and Mediterranean creativity, effectively "riding the waves of culture" [3].

Successful cross-cultural leadership in Europe is built on the ability to interpret and adapt to cultural cues in real-time. It`s not enough to follow a universal management manual; leaders must adapt their feedback and decision-making styles to the specific cultural map of their team [2].

Key strategies include:

- Multicultural Team Composition: Using "cultural bridges" to mediate communication.

- Decentralized Decision-Making: Allowing local branches to adapt corporate policies to local social norms.

- CQ Development: Investing in Cultural Intelligence to enhance individual and organizational adaptability [4].

In conclusion, cross-cultural management expands traditional organizational theory by integrating socio-cultural variables into business logic. Future research should focus on how digital transformation affects cross-cultural collaboration within the EU.

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УДК 811.111

CRAFT BEVERAGES IN RESTAURANT BUSINESS: FORMATION OF MENU CONCEPT AND CONSUMER DEMAND

(КРАФТОВІ НАПОЇ В РЕСТОРАННОМУ БІЗНЕСІ: ФОРМУВАННЯ КОНЦЕПЦІЇ МЕНЮ ТА СПОЖИВЧОГО ПОПИТУ)

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У статті досліджується явище крафтового виробництва напоїв та його вплив на розвиток ресторанного бізнесу в Україні. Розглядаються особливості формування концепції меню на основі крафтової продукції, аналізується споживчий попит та поведінка цільової аудиторії, визначаються ключові фактори успіху ресторанних закладів, що спеціалізуються на крафтових напоях.

Ключові слова: *крафтові напої, ресторанний бізнес, концепція меню, споживчий попит, пивна культура, локальне виробництво.*

The article investigates the phenomenon of craft beverage production and its influence on the development of the restaurant business in Ukraine. The features of menu concept formation based on craft products are examined, consumer demand and target audience behavior are analyzed, and the key success factors of restaurant establishments specializing in craft beverages are identified.

Keywords: *craft beverages, restaurant business, menu concept, consumer demand, beer culture, local production.*

The craft beverage movement, which originated in the United States in the 1970s and spread globally over the following decades, has become one of the most significant trends reshaping the modern restaurant industry. Craft beers, artisan wines, specialty coffees, and handcrafted non-alcoholic beverages are no longer niche products but have entered the mainstream of food service culture. For Ukrainian restaurant owners and managers, understanding this trend and leveraging it strategically represents a powerful opportunity for differentiation and growth.

According to industry research, the global craft beer market was valued at over USD 100 billion in 2023 and is projected to grow at a compound annual growth rate of approximately 10% through 2030 [1]. In Ukraine, domestic craft beer production grew by 19% in 2023, with the number of active craft breweries continuing to rise, reflecting a significant shift in both production capacity and consumer preferences. This growth has had a direct and measurable impact on restaurant beverage menus and business strategies nationwide [3].

The concept of a craft beverage menu differs fundamentally from traditional restaurant drink lists. Rather than relying on mass-produced brands with high brand recognition, craft-focused menus prioritize uniqueness, locality, and storytelling. Each beverage on such a menu carries a narrative — the origin of the ingredients, the philosophy of the producer, and the craftsmanship involved in its creation. This approach transforms the act of ordering a drink into an experience, which is increasingly what modern consumers seek when dining out [2].

Consumer demand for craft beverages is strongly correlated with demographic and psychographic factors. Research consistently shows that millennials and Generation Z consumers are more likely to choose craft products over mainstream alternatives, even when the price point is higher. These consumers tend to value authenticity, ethical production practices, and local sourcing. The growing popularity of craft beer in Ukraine is directly linked to the increasing demand for unique, locally produced products among younger urban audiences — a trend confirmed by market analysts tracking the Ukrainian and EU beverage sectors [3].

From a menu engineering perspective, craft beverages offer restaurants significant advantages in terms of profit margins and perceived value. A craft beer or specialty cocktail made with locally sourced ingredients can command a price premium of 30–50% compared to standard offerings, while the actual cost of goods sold remains similar or lower due to direct partnerships with local producers [4]. This dynamic makes craft beverage programs particularly attractive from a financial management standpoint, especially for independently owned restaurants competing against larger chains.

The successful integration of craft beverages into a restaurant concept requires careful alignment with the overall brand identity and target audience of the establishment. Gastropubs and craft beer bars represent one model, while farm-to-table restaurants that feature local craft wines and specialty soft drinks represent another. The key is coherence — the beverage program must reinforce and complement the culinary concept, the interior design, the service style, and the pricing strategy of the restaurant as a whole [2].

