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## SECTION 1. NANO TECHNOLOGIES, COMPUTER MODELLING

DOI <https://doi.org/10.30525/978-9934-26-459-7-1>

### DEVELOPMENT OF THE MODEL FOR YTTRIUM MONOXIDE *AB INITIO* CALCULATIONS

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#### **Abstract**

Rare earth oxides and monoxides are important for a wide range of applications. A model for the calculations of yttrium monoxide has been developed within the framework of this study. This model has been applied for the *ab initio* calculations of perfect YO to test whether it reproduces the basic parameters of the materials. Then the calculations varying the concentration of Y and O vacancies as well as with the addition of H atoms have been performed to assess the influence of these defects on atomic and electronic structure of the materials. The calculation revealed noticeable relaxation around the defect atoms in the calculated models as well as defects induced significant changes in the electronic structure of YO.

**Key words:** *density functional theory, ab initio calculations, yttrium monoxide.*

#### **1. Introduction**

Rare earth (RE) oxides are have an important role in a wide range of application, e.g. as superconductors, lasers, thermal barrier coatings, ceramics etc. Usually RE oxides are wide bandgap insulators such as Y<sub>2</sub>O<sub>3</sub>. Y<sub>2</sub>O<sub>3</sub> is one of the most stables oxides and it possesses a closed shell trivalent RE ions. The most common valence for yttrium is +3, however, it is also capable of forming compounds, where it has an oxidation state of +2. Yttrium is able to exhibit different oxidation states due to its electronic configuration and its position in the periodic table as a transition metal [1].

RE monoxides are of interest for spintronics applications and might also be useful as conductors and ferromagnetic semiconductors. E.g., YO is a tuneable semiconductor at ambient conditions while LaO is superconducting.

There studies of YO are scarce. YO phase diagram studies by applying *ab initio* methods have been performed in ref. [2]. The results of the modelling determined a metastable structure of YO, which has been attributed to the resistive switching between  $Y_2O_3$  and YO due to the similar stoichiometry of  $Y_2O_3$  parent oxide. Orthorhombic Pnma-YO might be considered as oxygen deficient cubic  $Y_2O_3$ , while P4/nmm is pseudo-degenerate to the orthorhombic Pnma-YO. Phase stability calculations of the Y-O systems performed in ref. [3] determined that under pressure several Y-O compounds including YO become thermodynamically stable. NaCl-type structure of YO with Fm-3m symmetry was found to be stable at 9.9 GPa, while Pnma and P4/nmm were found to be thermodynamically unstable in relation to  $Y_2O_3$  with additional Y atoms.

Within the framework of this study *ab initio* calculations of YO have been performed using Crystal computer code, which allowed to determine the lattice constants, stability of the system under investigation. Y and O vacancies have been calculated as well as the effect of vacancies on the structure. DOS have been constructed for both ideal YO and YO containing both Y and O vacancies. The comparison and analysis of DOS plots have been performed and analysed.

## 2. Computational details

CRYSTAL17 computer code [4,5], which employs Gaussian-type functions centred on atomic nuclei as the basis sets (BS) for an expansion of the crystalline orbitals has been used to perform hybrid DFT calculations. The following BSs have been used in the calculations: Y – Y\_POB\_TZVP\_rev2, O – O\_pob\_TZVP\_rev2, and H\_pob\_TZVP\_rev2.

Heyd-Scuseria-Ernzerhof hybrid exchange–correlation functional (HSE06) [6], which uses a screened hybrid functional and includes the exact nonlocal Fock exchange has been used in the calculations.

To perform the modelling of the defects supercells with the extensions of  $2 \times 2 \times 2$  have been created. The supercells contained 16, 64, and 32 atoms for Fm-3m, Pnma and P4/nmm structures, respectively. The Brillouin zone has been sampled by  $8 \times 8 \times 8$  Pack-Monkhorst net [7] with 29, 260, and 75 k-points for Fm-3m, Pnma and P4/nmm structures, correspondingly. For the calculations of YO under external pressure parameter EXTPRESS has been used in the input.

## 3. Results

The calculated lattice parameters for both bulk and supercell of Fm-3m YO are  $a_0 = 4.78 \text{ \AA}$ .

The calculations of YO have been performed at normal pressure, 10GPa, 20GPa, and 30GPa pressures. The lattice parameters in YO have decreased to  $4.70 \text{ \AA}$  under 10 GPa pressure,  $4.63 \text{ \AA}$  under 20 GPa pressure,

and to 4.58Å under 30 GPA pressure. The compression of YO lattice was also accompanied by a reduction of the effective charge of yttrium atoms.

Introduction of the O vacancy resulted in a slight increase of the lattice parameter to 4.79 Å, while introduction of two O vacancies leads to a noticeable increase of the lattice parameter along the defect axis.

Comparing to O vacancies introduction of Y vacancy resulted in a noticeable decrease of the lattice parameter to 4.75Å. Two Y vacancies lead to a larger distortion of the supercell compared with two O vacancies along the defect axis.

H defect atom calculations have been performed by placing H atom in tetrahedral positions or octahedral position replacing O atom. Substitution of O atom by H atom resulted in slight increase of the lattice parameters to 4.80 Å, while adding H atom to the tetrahedral position resulted in a larger increase of the lattice parameters to 4.82Å. Adding two H atoms to the tetrahedral positions resulted in a significant increase of the lattice parameters to 4.98Å. Positioning of H atom in the tetrahedral and closest octahedral sites resulted in the increase of the lattice parameter to 4.82Å.

#### 4. Conclusions

Calculations YO have been performed using the Crystal computer code. The calculated lattice parameters are in a good agreement with other theoretical studies.

Adding defect atoms significantly affect both atomic and electronic properties of the materials. DOS have been constructed and analysed for the calculated configurations.

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## MODELING OF BRANCHED FLUORENYLIDENE DERIVATIVES. STRUCTURE AND ENERGETICS USING QUANTUM CHEMISTRY APPROACH

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### Abstract

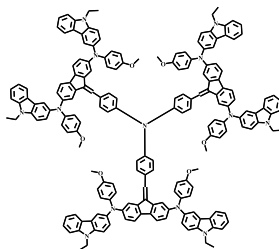
Quantum chemical study of several HTMs compounds is presented and discussed. Problems of the ground state geometry optimizations and excited state geometry optimizations were evaluated through matching the simulated results with the experimental ones.

**Key words:** *quantum chemical study, HTMs.*

### 1. Introduction

Organic perovskites represent a promising class of materials with the potential to revolutionize various aspects of energy conversion and optoelectronics [1] as efficient and flexible photovoltaic materials. Organic perovskite solar cells have shown remarkable progress in efficiency, reaching levels comparable to traditional silicon-based solar cells [2]. Due to long carrier diffusion lengths and high light absorption coefficient, usage of organic perovskites can open new possibilities for even more advanced technologies.

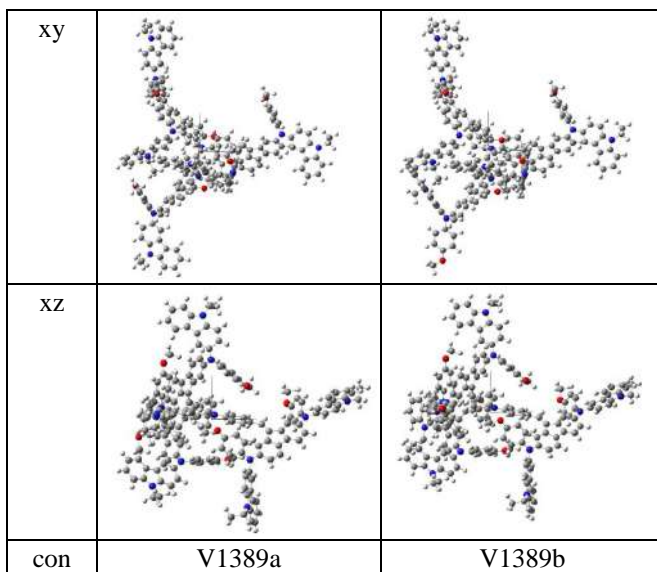
This work is devoted to the quantum chemical study of several HTMs [3]. Structure of 9-(4-bis(4-((2,7-bis((9-9-ethyl-9H-carbazol-3-yl)(4-ethoxyphenyl)amino)-9H-fluorene-9-ylidene)methyl)phenyl)amino)benzylidene-*N*<sup>2</sup>,*N*<sup>7</sup>-bis(4-methoxyphenyl)-9H-fluorene-2,7-diamine (V1389) is presented in Fig. 1.



**Fig. 1.** V1389

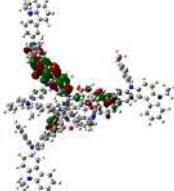

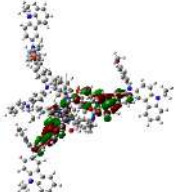

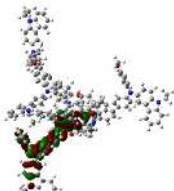


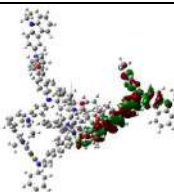
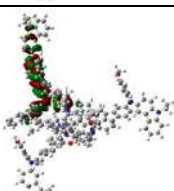
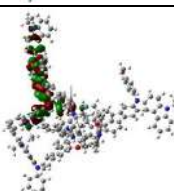
## 2. Review of research

Simulations of the ground state molecular structures for several of the most probable conformers were provided using Gaussian 16 software [4] using density functional theory (DFT) B3LYP method and 6-31G(d) basis set, supplemented with polarization functions (d). Fig. 2 represents molecular structure of two conformers V1389 after ground state energy optimization routine. All presented structures were obtained using grad optimization technique (convergence of parameters Maximum Force, RMS Force, Maximum Displacement, RMS Displacement has been achieved). Electronic excitations were simulated using the semi-empirical TD method (for singlets). Spatial distribution of the electron density for the HOMO-1, HOMO, LUMO, and LUMO+1 was analysed – see Table 1. For V1389, central unit is formed from three phenyls related through nitrogen atom. Charge redistribution between left and right substituents and central core is established for both conformers, a and b.



**Fig. 2.** Molecular structure of two conformers V1389 after ground state energy optimization routine using *Gaussian16*, B3LYP/6-31G(d) basis set

Table 1  
**Compounds V1388 and V1389. Set of MO involved into “spectroscopic”  
states  $S_0 \rightarrow S_1$  and  $S_0 \rightarrow S_2$**

MO	V1389a	V1389b
LUMO+1		
LUMO		
HOMO		
HOMO-1		
HOMO-2		

### 3. Conclusions

HTMs molecules exhibit charge transfer behaviour in partially in-plane/in-plane or twisted excited-state geometries that strongly depend on environmental parameters.

### Acknowledgments

Computations were performed on resources at the High Performance Computing Center "HPC Sauletekis" in Faculty of Physics, Vilnius University, Lithuania.

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## SPECIAL FEATURES OF IMPLEMENTING QOS IN NETWORK-BASED AUDIO ANALYTICS SYSTEMS

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### **Abstract**

This article examines the complexities of implementing Quality of Service (QoS) within network-based audio analytics systems, which are integral for the collection, transmission, processing, and analysis of audio data across network environments. By exploring the typical architecture and stages of QoS providing, special features of implementing QoS in network-based audio analytics systems are considered. Notably, the need to establish robust queue management mechanisms and optimize queue size and parameters is emphasized to ensure the required level of QoS. Addressing these challenges enables the optimization of network-based audio analytics systems' effectiveness and reliability across various applications and industries.

**Key words:** *quality of service, audio analytics systems, traffic classification, traffic policing.*

### **1. Introduction**

Network-based audio analytics systems represent sophisticated solutions that leverage network technologies for the comprehensive collection, transmission, processing, and analysis of audio data. With applications ranging from audio surveillance to sound signal analysis and voice analytics, these systems play a crucial role in various domains.

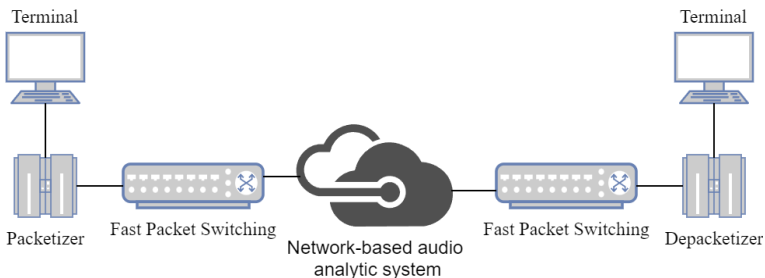
Quality of Service (QoS) stands as a cornerstone mechanism within computer networks, ensuring the management and guarantee of data transmission services' quality. The overarching aim of QoS is to maintain a specific level of reliability, throughput, delay, and other network parameters, tailored to meet the demands of specific applications or services. However, implementing QoS within network-based audio analytics systems presents unique challenges, primarily revolving around ensuring the stability of audio

data transmission and minimizing delays to facilitate quality audio information analysis.

Successful implementation of QoS within network-based audio analytics systems demands a good understanding of their architecture and operational requirements. By addressing these challenges and tailoring QoS mechanisms to suit the specific needs of audio data transmission, network-based audio analytics systems can achieve optimal performance and reliability across diverse applications and industries.

## 2. QoS in network-based audio analytics systems

Network-based audio analytics systems are comprehensive software or hardware-software solutions that utilize network technologies for the collection, transmission, processing, and analysis of audio data [1]. These systems are employed for various purposes, including audio surveillance, sound signal analysis, voice analytics, and others. The typical architecture of a network audio analytics system is illustrated in Figure 1.



**Figure 1. Architecture of a network-based audio analytics system**

Quality of Service serves as a mechanism used in computer networks to manage and guarantee the quality of data transmission services [2]. The primary goal of QoS is to ensure a certain level of reliability, throughput, delay, and other network parameters to support the requirements of specific applications or services. Implementing QoS in network-based audio analytics systems has its peculiarities, as it is crucial to ensure the stability of audio data transmission and reduce delays to ensure quality audio information analysis.

Typically, the main stages of ensuring QoS include traffic classification and marking, traffic policing, and the application of queuing and traffic shaping mechanisms. Through classification and marking, traffic is categ-

rized into classes to determine processing priority. Traffic policing is used to limit or regulate the amount of data transmission through the network interface to a certain level, according to pre-established rules and parameters. In cases where traffic requires limitation or prioritization, packets may be queued according to their QoS class. Traffic shaping involves regulating the level of outbound traffic to reduce congestion or harmonize traffic volume.

These QoS implementation mechanisms may not always be suitable for modern network-based audio analytics systems due to their more complex architecture [3]. In the context of network-based audio analytics systems, it is important to consider the specifics of data packetization and depacketization, as well as potential encryption, which may affect queue management mechanisms and QoS provisioning. Since all secured traffic passes through a packetizer, it is crucial to establish queue management mechanisms both at the output and input of this device. This allows for managing data flows before packetization and after depacketization, ensuring the required level of QoS.

Queue size and queue management parameters should be established considering the bandwidth requirements of the packetizer and cryptographic algorithms (if present). This may involve determining the maximum allowable delay and queue volume for each type of traffic. Using multiple queues with different priority levels enables processing high-priority traffic with minimal delay while still providing access to resources for less critical traffic types. However, it is necessary to avoid situations where less important traffic is blocked in the queue and does not receive sufficient resources due to the intense flow of more prioritized data.

### 3. Conclusions

Achieving effective QoS in network-based audio analytics systems requires a comprehensive understanding of their architecture and operational intricacies. By addressing these challenges, it is possible to enhance the performance and reliability of such systems across various applications and industries, ultimately advancing the state-of-the-art in audio data analysis and network-based technologies

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## DEVELOPMENT OF A DISTRIBUTED ENTERPRISE INFORMATION SYSTEM USING MULTIDIMENSIONAL DATABASES

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### Abstract

The food service industry, with its multi-location operations, faces significant challenges due to disconnected data systems. This research aims to solve this issue by implementing a cutting-edge solution. We propose a centralized, cloud-based, multi-dimensional database system, hosted on AWS, to integrate data from numerous sites and franchises. This innovative system efficiently manages and synchronizes diverse datasets, spanning across multiple restaurant locations. By harnessing AWS's capabilities, we demonstrate how real-time data access and in-depth analysis can be achieved, enabling improved decision-making and efficient resource management. The potential of this approach to enhance visibility, reduce waste, and boost profitability, across various restaurant chains, is explored. We conclude by underscoring the system's ability to foster seamless data coordination and its resultant positive impact on business performance.

**Key words:** *Multi-Dimensional Data, Disparate Systems.*

### 1. Introduction

The food service industry, known for its fast-paced environment and distributed nature, frequently struggles with managing and analyzing operational data. The use of separate systems for ordering, inventory management, and staffing leads to isolated data pockets, hindering effective coordination. This issue is particularly pronounced in chain restaurants, where analyzing data across multiple locations becomes a complex task.

Enter Distributed Enterprise Information Systems (DEIS), designed to integrate diverse operating systems and enable seamless data exchange. When combined with the power of multidimensional (MD) databases, these systems elevate data management and analysis to a whole new level. MD

databases are adept at handling and interpreting data across numerous dimensions, offering profound insights into critical success factors. (Alexandru-Florian Antonescu, 2014)

This conference paper delves into the potential of DEIS and MD databases to revolutionize the food service industry. It explores how these innovative solutions can enhance efficiency, drive profitability, and elevate customer experiences. The paper specifically focuses on the unique challenges faced by food service businesses, such as optimizing inventory, analyzing sales trends, and creating tailored customer journeys.

What sets this paper apart is its in-depth exploration of a comprehensive system architecture and implementation strategy. It aims to guide food service enterprises in harnessing the potential of DEIS and MD databases. By tailoring the approach to the industry's distinct needs, the paper offers a roadmap for successful technological integration. This includes strategies to streamline operations, minimize costs, and empower data-driven decision-making.

Recognizing the real-world complexities of implementation, the paper also discusses the challenges of data integration and user adoption. Emphasizing the importance of data quality, it provides practical insights for food service businesses looking to leverage DEIS and MD databases to gain a competitive edge.