Staff training plays a critical role in the effective delivery of a craft beverage program. Unlike standard beverage service, serving craft products requires staff to possess in-depth product

knowledge — including production methods, flavor profiles, food pairing recommendations, and the background of individual producers. Restaurants that invest in regular beverage education programs for their teams demonstrate measurably higher guest satisfaction scores and increased average check values, as knowledgeable staff are significantly more effective at upselling and guiding guest choices.

Building direct relationships with local craft producers represents another strategic advantage for restaurants. These partnerships can take various forms, from exclusive tap listings and co-branded events to collaborative seasonal menu development. Such collaborations benefit both parties: the producer gains a prestigious on-trade presence and direct access to consumers, while the restaurant gains exclusivity, fresh content for marketing, and the goodwill associated with supporting local businesses — an increasingly important value for Ukrainian consumers in the current socio-economic context [5].

Challenges associated with craft beverage programs include supply chain inconsistency, as small producers may have limited or seasonal output, higher storage and handling requirements for certain products, and the need for more frequent menu updates. These operational complexities require restaurant managers to develop more flexible procurement strategies and maintain stronger supplier communication compared to working with large-scale distributors.

In conclusion, craft beverages have emerged as a defining element of contemporary restaurant culture, offering establishments a powerful tool for differentiation, revenue growth, and community engagement. For Ukrainian restaurant businesses, embracing the craft movement means not only responding to evolving consumer tastes but also actively contributing to the development of the local food and beverage ecosystem. A thoughtfully curated craft beverage program, supported by well-trained staff and strong producer partnerships, can serve as a cornerstone of long-term competitive advantage in the modern hospitality market.

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УДК 811.111

TRANSFORMATION OF DEBT POLICY AND FISCAL CHALLENGES (ТРАНСФОРМАЦІЯ БОРГОВОЇ ПОЛІТИКИ ТА ФІСКАЛЬНІ ВИКЛИКИ)

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У роботі подано інформацію про боргову політику України у 2026 році, вплив воєнних витрат на фіскальну стабільність, регламентованість управління державним боргом та доступність міжнародного фінансування, а також необхідність адаптації фінансових стратегій для післявоєнного відновлення.
Ключові слова: *державний борг, фіскальна політика, бюджетний дефіцит, міжнародна допомога, воєнна економіка, фінансові ризики.*

The paper provides information about Ukraine's debt policy in 2026, the impact of wartime expenditures on fiscal stability, the regulation of public debt management and the availability of international financing, as well as the need to adapt financial strategies for post-war recovery.
Keywords: *public debt, fiscal policy, budget deficit, international assistance, wartime economy, financial risks.*

The year 2026 represents a defining moment for Ukraine's economic resilience, as the nation confronts the cumulative fiscal consequences of prolonged wartime expenditures while simultaneously laying the groundwork for post-war recovery.

The draft state budget for 2026 outlines expenditures of UAH 4.75 trillion against revenues of UAH 2.89 trillion, resulting in a deficit of 18.4% of GDP, with defense and security allocations consuming UAH 2.8 trillion, effectively all domestic tax revenues. This fiscal stance coincides with a projected slowdown in economic growth to just 2.4%, significantly below previous years' performance, while the state debt-to-GDP ratio is expected to approach 107% by the end of 2026, marking the peak of Ukraine's wartime debt burden [1].

This situation will likely result in several significant consequences:

- stronger dependence on external financial support and donor funding;
- additional pressure on debt sustainability and higher costs of borrowing;
- reduced capacity to finance reconstruction and social needs;
- increased macroeconomic risks, including inflation and exchange rate instability;
- weaker prospects for sustainable long-term economic growth.

The government has responded by approving the Medium-Term Public Debt Management Strategy for 2026-2028, which prioritizes increasing the share of grant financing, reducing debt risks through maturity extension and cost optimization, and developing the domestic government bond market as a tool for economic recovery [2].

This strategic document represents a significant departure from short-term crisis management approaches, signaling instead a commitment to institutionalizing fiscal responsibility even amid wartime conditions. The very existence of such forward-looking planning demonstrates Ukraine's

determination to maintain credibility with international financial institutions and private investors alike.

However, significant fiscal risks persist, including currency risk due to the high proportion of foreign currency-denominated debt, refinancing challenges, and the potential reduction in international assistance, which the National Bank projects at 51.4 billion US dollars for 2026 [3].

Projected external financing, though substantial, depends on geopolitical developments and international support beyond Ukraine's control, highlighting the need to diversify funding sources and boost domestic revenue.

The National Bank's January 2026 Inflation Report forecasts inflation at 7.5% by year-end 2026, with gradual monetary policy easing to support credit growth, yet warns that the tight linkage between fiscal and monetary policy – where banks prefer investing in high-yield government bonds over private sector lending – creates a "vicious circle" that constrains economic recovery [3].

This crowding-out effect represents perhaps the most insidious obstacle to sustainable growth, as it starves productive enterprises of the working capital needed for expansion and job creation.

For financial managers, this environment requires the use of complex currency risk hedging strategies, careful monitoring of changes in the tax sphere (including new excise taxes on sweetened beverages, which are expected to generate UAH 8.5 billion, and taxation of digital platforms, which is expected to generate significant revenues of UAH 14 billion), as well as strategic positioning to take advantage of the gradual liberalization of currency restrictions, while navigating the complex interplay between mobilizing domestic resources and continued dependence on international partners [1,3].

According to the Ministry of Finance of Ukraine, by the end of 2025 Ukraine's total public debt reached approximately UAH 9 trillion, or 98.4 percent of GDP. At the same time, its structure improved, as the average maturity exceeded 13 years, more than double the 2021 level, while the average interest rate declined to 4.5 percent [4].

These changes reduce refinancing risks and ease pressure on the state budget. Around three quarters of external debt is owed to official partners, including the European Union, and is provided on concessional terms.

Therefore, despite the high debt to GDP ratio, the improved structure of public debt strengthens fiscal stability and supports long-term economic planning.

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FORMATION OF A FINANCIALLY SUSTAINABLE AND COMPETITIVE BUSINESS THROUGH EFFECTIVE LEADERSHIP

(ФОРМУВАННЯ ФІНАНСОВО СТІЙКОГО ТА КОНКУРЕНТОСПРОМОЖНОГО БІЗНЕСУ ЧЕРЕЗ ЕФЕКТИВНЕ ЛІДЕРСТВО)

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Досліджено роль ефективного лідерства у забезпеченні фінансової стійкості та конкурентоспроможності підприємств в умовах глобалізації та ринкової невизначеності. Проаналізовано вплив стилів керівництва на різних етапах життєвого циклу підприємства. Визначено ключові лідерські компетенції, необхідні для управління змінами, формування корпоративної культури та забезпечення довгострокової стабільності бізнесу. Обґрунтовано необхідність системного розвитку лідерського потенціалу на всіх рівнях управління.

Ключові слова: *лідерство, фінансова стійкість, конкурентоспроможність, управління підприємством, корпоративна культура, стратегічне управління.*

The role of effective leadership in ensuring financial sustainability and competitiveness of enterprises in the context of globalization and market uncertainty has been studied. The influence of leadership styles at different stages of the enterprise life cycle is analyzed. Key leadership competencies necessary for change management, corporate culture formation, and ensuring long-term business stability are identified. The necessity of systemic development of leadership potential at all levels of management is substantiated.

Keywords: *leadership, financial sustainability, competitiveness, enterprise management, corporate culture, strategic management.*

In the context of globalization, the rapid development of market relations, intensifying competition, and growing uncertainty in the external environment, the issues of ensuring an enterprise's financial stability and competitiveness have become especially urgent. Modern firms operate in an intensely competitive environment where performance is determined not only by the availability of financial resources or innovative technologies, but also by a high level of managerial competence, the ability to adapt quickly to change, to make strategically sound decisions, and to anticipate risks.

According to findings from the McKinsey Global Survey and Harvard Business Review, companies that have successfully integrated new ways of working are characterized by a strong culture of trust, transparent communication, high team autonomy, and the capacity for independent decision-making. At the same time, the absence of a purposeful leadership approach to managing change leads to a decline in team synergy, loss of employee loyalty, and weakening of organizational resilience [1]. Thus, in contemporary conditions, effective leadership becomes a key factor in securing financial stability, fostering innovation, and maintaining an enterprise's competitiveness in national and global markets.

One of the central determinants of an enterprise's stability and success is the leader's ability to create a strategic vision for the organization's development, organize teamwork, motivate personnel toward shared goals, and provide favorable conditions for cultivating corporate culture. Effective leadership encompasses not only a set of managerial skills and competencies but also a

strategic leadership style that enables high productivity, strong team interaction, and psychological well-being among employees [2].