### **Overview**

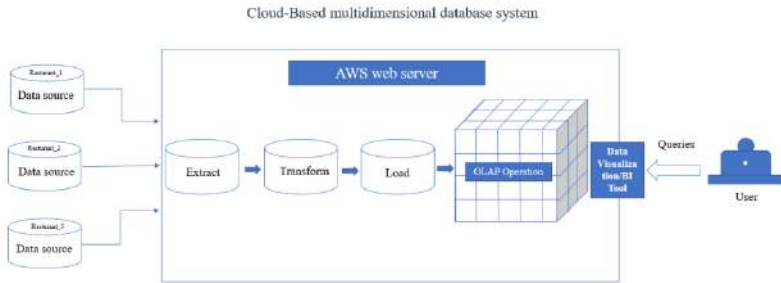
This work discusses the advantages, disadvantages and conclusions on the following issues:

- **Data Integration:** Seamlessly integrate diverse datasets from multiple sources from across the food serving enterprise, including POS, inventory, and online ordering systems.
- **Real-Time Accessibility:** Ensure instant access to the latest data across all locations, enabling prompt actions and decisions
- **Significant Initial Outlay:** Setting up the system requires substantial investment in hardware, software licenses, and expert consultation.
- **Complex Integration Process:** Integrating diverse datasets and systems involves intricate work and potential compatibility challenges.

### **Decision**

Based on the findings of this research, the implementation of a centralized, cloud-based, multi-dimensional database system is strongly recommended for food service businesses. The benefits of such a system include

improved data integration, enhanced operational efficiency, and reduced waste. (Syed, 2015)



The use of Amazon Redshift, with its scalable architecture and advanced analytics capabilities, is a suitable choice for managing and analyzing large volumes of data. The ETL pipeline process outlined ensures efficient data extraction, transformation, and loading, enabling real-time synchronization and analysis.

Food service businesses should embrace the potential of cloud technology and the insights it can offer. By leveraging OLAP capabilities and the multidimensional aspects of the database, businesses can make informed decisions, optimize their operations, and enhance their overall performance. (What is OLAP (Online Analytical Processing)?, n.d.)

For seamless integration, it is further recommended to customize the system according to each restaurant's specific needs, ensuring compatibility with existing software and processes. This may involve tailoring the database structure, user interfaces, and analytical tools to match the unique requirements of each location.

## Conclusion

this research has explored the potential for significant improvement in the food service industry's operational efficiency and overall success through innovative technological integration. Specifically, we have examined the advantages of implementing centralized, cloud-based, multi-dimensional database systems, highlighting their ability to revolutionize data management and analysis.

The findings emphasize the benefits of enhanced data integration, real-time accessibility, and in-depth insights, which collectively improve decision-making and resource optimization. By adopting such systems, food

service businesses can elevate their performance, reduce operational waste, and boost profitability.

While the advantages are compelling, this research also acknowledges the challenges and costs associated with implementation. These include the initial setup costs, complex integration processes, and the criticality of data security and reliability. However, with careful planning and tailored solutions, these potential disadvantages can be mitigated.

This work serves as a guide, encouraging food service enterprises to embrace the power of distributed enterprise information systems and multidimensional databases. By leveraging the capabilities of cloud technology and advanced data analytics, businesses can gain a competitive edge in a dynamic market.

The future of the food service industry lies in its ability to adapt and integrate cutting-edge solutions, enhancing the customer experience and driving sustained success.

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## AN EXPERIMENTAL APPROACH TO SECURING SERVERS BY THE PORT KNOCKING METHOD WITH ROUTEROS

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### Abstract

In computer networks the access to services is commonly provided by opening ports in the router firewall. This paper will focus on the port knocking method for augmenting the computer security of networks. It provides an overview of the technique and discusses some of the modern implementations, namely using Software Defined Networking and P4. A discussion of the implementation of port knocking with routers running RouterOS, supplied by MikroTik, is also presented with some experimental details. The knockd implementation is also shortly discussed. Although the port knocking technique greatly enhances the computer security of network access to services, even with poor implementations, there are advices to follow that are listed in this paper.

**Key words:** *computer security, internet firewall, port knocking, routing, software defined networking.*

### 1. Introduction

The port knocking method was proposed in 2003 by Martin Kryzwinski [1], but it remains a technique more relevant than ever before. A large number of cyberattacks start with a port scanning to the computers and routers attached to a certain network. The scanning purpose is to determine which services and operating system versions are running in the computer servers in the network. This knowledge allows the attackers to exploit eventual vulnerabilities of these computer systems. Internet-connected machines may be protected by filtering packets, or trust application-level security. Firewalls implement the first method and are Internet devices with software designed to filter or produce log files reporting unwanted network traffic. However, firewalls do not protect against the exploitation of application-level software vulnerabilities. The Internet architecture is

designed in a way that services attached to a port should be accessible by any machine using the Internet protocols.

Another set of software is based on the deployment of strong application-level security mechanisms. These are usually built above the network level and are subject to attacks when discovered on a server. A very useful method to avoid many cyberattacks is to have all the server or router service ports initially closed and to only open the port of the router/server for connection to a client after a certain well defined sequence of connection requests to certain ports is performed. This method is designated by port knocking and although *per se* it is already very secure, additional techniques further the safety.

A short enumeration of the advantages of port knocking are:

- the practical impossibility to assert whether port knocking is implemented on the router/server;
- intrusion detection systems (IDS) and firewalls providing access control;
- the enormous challenge to detection by sniffing;
- the room available for improving the technique.

Nevertheless there authors pointing to the shortcomings of port knocking, namely Sristava *et al.* [5] and Pali and Amin [6], among others. Some solutions are based on black listing after wrong scan, dynamic change of port knocking sequences after some sort of assymetric ciphered message exchange [8]. Another proposal for improvement is a two level host authentication [7].

In this paper a short review of the port knocking method is presented. Several implementations such as the *knockd* server, or only *firewall* based port knocking, such as *iptables* or *nftables* are discussed. Modern Software Defined Networking (SDN) proposals are briefly discussed, namely with P4. An implementation with the RouterOS firewall is detailed and discussed and some examples are given, along with some Python port knocking scripts.

The document has the following structure. The first section defines the problem, presents the authors contributions and the contents of each part of the paper. In the second section the authors present a short review of the state of the art. In the third section the experimental details of the RouterOS implementation of port knocking is discussed. Finally the last section is devoted to the conclusions.

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**Experience:** Associate Professor IPBeja (3y), Assistant Professor IPBeja (23y), Assistant Professor ENIDH (1y), Assistant Professor IP Setúbal (1y), Assistant Teacher FCT-UNL (1), University Teacher (2y), Electronics and Telecommunications technician (1y). Member of IEEE (32y), Member of the SEPSI Lab (<http://sepsi.ipbeja.pt/jasnau.html>)

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## **EFFECTIVE DIFFUSION COEFFICIENT AND EFFECTIVE MEDIA THEORY FOR RANDOM WALKING ON 2D LATTICE WITH INCLUSIONS**

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Discrete two-dimensional periodic system of squares with impenetrable inclusions is considered. Non monotonous effective diffusion coefficient  $D_{eff}$  dependence on inclusions' volume fraction  $f$  is analyzed. It is shown that modified Maxwell-Garnett equation [1] for  $D_{eff}$  applicability extends to inclusions' volume fraction close to 1. Theoretic estimation of  $D_{eff}$  for  $f$  values in the limit  $f=1$  are given. Results are confirmed by computer simulation for growing period  $L$  values (measured in elementary hopping lengths). Function  $D_{eff}(L)$  is analyzed and essential differences from diffusion theory results are stressed.

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DOI <https://doi.org/10.30525/978-9934-26-459-7-7>

## **IMPACT OF ARTIFICIAL INTELLIGENCE ON STRATEGIC AND OPERATIONAL DECISION MAKING**

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### **Abstract**

Artificial intelligence (AI) is being widely used in both operational and strategic decision-making processes in the modern world. These choices have a major impact on how companies develop and, ultimately, how successful they are. Although managers are generally aware of the benefits that AI offers in various domains of decision-making, they frequently run against unanticipated obstacles that prevent them from achieving their goals. Thus, it becomes necessary to investigate the positive and negative effects of AI on operational and strategic decision-making. Such investigation helps determine whether AI is appropriate in a variety of decision scenarios and clarifies the complex consequences of the technology. In order to facilitate the wise deployment of AI in various decision scenarios, this research aims to disentangle the complex relationship between AI and decision-making.

**Key words:** *Artificial Intelligence, Strategic decision-making, and operational decision-making.*

### **1. Introduction**

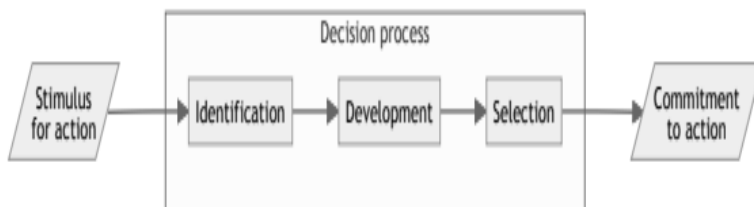
To get a comparative advantage and generate a new revenue stream most organizations in the world can integrate artificial intelligence into their business decision-making. In an organization, the role of the manager is to make decisions and then become responsible for decision outcomes. Making informed choices is an ability of the manager (Sayegh, Anthony & Perrewé, 2004). In the research, there is a huge interest in the topic of decision-making because of the most important role of decision-making in the organization's success along with the decision-making's complex and challenging nature. Lammers (2019) stated that within an organization flow of decisions, information, operations, and control are represented through the central line of formal authority. At each level of an organization, the data related to the performance of the operations within an organization are

collected. All of the data related to the operation performance are collected and then developed structure report which is sent to the upper authority to make a decision which is called the management information system. Management information systems are used in the decision-making process within an organization. From identification of a need to decide on the commitment to the action contains a different phase and this process is called the decision-making process (Perkins & Rao, 1990). Chiheb, Boumahdi and Bouarfa (2019) mentioned that there are different steps and three phases of the decision-making process.