The life cycle of an enterprise reflects shifts in the dominant leadership style depending on its stage of development. In the initial phases of formation and growth, the leader focuses on market entry, organizing production, and selling products, while employee motivation is supported by trust in the leader and the promise of participation in the organization's growth. As the scale of operations expands, there emerges a need for a strong manager to implement effective managerial practices, establish control, and ensure product or service quality. During growth, management style may shift from democratic to more authoritarian; in later stages, an authoritarian style often predominates, aimed at consolidating the enterprise's market position and building a stable corporate culture. However, drawbacks of authoritarian management - such as bureaucracy, conservatism, and a lack of innovation - can lead to crises that require a transformation toward a more democratic and adaptive leadership style [3].

Contemporary economic and technological transformations driven by digitalization, globalization, and the spread of hybrid work models place heightened demands on managerial competence. Key competencies include strategic planning ability, effective communication, personnel motivation, organization of transparent processes and knowledge management, and creating conditions for autonomous, high-performance teams to develop. Insufficient mastery of these competencies can result in reduced operational effectiveness, weakened team collaboration, and loss of competitive advantage.

Building a competitive and financially resilient business requires a systemic approach to developing leadership competencies at all management levels. This entails not only improving strategic thinking and planning but also creating opportunities for professional development of personnel, supporting corporate culture, implementing innovative managerial practices, and establishing mechanisms for adapting to changes in the external environment.

Consequently, the relevance of this research topic is determined by the need to develop effective managerial approaches that ensure economic viability, human capital development, and the sustainable operation of enterprises amid fluctuating market conditions. The object of the study is the processes of enterprise management in the context of its financial stability and competitiveness, while the subject is the role of effective leadership in forming a financially stable and competitive business.

In summary, investigating the processes of forming financially stable and competitive businesses through effective leadership is both timely and of considerable theoretical and practical importance. The results of such research can identify optimal management strategies, increase organizational efficiency, ensure long-term financial stability, and strengthen firms' competitive positions at national and international levels.

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PSYCHOLOGICAL TRIGGERS IN ONLINE SHOPPING

(ПСИХОЛОГІЧНІ ТРИГЕРИ В ОНЛАЙН-ШОПІНГУ)

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Psychological triggers (FOMO, social proof, personalization) in online shopping are considered as digital marketing tools for influencing consumer behavior in the agro-industrial complex. The role of SMM, content marketing, and AI chatbots in increasing the competitiveness of agricultural enterprises through automation of interaction and cost reduction is analyzed. Recommendations for integrating triggers for effective online sales are proposed.
Keywords: *psychological triggers, online shopping, digital marketing, chatbots, artificial intelligence, consumer behavior, agro-industrial complex.*

Розглянуто психологічні тригери (FOMO, соціальний доказ, персоналізація) в онлайн-шопінгу як інструменти цифрового маркетингу для впливу на поведінку споживачів в агропромисловому комплексі. Проаналізовано роль SMM, контент-маркетингу та AI-чатботів у підвищенні конкурентоспроможності аграрних підприємств через автоматизацію взаємодії та зниження витрат. Запропоновано рекомендації щодо інтеграції тригерів для ефективних онлайн-продажів.
Ключові слова: *психологічні тригери, онлайн-шопінг, digital-маркетинг, чатботи, штучний інтелект, поведінка споживачів, агропромисловий комплекс.*

In today's digital environment, online shopping is becoming a key channel for product sales, particularly in the agribusiness sector, where promoting goods via the internet allows companies to reach a wider audience and optimize costs. Psychological triggers such as fear of missing out (FOMO), social proof, and personalization play a decisive role in shaping consumer behavior, prompting quick purchasing decisions. These mechanisms are integrated into online promotion tools, making them effective for agribusiness, where traditional sales channels are complemented by digital platforms for selling seeds, fertilizers, or finished products. In addition, in the face of growing competition in the agricultural goods market, psychological triggers help differentiate brands by creating an emotional connection with consumers, which encourages repeat purchases and recommendations.