**Identification:** In the decision process, there is a recognition of an opportunity and the problem at the identification phase. At this phase, the problem is identified.

**Development:** In the second phase of the decision process, the design of tailor-made solutions or ready-made solutions is searched.

**Selection:** In the case of a group decision, bargaining, analysis of alternatives, and personal judgment are used to select the best solution for a problem.



**Figure 1.1. Mintzberg's Structure of Decision-Making Chiheb, Boumahdi and Bouarfa (2019)**

A large number of the decisions we make at the lower level of an organization and the decisions that are made at the lower level are ambitious, less elastic, and shorter duration. They were more structured decision-making at the lower level within an organization (Papadakis, Lioukas & Chambers, 1998). There is no classification of the decision rather there are certain criteria based on which the decisions can be classified. Criteria of decision-making include importance, process, functional area, frequency, and structure (Beckers & Bsat, 2002). Mostly there are three types of decisions within an organization;

**Strategic:** Organizations are greatly affected by the strategic decision making including the decisions related to acquisition and investment (Alzoubi & Aziz, 2021).

**Administrative:** Administrative decision-making has not a significant impact on the success of an organization. Administrative decision-making is an unstructured process. these are the decisions which are taken on a routine basis. Administrative decision-making includes the decisions related to the budgeting of an organization's planning and coordination (Aguinis & Burgi-Tian, 2021).

**Operative:** With the readymade solution there is a predetermine phases in an operated decision making and operating decision-making has a limited impact. Operating decision-making includes librarians searching for a reference and workers starting a machine (Khalifa, 2021).

Ford and Gioia (2000) stated that judgment at the basic factor behind business decision-making around 50 to 70 years ago. Intuitions of professionals are used to decide on an organization. Organizations rely on the experience of professionals to approve financial investments and determine the optimal inventory levels. To differentiate the risky or safe business decisions, high or low, and good or bad business decisions, one of the primary ways which was used by businesses in the past was gut instinct. Due to cognitive biases, intuitions are not a good decision-making instrument. To make operational decisions, many organizations use the data-driven approach these days. A central processor in the data given decision-making is also human judgment. There are certain limitations to this approach. Artificial intelligence helps in structuring the data which makes the decision effective. Without error, large amounts of the data are summarized by artificial intelligence which is used in decision-making (Wong & Wang, 2003).

### **Overview**

This work discusses the following topics:

1. Reasons behind the use of AI in decision-making.
2. Role of AI in strategic and operational decision making.
3. Challenges companies face while implementing AI in decision-making
4. Strategies used to deal with the challenges faced while implementing AI in decision-making.

### **Decision**

To determine the impact of artificial intelligence on strategic and operational decision making, an interview is conducted. This is an structured

interview and interview is taken from those managers which used the AI in strategic and operational decision making. From the data collected through interview, it is determined that AI is most effective in which types of decisions( strategic or operational decisions).

### Conclusion

Artificial intelligence play a very important role in doing the repetitive tasks and has positive impact on the operational decision making. While strategic decision making required the critical thinking and considered many other factors and AI is not an effective outcome in strategic decision making.

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## PRIVACY AND SECURITY IN THE INTERNET OF THINGS ERA

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### **Abstract**

Since the third era of globalisation started by 1989 and continues today, according to United Nations Population Fund records approximately 8.5 billion people will be living in big cities by 2030. People are swarm into big cities for a new job, opportunities and better life standart. This situation causes big problems in cities such as urban sprawl, air pollution, waste of water sources, increasing criminal rates, traffic congestion, sustainability and so on and so forth. On the other hand, security and privacy concerns become a real problem, The increase of interconnected devices poses significant risks including cyberattacks, data breaches, unauthorised surveillance. We will address these crucial issues by proposing robust cybersecurity measures, data encryption protocols, privacy-enhancing technologies to decrease risks and build trust in IoT-enable smart city initiatives.

**Key words:** *Internet of Things, privacy, cyberattacks, protection protocols, vulnerability.*

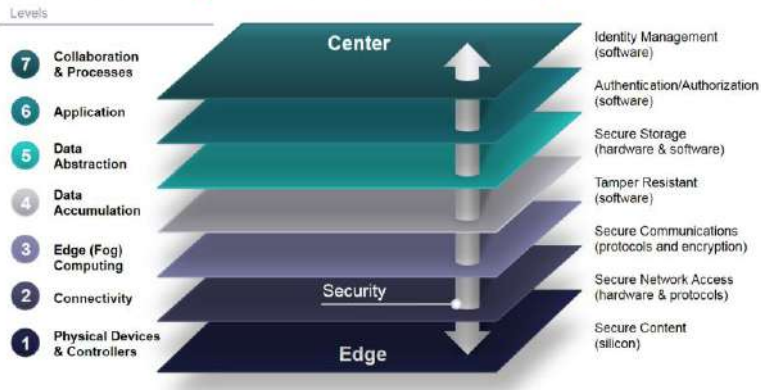
### **1. Introduction**

In today's digital world, the growing number of connected devices has brought about a big change in how technology advances and makes things easier.

IoT devices became a necessity for daily life, business models and even city planning. However besides all the benefits of IoT devices, there are some critical issues about privacy and security. The intertwining of privacy and security issues within the IoT ecosystem raises critical questions regarding the safety of personal information, the prevention of unauthorised access, the softening of potential risks and vulnerabilities.

We can see the reference model of IoT below.

## Internet of Things Reference Model: Security



Security is one of the most important requirements for an IoT system architecture. Somehow, it also happens to be one of the key challenges facing IoT architecture, and IoT devices themselves. Broadly, the IoT **security** layer comprises three main aspects:

- **Equipment Security:** involves the actual IoT devices, and protecting these endpoints from malware and hijacks
- **Cloud Security:** with most IoT data being processed in the cloud, cloud security is crucial to prevent data leaks
- **Connection Security:** focused on securing data transmitted across networks, primarily with encryption. The transport layer security (TLS) protocol is considered the benchmark for IoT connection security

We will dive into those aspects and provide the most efficient model for secure IoT devices.

### Overview

The Internet of Things (IoT) has revolutionised the way we interact with technology, connecting billions of devices and generating huge amounts of data. However, this unprecedented connectivity also brings significant challenges in terms of privacy and security. In this thesis, we explore the evolving landscape of privacy and security in the IoT era, addressing key concerns, identifying common threats, and proposing mitigation strategies. By examining the intersection of technology, policy, and user behaviour, I aim to contribute to the development of robust solutions that safeguard individual privacy and enhance the security of IoT ecosystems.

### **Decision**

The Internet of Things (IoT) connects lots of devices, like smart thermostats and fitness trackers, to make our lives easier. But sometimes, these devices can cause privacy and security problems. This thesis explores these issues and suggests ways to keep our information safe. We'll look at what goes wrong, what we can do about it, and how everyone—from regular people to big companies—can make smart choices to protect our privacy and security online.

### **Conclusion**

In conclusion, this thesis has explored critical points of privacy and security in IoT. Through a comprehensive examination of emerging threats, vulnerabilities and mitigation strategies, gained valuable insights into the complexities of safeguarding IoT devices and ecosystems.

By advocating for robust security practices, such as encryption, authentication, and regular updates, we can enhance resilience against malicious actors and mitigate the risks posed by evolving cyber threats.

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## INNOVATION TRAINING CENTER BUSINESS AUTOMATION

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### **Abstract**

Currently, business automation is an actively developing area of the training center industry and beyond. Because automation is a relatively young field, best practices and standards do not yet exist. Currently, there are many approaches and tools on the market used by different companies. Some of them are useful and can actually save companies money in the software development process. However, some approaches and tools are just a waste of resources. With the variety of tools and approaches, it can be difficult to find the right way to configure an automation solution. This work is an attempt to find a better way to do this.

**Key words:** *automation testing, quality control, test automation tools.*

### **1. Introduction**

Considering that many business/work processes are being automated, I chose the field of training centers. Automation of training centers at first glance is very simple, but if you study this area more deeply, there are a lot of factors. Nowadays, business automation has become very popular, from sewing workshops to huge business processes. This software will help training centers automate the business process. If we go back in history and take into account the analysis of training centers, many managers entered their work in various programs such as MS Office. Since all computer owners use this software, it was difficult to offer an analogue to this product. Our software will help training centers integrate all big data such as: Finance, Data Accounting, Marketing and so on. To develop this software you need to conduct research and identify the problem in the training centers and all the shortcomings in their work and what they need.

Business automation in training centers can be useful for several reasons:

Process optimization: Automation allows you to reduce the time spent performing routine tasks, such as registering for courses, accounting for payments and generating reports. Increasing efficiency:

Automated systems can help optimize class scheduling, manage resources, and improve the quality of training. Improved customer experience: Ease of registration for courses, quick access to information and convenient interaction with the training center create a positive experience for customers.

Analytics and reporting: Automation systems provide data to analyze business performance and make informed decisions for its development.