Promoting goods and services on the Internet is a relevant direction for business development, as it allows the use of a set of marketing tools to influence consumers' emotions and decisions. Among them are SEO optimization, which increases the visibility of a website in search engines, creating a sense of relevance and trust; social media marketing (SMM), where content stimulates emotional responses through stories and reviews; Internet advertising, in particular contextual and targeted advertising, which is based on user behavior data for personalized impact; email marketing, which evokes a sense of exclusivity and urgency; content marketing, which appeals to consumer values through storytelling; and influencer marketing, which activates social proof through recommendations from opinion leaders [1, p. 408]. These tools are cheaper than traditional advertising, reach a wider audience, and allow for analysis of effectiveness, reinforcing psychological triggers. In the context of the agro-industrial complex, this manifests itself in the online sale of farm products through social networks, where limited offers stimulate quick purchases, and personalized recommendations increase buyer loyalty to agricultural brands. Moreover, the integration of these tools with mobile applications allows agricultural enterprises to

respond quickly to seasonal changes in demand, for example, for agricultural machinery or seeds, reinforcing the FOMO effect through temporary promotions.

Digital marketing is a key factor in increasing business competitiveness, as it has a more effective impact on the audience than traditional methods thanks to the use of data and technology. In a world where consumers spend an average of 4.2 hours a day on the internet, digital marketing allows for precise targeting of offers, evoking emotions of trust, desire, and fear of loss [2, p. 192]. This is especially relevant for the agricultural sector, where increased time online intensifies triggers such as FOMO due to the constant availability of content about seasonal promotions for agricultural products. Digital marketing integrates tools for market analysis, brand promotion, and profit maximization, where psychological influence is central: email newsletters with promotions create urgency, and social networks stimulate purchases through emotional resonance. In Ukraine, digitalization trends are marginalizing businesses without an online presence, so agricultural enterprises can use AI to analyze behavior, creating personalized offers that enhance their competitive position. For example, online platforms for farmers activate purchase triggers through "exclusive offers," contributing to the development of the agro-industrial complex by increasing sales and brand awareness.

Artificial intelligence in customer service, particularly chatbots, significantly improves the customer experience in marketing by automating interactions and reducing costs. Chatbots provide instant responses 24/7, creating a sense of care and urgency that stimulates purchases through personalization: product recommendations based on previous behavior evoke emotions of trust and desire [3, p. 68]. In online shopping, chatbots handle requests ranging from basic (product information) to complex (logistics), strengthening loyalty through positive experiences. For the agro-industrial complex, this means using chatbots in online stores of agricultural goods for quick consultation, where triggers such as social proof ("others bought") or anchoring (price comparison) activate purchasing decisions. AI collects data for marketing by analyzing behavior, which allows for optimization of promotion, reducing the workload on staff and increasing efficiency. The profound impact of AI on marketing is evident in automation, efficiency, and improved interaction, making online shopping more attractive to consumers of agricultural products.

Therefore, psychological triggers in online shopping, integrated into promotion tools, digital marketing, and AI chatbots, are powerful mechanisms for improving business efficiency in the agro-industrial complex. Their use allows agricultural enterprises to adapt to the digital environment, stimulating emotional responses from consumers and providing competitive advantages through personalization and automation. For young people involved in the development of the agro-industrial complex, the introduction of these technologies opens up prospects for innovative development, contributing to the sustainability and profitability of the sector. In addition, in the future, the combination of psychological triggers with virtual reality could revolutionize online shopping for agricultural products, enabling virtual farm tours or harvest simulations, which will enhance the emotional impact and engagement of the audience.

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NIGELLA – PROMISING NICHE CULTURE

(НІГЕЛА – ПЕРСПЕКТИВНА НІШЕВА КУЛЬТУРА)

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В статті розглядаються ботанічні особливості, умови вирощування та практичне значення нігелли (чорнушки). Охарактеризовано її морфологічні ознаки, вимоги до ґрунту й кліматичних умов, способи розмноження, а також основні шкідники та хвороби.

Ключові слова*: нігелла, чорнушка, Nigella, лікарська рослина, ботанічні особливості, вирощування, насіння, ефірні олії, лікувальні властивості, кулінарне застосування.*

The text reveals the botanical characteristics, growing conditions and practical significance of nigella (black cumin). It describes its morphological features, soil and climatic requirements, methods of propagation, as well as the main pests and diseases.

Keywords*: nigella, black cumin, Nigella, medicinal plant, botanical characteristics, cultivation, seeds, essential oils, medicinal properties, culinary uses.*

Nigella (black cumin) is an annual herbaceous plant belonging to the Ranunculaceae family. There are three main types of nigella: Nigella damascena (Damascus black cumin), Nigella sativa (black cumin), and Nigella orientalis.