Reduce Costs: Automation can reduce the costs of administrative tasks and resource management, which ultimately increases business profitability.

### **Overview**

This work discusses the advantages, disadvantages and conclusions on the following issues:

- Testing only on real cases
- Long process testing and software development
- Convenient UI/UX and use program
- Facilitation of many work processes
- Saving time and money

### **Decision**

As an example, let's take one training center's results before and after installing the software.

#### **BEFORE:**

- data accounting in MS Office;
- manual financial accounting;
- manual recording of student attendance;
- counting days and holidays manually;
- creating different classrooms and courses manually;
- manual registration of applications for studies;
- without CRM.

#### **AFTER:**

- accounting of all data in one place;
- automatic calculation of salaries for teachers for each lesson taught;
- before visiting, each student makes a FACE ID for registration;
- the administrator of the training center indicates to the program that X-day is a holiday;
  - the administrator creates a separate office, for example, the DESIGN office, office – 203, teacher Tairov Temur-Malik;

- new applications within the program;
- CRM accounting.

**Conclusion**

Automation improves profitability and reduces operational costs, especially in departments with manual, paper-based workflows. By making internal processes run faster, spending less time and money on needed resources, employees can focus on more important tasks.

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## TESTING AUTOMATISATION IN MODERN WEB-APPLICATIONS

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### **Abstract**

There are many different programming languages, frameworks and architectural styles available today for developing web services. It is often difficult for a developer to decide what the best implementation solution would be and how it would affect system performance.

**Key words:** *automation testing, quality control, test automation tools.*

### **1. Introduction**

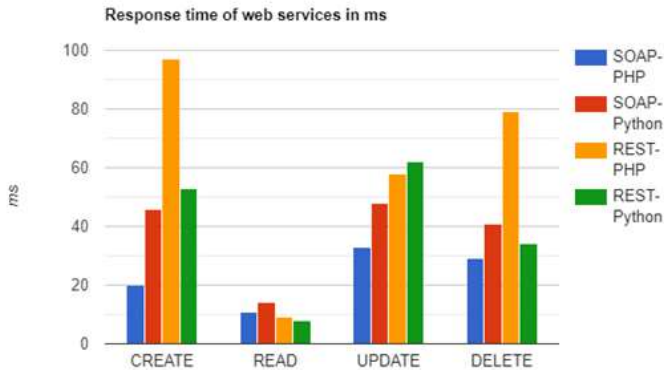
Web services have acted as the catalyst for digital transformation over the past two decades. What began as basic protocols designed to foster inter-system communication have matured into sophisticated architectures that ensure seamless data exchange across diverse platforms. The transition from the monolithic constructs of the early 2000s to today's agile microservices demonstrates the adaptability of web services, echoing the ever-changing tech environment. By offering standardized interfaces, web services have not just promoted system compatibility they have been the bedrock for innovation, enabling businesses to integrate various software components with ease [1].

However, with the diversification of web service technologies, a significant challenge has emerged: the conundrum of selection. Developers and enterprises find themselves navigating a complex array of programming languages, developmental frameworks, and architectural patterns. While this vast array of choices showcases the rich evolution of web technologies, it often introduces uncertainty. The technological choices made have lasting implications, affecting a system's efficiency, scalability, and maintainability. Thus, the need for an evidence-based assessment of these tools and architectures is paramount [2].

### **Overview**

The experimental section of this research stands as its backbone, offering tangible insights into the actual workings and efficacy of web services

implemented using different paradigms and languages. This section encapsulates the meticulous process of setting up, developing, testing, and evaluating web services. While the choice of languages, PHP and Python, and architectures, REST and SOAP, might vary, a few constants persist, ensuring uniformity in evaluation and analysis.



Methodology: Using Apache JMeter, a series of CRUD (Create, Read, Update, Delete) operations were sent to each of our web services: SOAP-PHP, SOAP-Python, REST-PHP, and REST-Python. The objective was to monitor and compare the response time (in milliseconds) for each type of request across the services.

### Decision

My analysis reveals the strengths and potential weak spots of each web service, laying a foundation for further refinement and optimization. While certain services like SOAP-PHP shine in many aspects, others like REST-Python raise flags in specific scenarios. Ultimately, the choice and optimization of a web service will hinge on the specific use-case requirements, anticipated load, and the criticality of performance. This data-driven insight empowers developers and businesses to make informed decisions, ensuring web services that are both robust and efficient.

## Conclusion

As I conclude this research, it's essential to synthesize the findings, observations, and analyses into cohesive insights that have been derived from this experimental work. The primary aim of this thesis was to understand the nuances of different web services, contrasting and comparing their performance across various parameters, including response times and resource utilization.

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## SECTION 2. INFORMATION AND COMMUNICATION TECHNOLOGIES

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### RELIABILITY CRITERIA OF SOFTWARE TOOLS FOR REMOTE ADMINISTRATION

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#### Abstract

In the modern Internet, there are a vast number of risks associated with remote access to PCs, including traffic interception, personal data theft, and even file replacement with viruses. Therefore, it is crucial to pay attention to encryption methods and how traffic is transported over the Internet.

**Key words:** *efficiency, evaluation, software, remote administration, criteria, reliability.*

#### Introduction

Reliability of software is the ability of a software product to perform certain functions without failure under specified conditions for a specified period of time with a sufficiently high probability. The degree of reliability is characterized by the probability of the software product operating without failure for a certain period of time.

There are four main components of functional reliability of software systems:

- Fault tolerance: the property of a program to continue operating despite the presence of faults or errors.
- Performance: the property of a program to operate correctly (as expected by the user) throughout the specified period of use.
- Safety: the property of a program not to be dangerous to people and surrounding systems.

– Security: the property of a program to resist accidental or intentional intrusions.

In addition to the risks in the Internet space for remote access, a reliable physical connection to the global network is very important. When using remote access, the system administrator becomes highly dependent on the reliable operation of the power grid on the entire chain of network equipment, as well as on the reliable operation of the network equipment.

Based on this, the main risks for the user of remote access to a PC can be identified:

– The risk of remote rebooting of the PC, the system may not boot, as a result of which remote configuration of the PC will be impossible until local intervention.

– The risk of losing connection with the remote PC due to malfunction of the network equipment of the provider.

– The risk of losing connection with the remote PC due to the fault of the power supply of the intermediate equipment of the provider.

– The risk of losing connection with the remote PC due to the absence of power supply of the remote office and, as a result, the inability to remotely turn on and continue configuring the PC.

– The risk of losing connection with the remote PC due to the fault of the network equipment in the local network, the network equipment (switch, for example) may hang, as a result of which access to the PC will be impossible.

– There is a risk that part of the lightning discharge will get into the twisted pair, then all the network cards will burn out along the network distribution. In the case of a server, this is very critical. And in this case, the remote session will be irreversibly torn. In this case, access to the "network card" may help to see the affected areas.

– Risks associated with insufficient connection security. In remote access programs, there is the possibility of using a buffer exchange. There is a risk that during copying, a file may be replaced with a malicious one with the same name and size. As a result, there is a risk of getting a system infected with a Trojan in the best case, and in the worst case, getting a miner virus or a ransomware.

– When remotely connecting using remote access services from publicly available access points, especially WI-FI, there is a risk of intercepting login credentials and subsequently using them for malicious purposes.

– In the case of LiteManager, at first glance, it is a very convenient solution for remote administration. It consists of a server and client parts. Once installed on a remote PC, the server part can establish an unlimited

number of connections with the remote PC using a combination of ID and password. At first glance, everything is fine. However, the manufacturer company used a solution for processing connections similar to Torrent. Any interested person can install the NOIP Server on their PC and intercept all encrypted traffic passing through their server. This is a huge risk and a security hole for the program and the network in which it is installed.

In connection with the constant growth of attacks on local networks, new vulnerabilities are constantly being discovered in software and, as a result, a new type of attacks appears. Under these conditions, responsible systems for the security of remote access must be able to withstand various attacks, both external and internal, automated and coordinated. Sometimes an attack lasts a few seconds, sometimes probing vulnerable spots is slow and stretches over hours, so suspicious activity is practically invisible. The goal of attackers may be to violate all components of information security – availability, integrity, or confidentiality. The main threats to information security include:

- disclosure of confidential information;
- compromise of information;
- unauthorized use of resources of the local computing network;
- improper use of its resources;
- unauthorized exchange of information;
- denial of information;
- denial of service.

Means of implementing the threat of disclosure of confidential information may be unauthorized access to databases, eavesdropping on local computing network channels, etc. In each case, obtaining information that is the property of some person (or group) causes substantial harm to its owners.

Compromise of information is typically carried out by making unauthorized changes to databases, as a result of which the user is forced to either abandon it or spend additional efforts to detect changes and restore true information. In the case of using compromised information, the user may make incorrect decisions with all the consequences that follow.

Unauthorized use of local computing network resources, on the one hand, is a means of disclosing or compromising information, and on the other hand, has independent significance, since, even without touching user or system information, it can cause certain damage to subscribers or administration of the local computing network. The extent of damage can vary widely – from reducing the receipt of financial resources to the complete failure of the network.

Improperly sanctioned use of local computing network resources can also lead to the destruction, disclosure, or compromise of the specified resources.

This threat most often is a result of errors in the software of the local computing network.

Unauthorized exchange of information between subscribers of the local computing network can lead to one of them receiving information that is forbidden to access, which is equivalent in its consequences to the disclosure of information.

Refusal of information consists in the denial by the addressee or sender of this information of the fact of its receipt or sending. This, in particular, can serve as a reasoned reason for one of the parties to refuse a previously supported agreement (financial, trade, diplomatic, etc.) "technically", formally not refusing it, thus can cause significant damage to the other side.

Refusal of service is a very significant and quite common threat, the source of which is the local computer network itself. Such a refusal is especially dangerous in situations when a delay in providing network resources to the subscriber can lead to serious consequences for him. For example, the absence of data necessary for decision-making in the subscriber may be the cause of his irrational or non-optimal actions.

### **Conclusions**

Reliability of software is crucial for the successful performance of its intended functions without failure. The main components of functional reliability of software systems are fault tolerance, performance, safety, and security. Remote access to a PC poses various risks, including remote rebooting, loss of connection, and insufficient connection security, which can result in unauthorized access, compromised information, and unauthorized use of resources. Responsible systems for remote access security must be able to withstand various attacks and protect against disclosure, compromise, and denial of information or service

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## **AUTOMATED DRONE CONTROL SYSTEM**

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### **Abstract**

The utilization of unmanned aerial vehicles (UAVs), commonly known as drones, has seen a significant expansion across various sectors, including surveillance, agriculture, logistics, and emergency response. This proliferation necessitates the development of sophisticated Automated Drone Control Systems (ADCS) to ensure efficient operation, coordination, and safety compliance. This study introduces an innovative ADCS framework that leverages advanced algorithms for real-time data processing, autonomous decision-making capabilities, and integration with existing information networks. By analyzing the performance of this system in simulated environments, we aim to demonstrate its potential to enhance operational efficiency, response time, and adaptability in dynamic scenarios.

**Key words:** *Unmanned Aerial Vehicles (UAVs), Automated Drone Control System (ADCS), Autonomous Decision-Making, Real-Time Data Processing, Information Networks.*

### **Introduction**

In today's world, unmanned aerial vehicles (UAVs), commonly known as drones, are extensively used across various sectors – from agriculture and geodesy to search and rescue operations and delivery services. The increasing complexity of tasks performed by drones, as well as the necessity for their integration into broader information systems, necessitate the development of advanced control methods capable of ensuring autonomous operation, a high level of safety, and effective interaction among different drones. In this context, the development of an Automated Drone Control System (ADCS) emerges as a critical innovative task aimed at further advancement and optimization of UAV utilization across diverse activities.

The primary goal of ADCS is to minimize human intervention in the processes of mission planning, execution, and data analysis collected by

drones. This involves the use of complex algorithms for automatic route planning, real-time sensor data processing, decision-making based on the analysis of gathered data, and managing the flights of a drone group with minimal operator involvement.

Significant interest in ADCS is also driven by the need to enhance flight safety, particularly through the automation of response procedures to unforeseen circumstances, such as changing weather conditions or the emergence of obstacles on the route. Additionally, the integration of drones into accepted information systems requires the development of standardized communication protocols and data exchange, which represents another research direction within the ADCS creation framework.

Thus, the development of ADCS stands at the intersection of many scientific and technological disciplines, including artificial intelligence, data processing, cybersecurity, as well as technical regulation and standardization. This opens up broad opportunities for scientific research and the development of innovative solutions aimed at expanding the capabilities of drone usage in society.

### Overview

When developing software for automated drone control systems (ADCS), a comprehensive analysis and integration of several critical technical and operational parameters must be conducted. These parameters define the system's efficiency, safety, and reliability in dynamic and unpredictable environments. Here are the key elements that should be considered during development: **Flight Safety Aspects.** Ensuring reliable processing of input data from a multitude of UAV sensors is fundamental for obstacle detection, flight stabilization, and accurate navigation. The system must include mechanisms for autonomously responding to changes in conditions, such as worsening weather or loss of navigation system signals.

**Energy Optimality.** Algorithms for minimizing energy consumption by choosing the most efficient trajectories and regulating flight speed should be implemented. The software must adequately manage the limited energy resources of the battery, predicting operating time and optimizing energy distribution.

**Autonomy of Actions.** The integration of artificial intelligence and machine learning algorithms allows UAVs to independently recognize objects, make decisions, and adapt to environmental changes without operator intervention. In the case of using several UAVs, the software must ensure the synchronization of actions between devices to avoid collisions and optimize the overall mission efficiency.

**Integration and Compatibility.** A high level of integration with air traffic control systems, geographic information systems, and other external data sources must be ensured. The software architecture should be flexible, allowing easy addition of new features, integration of additional equipment, or adaptation to different types of UAVs.

**Information Protection.** It is crucial to implement robust protection mechanisms to ensure the security of communications between the UAV and the operator, as well as to protect stored data and software code. Advanced encryption methods should be used to protect transmitted data.

Developing an artificial intelligence algorithm that allows UAVs to autonomously recognize objects involves using deep learning and computer vision. Such an algorithm can be implemented through neural networks, specifically through Convolutional Neural Networks (CNN), which are the de facto standard for image recognition tasks. Here are the basic steps for developing such an algorithm:

1. **Data Collection.** The first step is to collect a large number of annotated images containing examples of objects that need to be recognized. These could be photographs of various objects from different angles and in different lighting conditions.

2. **Data Preprocessing.** The images need to be prepared for model training. This includes normalization (scaling pixel values), augmentation (applying random transformations to images to increase data diversity), and possibly object cropping.

3. **Model Architecture Selection.** Choosing the CNN architecture depends on the specific task. Popular architectures such as ResNet, Inception, or YOLO (for real-time object detection tasks) can be used as a starting point.

4. **Model Training.** The model is trained on the prepared dataset using the backpropagation algorithm. The training process involves optimizing the neural network's weights to minimize recognition error. Using regularization techniques, like Dropout, helps prevent overfitting of the model.

5. **Testing and Validation.** After training, the model is tested on a dataset that was not used during training to evaluate its ability to generalize recognition skills to new data. Assessing accuracy, recall, and other metrics helps understand the model's effectiveness.

6. **Implementation and Optimization.** The optimized and validated model is integrated into the UAV software. Further optimization may be necessary to reduce execution time and resource usage, especially for real-time use.

7. Continuous Learning. The development of the algorithm does not end with its implementation. Collecting data from real missions and analyzing it can be used for continuous improvement of the model.

### **Conclusions**

Developing software for automated drone control systems requires an interdisciplinary approach that combines knowledge in aerospace engineering, computer science, artificial intelligence, and cybersecurity. Considering the above aspects is key to creating effective, safe, and reliable UAV control systems.

This approach allows the creation of a powerful artificial intelligence system for UAVs, which can effectively recognize objects in various conditions, enhancing the autonomy and operational capabilities of drones.

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## RESEARCH AND SYNTHESIS OF A COMPUTERIZED CONTROL SYSTEM FOR MOVING OBJECTS

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### **Abstract**

The advancement of computerized systems for controlling moving objects such as drones, autonomous vehicles, and robotic systems presents significant technological and operational challenges. This research focuses on developing an integrated control system that utilizes real-time data processing, machine learning algorithms, and networked communication to enhance the autonomy and efficiency of moving objects. The proposed system aims to optimize route planning, object avoidance, and task execution in dynamically changing environments.

**Key words:** *Computerized Control, Autonomous Systems, Real-time Data Processing, Machine Learning, Networked Communication.*

### **Introduction**

In recent years, the rapid advancement of autonomous technologies has fundamentally transformed industries ranging from logistics and transportation to urban management and defense. The core of these transformations lies in the ability to efficiently and safely control moving objects – be it unmanned aerial vehicles (UAVs), autonomous vehicles, or robotic systems – in dynamically changing environments. The traditional control systems, largely manual or semi-automated, are increasingly proving inadequate in handling the complex decision-making required for high autonomy and real-time responsiveness. This necessitates a shift towards more sophisticated, integrated control systems that leverage advancements in computation, artificial intelligence, and communications technologies.

### **Overview**

A specific technical solution highlighted in these theses is the application of deep reinforcement learning (DRL) for autonomous drone navigation

in urban environments. This method involves training a neural network to make navigational decisions by interacting with a simulated environment in a trial-and-error learning process. The network learns to maximize certain outcomes based on the rewards it receives for successful actions.

To provide a comparative analysis of the Deep Reinforcement Learning (DRL) method for autonomous navigation against other prevalent methods, it is essential to consider several key dimensions such as adaptability, computational efficiency, and the ability to handle complex dynamic environments. Here, we'll compare DRL with two other popular methods: Rule-Based Systems and Supervised Learning Models.

### 1. Rule-Based Systems

**Description:** Rule-Based Systems operate based on predefined rules and conditions that dictate the behavior of the system. These rules are often designed based on expert knowledge and are straightforward in their implementation.

#### Advantages:

- **Simplicity:** Easy to understand and implement. The rules are explicit, making the system's decisions transparent and predictable.
- **Deterministic:** Provides consistent outputs for known situations, ensuring reliable operation under predefined conditions.

#### Disadvantages:

- **Limited Flexibility:** Struggles with novel scenarios not covered by existing rules. Adapting to new conditions requires manual updates to the rule set.
- **Scalability:** Managing and updating a large set of complex rules becomes cumbersome as the operational environment grows in complexity.