Black cumin has a rich history dating back thousands of years. In ancient Egypt, black cumin seeds were found in Tutankhamun's tomb; the Egyptians used it for medicinal purposes. In ancient Rome and ancient Greece, it was added to dishes and used as a perfume. In Europe, it was planted near homes as an ornamental plant.

In the modern world, nigella is widespread in Western Europe, Western Asia and North Africa. Thanks to its decorative, medicinal and culinary properties, black cumin is widely used in various fields.

Botanical features and growing conditions. Nigella has a branched stem 15 to 70 cm high. The leaves are alternate, 2–3 cm long, twice or thrice pinnately dissected into numerous narrow linear segments, giving the plant an openwork appearance. The flowers are solitary, quite large, and form at the tops of the shoots. The most distinctive part of the flower is a corolla-like calyx with five elongated bluish sepals; the colour of the flowers can be white, blue or yellowish. The fruit is a multi-seeded capsule consisting of 3–7 (most often 5) fused leaflets 1–1.5 cm long. Each of them is swollen and has a characteristic long beak. The seeds are small, triangular, wrinkled and bumpy, black in colour [1].

The plant is cold-resistant and undemanding to soil, although it achieves the best results on light, moderately moist soils with lime content. It tolerates sunlight well, requires moderate

watering and is sensitive to excessive moisture. Possible diseases include powdery mildew; if it appears, 2-3 treatments with a fungicide at intervals of 7-10 days are recommended. During prolonged drought without proper watering, plants can be affected by spider mites, which are controlled with insectoacaricides [3].

Black cumin propagates exclusively by seeds, which can be sown directly into the ground in May or before winter. Due to poor transplant tolerance, it is recommended to immediately choose a permanent place for sowing. For seedlings, seeds are sown in March–April in a greenhouse, deepening by about 2 cm. Sprouts appear in 14–20 days. After the first pair of true leaves appear, the seedlings are pricked out into individual peat-humus pots and planted in the ground together with them [5].

Medicinal and culinary properties. Black cumin seeds contain essential oils, vitamins (in particular, E, carotene, ascorbic acid) and enzymes, which determine its value as a medicinal plant. It has the following properties: diuretic, choleretic and anthelmintic action; antispasmodic and analgesic effect; immunostimulant and antioxidant effects; anti-allergic, bronchodilator and anti-tumour effects [2].

In folk medicine, black cumin is used to strengthen the immune system, improve gastrointestinal function, normalise blood pressure and treat respiratory diseases.

In cooking, the seeds are used as a fragrant spice. They are added to baked goods, when pickling cucumbers and watermelons, fermenting cabbage, and also to various dishes as a seasoning. They have a characteristic spicy, slightly bitter taste with nutmeg notes, which makes them popular in the cuisines of many nations around the world.

Thus, nigella is not only a beautiful ornamental plant, but also a valuable natural remedy with powerful healing properties. Thanks to its unpretentious cultivation and wide range of applications, it is promising for use in both medicine and the food industry.

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SPIRULINA AS AN ALTERNATIVE SOURCE OF PROTEIN

(СПІРУЛІНА ЯК АЛЬТЕРНАТИВНЕ ДЖЕРЕЛО БІЛКУ)

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У даних тезах розглянутий перспективний біотехнологічний напрям виробництва альтернативного білку з синьо-зелених водоростей спіруліни в умовах зростаючого населення планети та обмежених харчових ресурсів. Обґрунтовано доцільність використання спіруліни у харчовій промисловості та системах сталого виробництва продовольства.

***Ключові слова**: спіруліна, водорості, мікроводорості, білок, харчування.*

These theses consider a promising biotechnological direction of alternative protein production from blue-green algae (spirulina) under conditions of global population growth and limited food resources. The expediency of using spirulina in the food industry and sustainable food production systems is substantiated.

***Keywords:** spirulina, algae, microalgae, protein, nutrition.*

Protein plays an important role in human nutrition and life, as proteins are one of the key structural and functional components of the human body.

Since ancient times, humanity has searched for the most optimal sources of nutrients. Food had to be accessible and nutritious because survival and competition for limited resources were crucial factors. In the modern dynamic world, when people are constantly solving multiple tasks and have increased demands, food must also be nutritious, healthy, and convenient for quick consumption.

For these reasons, the search for alternatives to traditional food products and the development of new food supplements is ongoing.

Currently, food supplements based on algae are becoming increasingly popular. This is due to the fact that algae can serve as a good alternative to animal and plant protein sources. They also contain various micro- and macroelements and are relatively easy and economically feasible to cultivate.