### 2. Supervised Learning Models

**Description:** Supervised Learning involves training a model on a labeled dataset, where the input data is mapped to known outputs. The model learns to predict the output from the input data.

#### Advantages:

- **Accuracy:** With sufficient training data, supervised learning can achieve high accuracy for tasks where the relationship between input and output is well-defined and stable.
- **Generalization:** Good at handling variations within the scope of the training data. It can generalize to new data that resemble the training set.

#### Disadvantages:

- **Dependency on Labeled Data:** Requires a large amount of labeled data for training, which can be expensive and time-consuming to obtain.

- **Poor Adaptation to New Scenarios:** May perform poorly in situations that deviate significantly from the training data. Adapting to new scenarios often requires retraining with new data.

### 3. Deep Reinforcement Learning (DRL)

**Description:** DRL allows agents to learn optimal behaviors through trial-and-error interactions with a dynamic environment, using a reward system to reinforce good behaviors.

#### Advantages:

- **Adaptability:** Excellently handles dynamic and uncertain environments by continually learning from interactions, making it suitable for complex scenarios like urban drone navigation.

- **Continuous Learning:** The ability to learn continuously from ongoing interactions allows the model to improve over time and adapt to changes in the environment.

#### Disadvantages:

- **Computational Intensity:** Requires significant computational resources for training, especially in environments with large state and action spaces.

- **Convergence Issues:** Training can be unstable or slow, and finding the optimal policy can be challenging without careful tuning of the reward structure and learning parameters.

#### Comparative Analysis

- **Flexibility and Adaptability:** DRL outperforms Rule-Based Systems in adaptability and flexibility, as it does not rely on predefined rules and can adapt to new scenarios over time. While Supervised Learning models generalize well within the scope of their training data, they lack the continuous adaptability that DRL offers.

- **Operational Efficiency:** Rule-Based Systems are highly efficient during operation as they do not require real-time computation beyond rule evaluation. In contrast, both DRL and Supervised Learning require significant computational resources, with DRL often requiring more due to its ongoing learning process during operation.

- **Robustness in Dynamic Environments:** DRL is inherently designed for dynamic environments and can handle complexities that are challenging for Rule-Based and Supervised Learning models, which both require modifications or retraining to adapt to new changes.

## Conclusions

This overview and the detailed discussion of a specific technical solution demonstrate the potential of the proposed computerized control system to enhance the autonomy, efficiency, and safety of moving objects. The integration of edge computing and deep reinforcement learning into the system architecture not only addresses the immediate challenges of autonomous navigation but also sets a scalable model for broader applications in various domains.

This detailed overview provides a comprehensive understanding of the system's architecture, its components, and the innovative application of deep reinforcement learning, positioning the research at the forefront of technological advancements in automated control systems for moving objects.

In conclusion, while each method has its strengths and weaknesses, DRL offers a promising approach for scenarios requiring high levels of autonomy and adaptability, despite its higher computational demands and complexity. This makes it particularly suitable for applications such as autonomous drone navigation in unpredictable urban environments.

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## **TRANSFORMATIVE POWER OF GENERATIVE AI: BUSINESS APPLICATIONS AND EMERGING CHALLENGES**

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### **Abstract**

Generative artificial intelligence (Gen AI) has become a crucial aspect of modern business operations, revolutionising management practices across industries. This paper summarises research findings on the current adoption of Gen AI and highlights its positive and negative impacts on businesses of all sizes and industries. Although Gen AI holds great promise for enhancing innovation, productivity, and operational efficiency, there are concerns about its safety, reliability, and potential impact on employment. To harness the transformative potential of Gen AI while mitigating the associated risks to sustainable business growth, it is essential to engage in strategic planning and proactive risk management.

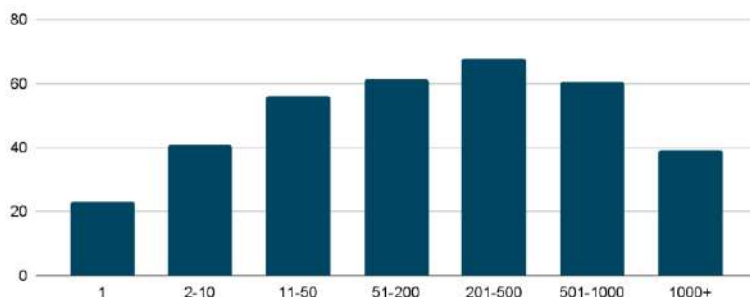
**Key words:** *artificial intelligence for business, implementation of artificial intelligence on business processes, tools for entrepreneurship, changement of business administration, use of generative artificial intelligence (Gen AI) for business purposes.*

### **1. Introduction**

Generative Artificial Intelligence (Gen AI) sparked a surge of interest in 2022, leading to a rapid expansion of tools in 2023 that have impacted numerous areas of life, including business operations and management. The survey conducted by QuantumBlack AI, by McKinsey, reveals that 79% of respondents have had some exposure to AI on or off the job. Moreover, more than a third of respondents reported that their organisations regularly use Gen AI in at least one business function [1]. These findings demonstrate that new technologies have already had an impact on business principles and offer valuable insight into the direction they may take in the near future.

## 2. The current state of Gen AI in the business world

The integration of Gen AI into business processes is gaining momentum, with a significant portion of companies incorporating these tools into their operations. Surveys indicate that adoption rates vary depending on the size of the company, with those ranging from 201 to 500 employees showing the highest adoption rate at 67.6%. Looking at a broader spectrum, companies with 11 to 1000 employees maintain an average adoption rate of 61.5%. However, smaller companies with 1 to 10 employees exhibit lower adoption rates, averaging at 30% displayed on figure 1 [2].

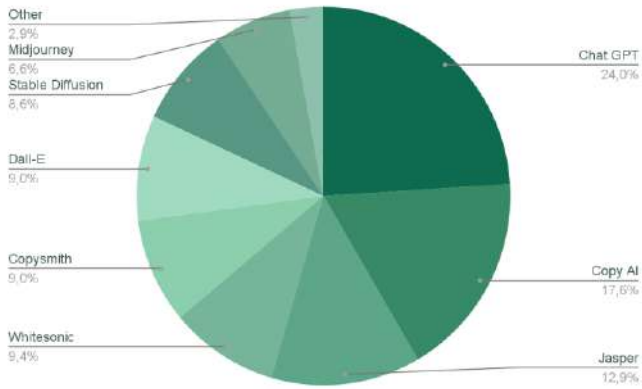


**Figure 1. Use of artificial intelligence based on the the company size [2]**

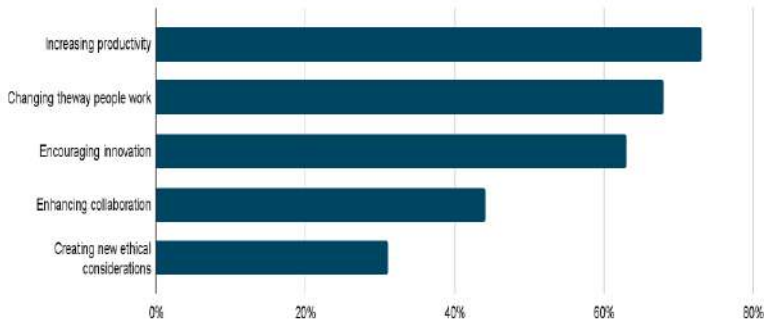
IBM's 2021 study further underscores the trend, revealing that larger corporations are 70% more inclined to implement AI into their business strategies compared to smaller counterparts.

Additionally, within organisational settings, text-based tools prove to be the most popular choice among users, outweighing the preference for image-based alternatives. Among these tools, ChatGPT emerges as the frontrunner, capturing the interest of over a quarter of users displayed on figure 2 [2].

The new tools are most commonly used in business functions such as marketing and sales, product and service development, and service operations like customer service and back-office support. They have increased productivity and relieved employees of monotonous work, allowing them to focus on more complex tasks in a more creative way displayed on figure 3.



**Figure 2. Top Gen AI Tools Used in the Workplace [2]**

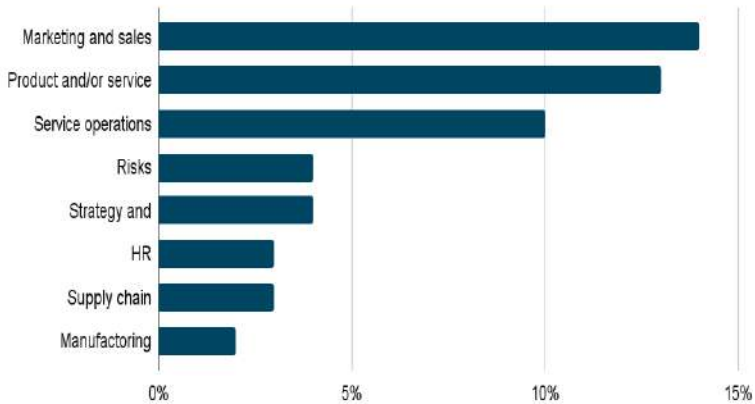


**Figure 3. Gen AI adoption changes employee performance [3]**

As a result, the implementation of Gen AI provides more opportunities for business development and fundamentally alters the way business is conducted.

### **3 Key Business Processes for Gen AI Assistance**

Generative AI is transforming various sectors, including customer operations, marketing, sales, software engineering, and product research and development (R&D), displayed on figure 4.