Spirulina is most commonly used for protein production from algae. Spirulina is a blue-green microalga (cyanobacterium) that inhabits alkaline and well-lit water bodies.

Spirulina was consumed by the ancient Aztecs. The algae were collected from Lake Texcoco (modern Mexico). The biomass was dried in the sun on stones and formed into dry cakes. It could also be ground into powder or consumed as a fresh paste. The Spanish conquistador Bernal Díaz del Castillo described its taste as earthy and slightly similar to cheese [1, 2].

In the modern world, spirulina and spirulina-based products are becoming a trend among supporters of healthy and natural nutrition. Due to its specific taste, it is rarely consumed alone. It is usually added to smoothies, salads, fitness bars, hummus, sauces, and beverages.

Spirulina contains approximately 60–70% protein in dry mass [3], which is comparable to the protein content of dried meat (60–80%).

Spirulina-based supplements are reported to improve general health, support immunity, provide antioxidant effects, reduce cholesterol and blood sugar levels, and contribute to overall well-being [3].

The economic advantages of spirulina protein production include:

- high productivity of biomass;
- rapid growth rate;
- high protein concentration;
- low land requirements;
- environmentally friendly cultivation;
- suitability for controlled growing conditions.

Currently, spirulina is cultivated in countries such as Mexico, Israel, and Japan. It is grown on specialized farms in tanks or ponds where lighting, pH, temperature (around 33°C), oxygen levels, and nutrients are regulated [4]. Although spirulina can also be cultivated in natural water bodies, this increases the risk of contamination.

Commercial forms of spirulina include powders, tablets, pressed bars, liquid shots, syrups, and freeze-dried biomass.

Conclusions: Spirulina is a promising alternative source of protein due to its high nutritional value, environmental sustainability, and economic feasibility of cultivation. The historical experience of its use, confirmed by its modern application in nutrition and food production, demonstrates the significant potential of this microalga in sustainable food systems of the future.

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CIRCULAR ECONOMY ON THE FARM: THE PROBLEM OF LIVESTOCK WASTE DISPOSAL AND ITS CONVERSION INTO BIOGAS OR ORGANIC FERTILIZERS

(ЦИРКУЛЯРНА ЕКОНОМІКА НА ФЕРМІ: ПРОБЛЕМА УТИЛІЗАЦІЇ ВІДХОДІВ ТВАРИННЦТВА ТА ПЕРЕРОБКИ ЇХ У БІОГАЗ ЧИ ОРГАНІЧНІ ДОБРИВА)

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Дослідження спрямоване на розробку моделі безвідходного виробництва, що забезпечує енергетичну автономність фермерських господарств.

Ключові слова: *циркулярна економіка, тваринництво, дигестат, органічні добрива, біозахист.*

The research is aimed at developing a zero-waste production model that ensures the energy autonomy of farms.

Keywords: *circular economy, livestock farming, digestate, organic fertilizers, biosecurity.*

The modern Ukrainian agribusiness faces a critical turning point: maintaining profitability amidst energy and fertilizer shortages. For future experts in animal product technology, the implementation of circular economy principles is the ultimate solution. This strategy shifts the perception of livestock by-products from environmental liabilities to high-value assets — renewable energy and soil biostimulants.

The cornerstone of zero-waste production is anaerobic fermentation. Through controlled organic decomposition, we obtain two vital outputs:

- Biomethane Concentrate**:** a fuel source ensuring the facility's energy independence.
- Stabilized Digestate: a next-generation fertilizer. Unlike traditional manure, digestate offers nitrogen in a bioavailable form and is free from viable weed seed [1].

Despite its technological appeal, widespread adoption is hindered by several factors:

- Financial Inertia: High entry costs and capital intensity. Given wartime risks, an 8–10 year payback period is often perceived as too lengthy by investors.

- Regulatory Labyrinths: The legislative classification of digestate as a product rather than waste still requires refinement, complicating the certification of fertilizers for commercial use.
- Infrastructural Gap: Handling liquid digestate requires modernizing the farm's logistics, including separators and umbilical hose injection systems.
- In this ecosystem, the technologist serves as the guardian of biosecurity. The primary challenge is maintaining a strict thermophilic regime to eradicate pathogens (such as ASF). Without proper microbiological oversight, "eco-friendly fertilizer" could become a veterinary hazard [2].

Transitioning to circular models in livestock farming is a prerequisite for post-war recovery. This pathway leads to the creation of future farms that function simultaneously as food producers and small-scale power plants.

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УДК 811.111

INNOVATIVE METHODS OF STAFF MOTIVATION AS A FACTOR IN INCREASING PRODUCTIVITY
(ІННОВАЦІЙНІ МЕТОДИ МОТИВАЦІЇ ПЕРСОНАЛУ ЯК ФАКТОР ПІДВИЩЕННЯ ПРОДУКТИВНОСТІ)

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Обґрунтовано значення інноваційних методів мотивації персоналу для підвищення продуктивності праці та ефективності підприємства. Визначено їх роль у зростанні залученості працівників, розвитку корпоративної культури та зміцненні конкурентоспроможності організації. Проаналізовано сучасні інструменти мотивації й окреслено напрями їх упровадження в управління персоналом.

Ключові слова: *інноваційна мотивація, персонал, продуктивність праці, управління персоналом, корпоративна культура, ефективність підприємства.*

The importance of innovative methods of staff motivation for increasing labor productivity and enterprise efficiency is substantiated. Their role in increasing employee engagement, developing corporate culture, and strengthening the competitiveness of the organization is determined. Modern motivation tools are analyzed and directions for their implementation in personnel management are outlined.

Keywords: *innovative motivation, personnel, labor productivity, personnel management, corporate culture, enterprise efficiency.*

In today's environment of dynamic economic development and growing competition in the labor market, effective personnel management is becoming particularly important. One of the key factors in an organization's success is a motivation system that encourages employees to achieve high results and professional growth. Traditional methods of encouragement are gradually losing their effectiveness, as modern employees seek not only material rewards, but also opportunities for self-realization, development, and participation in innovative processes. That is why it is important to introduce innovative methods of personnel motivation that combine material, non-material, and socio-psychological incentives. The use of such approaches contributes to increasing employee engagement, strengthening corporate culture, and, as a result, increasing labor productivity.

Innovative motivation is a system of non-standard approaches based on new management technologies, psychological tools, and digital solutions. It aims to increase staff engagement, develop corporate culture, and create an environment in which employees feel personally responsible for the results of their work [3].

One of the most common innovative tools is gamification. Its essence lies in the use of game mechanics in a non-gaming environment, for example, in a system of rewards for achievements, ratings, difficulty levels, virtual awards, etc. Gamification helps to increase employee motivation, as the work process becomes more engaging and structured. In companies such as Microsoft, Google, and IBM, gamification elements are used for training, performance evaluation, and team development. Practice shows that this increases productivity, improves communication between employees, and increases job satisfaction [2,4].

Another important area is flexible forms of work organization, which are becoming the basis of modern non-material motivation. The ability to work remotely, choose a convenient schedule, and coordinate individual workloads are factors that significantly increase staff loyalty and engagement. Flexible working conditions enable employees to achieve a better work-life balance, reduce stress and burnout, and thus increase the overall efficiency of the enterprise [1,2].

Coaching and mentoring occupy an important place among innovative motivation methods. Coaching is focused on unlocking the potential of employees, instilling in them a sense of

responsibility for the results of their work, and developing leadership and communication skills. Mentoring, in turn, is based on the transfer of experience from more experienced employees to newcomers, which contributes to faster adaptation, the formation of team spirit, and unity of values [4].

Digital technologies in the motivation system deserve special attention. Modern HR platforms allow for continuous monitoring of employee satisfaction levels, tracking of their performance results, collection of feedback, and automation of incentive processes. For example, the use of mobile applications to evaluate achievements or a system of electronic badges motivates employees to improve their own performance. In addition, the use of HR analytics helps managers make informed decisions about employee career development and prevent demotivation or burnout.

Innovative motivation is also linked to the individualization of approaches to work incentives. Modern companies are moving away from universal incentive schemes and introducing personalized motivation programs. They take into account the age, values, professional goals, and thinking style of each employee. For young people, the priorities may be training, career opportunities, and flexible schedules, while for experienced professionals, it is stability, respect, and social benefits. Individualized motivation allows for more effective satisfaction of staff needs and reduces the risks of demotivation [4].

Thus, innovative motivation methods involve the use of gamification, coaching, mentoring, digital HR platforms, corporate culture development programs, emotional stimulation, and flexible forms of work organization. Such approaches not only increase staff engagement but also create a favorable environment for self-realization, creativity, and professional growth. They contribute to creating a positive image of the employer, strengthening corporate values, and reducing staff turnover.

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