**Figure 4. The use of Gen AI in different sectors [4]**

In customer operations, it has a significant impact by enabling digital self-service, accelerating issue resolution, and improving response times. AI-driven chatbots and instant access to customer data enhance customer satisfaction and streamline agent efficiency.

Generative AI has significant potential in marketing and sales, enabling personalised messaging, content creation, and lead prioritisation. This can result in increased engagement and improved sales productivity. Additionally, it can be applied in software engineering to accelerate coding processes, reduce time spent on tasks such as code correction and design, and enhance overall productivity.

Generative AI is becoming increasingly important in product research and development. It can optimise design processes, assist with product testing, and improve overall product quality. By selecting materials efficiently and optimising manufacturing processes, businesses can reduce costs and improve their products.

Generative AI is a transformative force across industries, offering significant productivity gains and operational enhancements. Its diverse applications highlight its potential to transform conventional workflows and stimulate innovation in the digital era.

#### **4. Concerns of Gen AI business adoption**

The integration of Generative AI (Gen AI) into business operations sparks a myriad of uncertainties and concerns among executives, hindering

broad adoption. Key among these concerns are issues surrounding security, reliability, potential job displacement, and the overall value proposition. Executives, as revealed in surveys, highlight challenges such as talent scarcity, cost constraints, and ambiguity in application domains as primary barriers to implementation [3].

In response to these uncertainties, governments worldwide have introduced regulatory frameworks like the US AI Bill of Rights and the EU AI Act, mandating businesses to consider both the benefits and consequences of Gen AI adoption. Compliance with such regulations becomes paramount for maintaining reputation and trust, especially given the predicted transformative impact of Gen AI across various business models.

Despite acknowledging Gen AI's potential to bolster stakeholder trust, executives express apprehension about its unintended consequences. Concerns range from inaccuracies in basic facts to the risk of compromising privacy, security, and compliance standards [3]. The unpredictable nature of Gen AI algorithms poses risks of alienating customers, damaging brands, and triggering employee anxiety due to potential job displacement or disruptions in work routines.

Moreover, budget constraints emerge as a significant barrier, particularly for smaller businesses and freelancers, limiting their ability to fully embrace Gen AI at scale. Respondents recognize the potential job security risks associated with Gen AI, particularly in administrative, customer service, and creative roles.

While Gen AI holds immense promise, the complexities and uncertainties surrounding its implementation underscore the critical importance of robust risk management strategies. Cybersecurity, privacy concerns, liability issues, and job displacement emerge as top priorities for risk management and mitigation efforts. As the business landscape navigates the transformative potential of Gen AI, careful consideration of risks alongside opportunities becomes imperative to ensure sustainable and responsible adoption.

## **5. Conclusions**

Generative Artificial Intelligence (Gen AI) has rapidly infiltrated various business sectors, impacting operations and management. Although adoption rates vary, concerns surrounding security, reliability, job displacement, and budget constraints hinder widespread implementation. Regulatory frameworks aim to address these concerns, emphasising the need for responsible adoption. Despite the challenges, Gen AI offers significant

productivity gains, especially in customer operations, marketing, sales, software engineering, and product R&D. Strategic planning and proactive risk management are essential for navigating the complexities of Gen AI integration and ensuring sustainable business transformation.

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## **CLOUD COMPUTING AND ITS IMPACT ON BUSINESS OPERATIONS**

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### **Abstract**

Cloud computing has revolutionized the way businesses operate, offering a wide array of advantages such as cost-efficiency, scalability, and enhanced collaboration. This article delves into the impact of cloud computing on business operations, using statistical data to highlight its benefits and challenges. From increased agility to improved data security, cloud technology continues to reshape industries, paving the way for a more connected and efficient future.

**Key words:** *Cloud Computing, Business Operations, Digital Transformation, Business Operations, Scalability, Cost-Efficiency, Agility, Collaboration, Innovation Data Security, Cost-efficiency, Scalability.*

### **Introduction**

In the realm of modern business, the evolution of technology has been a driving force behind efficiency, innovation, and competitiveness. Among the most transformative advancements is cloud computing, a paradigm shift that has revolutionized how organizations manage, store, and process data. According to a report by Gartner, global spending on cloud services is projected to reach \$661 billion by 2025, underlining the widespread adoption and significance of this technology.

### **The Rise of Cloud Computing:**

Cloud computing, simply put, refers to the delivery of computing services—including servers, storage, databases, networking, software, analytics, and more—over the internet ("the cloud"). This model eliminates the need for on-premises hardware infrastructure, offering businesses a

flexible and cost-effective alternative. The scalability of cloud services allows companies to adjust resources according to demand, optimizing efficiency and reducing operational costs.

According to Flexera's 2021 State of the Cloud Report, 92% of respondents reported having a multi-cloud strategy, indicating the prevalent use of multiple cloud services for varied business needs.

A study by IDC forecasts that by 2023, over 50% of global GDP will be digitized, driven by enterprises' efforts to offer customers digitally enhanced products and services through cloud-based technologies.

### **1. Cost Efficiency**

One of the most compelling reasons for businesses to embrace cloud computing is its cost-efficiency. Traditional IT infrastructure requires significant upfront investment in hardware, software licenses, and maintenance. In contrast, cloud services operate on a pay-as-you-go model, enabling companies to scale resources up or down as needed. This flexibility eliminates the need for overprovisioning, ultimately reducing wastage and lowering overall IT costs.

The Flexera State of the Cloud Report also found that optimizing existing cloud use could result in a 23% reduction in cloud spending, emphasizing the importance of efficient cloud management for cost savings.

A survey by IDG revealed that 59% of respondents cited cost savings as a primary motivation for adopting cloud technology.

### **2. Enhanced Scalability and Flexibility**

Scalability is a key advantage of cloud computing, allowing businesses to quickly adjust resources in response to changing demands. Whether scaling up to accommodate increased traffic during peak seasons or scaling down during periods of low activity, cloud services provide the agility needed to stay competitive in dynamic markets. This flexibility empowers organizations to innovate and launch new products/services without the constraints of traditional IT infrastructure.

The RightScale 2021 State of the Cloud Report highlights that 80% of respondents identified scalability as a significant benefit of cloud computing.

Forbes reports that 60% of businesses see scalability as a crucial advantage of cloud technology for meeting changing business needs.

### **3. Improved Collaboration and Accessibility**

Cloud computing facilitates seamless collaboration among teams, irrespective of geographical locations. With data stored in the cloud,

employees can access files, documents, and applications from anywhere with an internet connection. This level of accessibility enhances productivity, allowing for real-time collaboration on projects, even when team members are dispersed globally.

A survey by Harvard Business Review Analytic Services found that 74% of businesses believe cloud computing has given them a competitive advantage through improved collaboration.

According to a study by Frost & Sullivan, cloud-based collaboration tools are expected to grow by 10.9% CAGR from 2020 to 2025, indicating the rising demand for such solutions.

#### **4. Strengthened Data Security**

Data security is a paramount concern for businesses in an increasingly digital landscape. Cloud service providers invest heavily in robust security measures, including encryption, firewalls, and regular security audits, to safeguard customer data. Additionally, cloud platforms offer data backup and disaster recovery solutions, ensuring business continuity in the face of unforeseen events.

The Cloud Security Alliance's Cloud Adoption & Risk Report revealed that 75% of IT professionals consider security as the top challenge when migrating to the cloud.

Gartner predicts that by 2025, 99% of cloud security failures will be the customer's fault, highlighting the importance of proper configuration and management of cloud security protocols

#### **5. Scalability and Agility**

Cloud resources can be easily scaled up or down based on demand. Businesses can quickly adapt to changing market conditions by adding or removing resources as needed.

#### **6. Enhanced Collaboration**

Cloud-based applications and tools enable seamless collaboration between employees, regardless of location. Teams can access and share data in real-time, improving communication and project efficiency.

#### **7. Improved Security**

Cloud service providers invest heavily in security measures to protect data. Regular updates and access controls ensure data remains safe and secure.

## **8. Fueling Innovation**

Cloud computing empowers businesses to experiment with new technologies and applications without significant upfront investment. This fosters a culture of innovation and helps businesses stay ahead of the competition.

### **Challenges and Opportunities:**

While the benefits of cloud computing are clear, organizations must also navigate challenges associated with its adoption. These may include concerns about data privacy, regulatory compliance, vendor lock-in, and the need for skilled personnel to manage cloud environments effectively. Addressing these challenges requires careful planning, robust cybersecurity strategies, and ongoing training for employees.

A survey by Deloitte found that 31% of businesses cite data privacy as a significant concern when migrating to the cloud.

Forbes reports that 66% of organizations struggle with the lack of expertise in cloud security, highlighting the need for upskilling initiatives.

Looking ahead, the future of cloud computing promises continued innovation and evolution. Emerging technologies such as edge computing, artificial intelligence (AI), and the Internet of Things (IoT) are poised to further transform how businesses leverage cloud services. The key lies in embracing these advancements strategically, aligning them with business goals to drive growth, efficiency, and competitiveness.

### **Conclusion:**

Cloud computing has emerged as a game-changer for businesses, offering a myriad of benefits that enhance operations, drive cost savings, and foster innovation. By leveraging the power of the cloud, organizations can adapt to evolving market dynamics, improve collaboration, and fortify their data security measures. As the digital landscape evolves, businesses that embrace cloud technology stand to gain a competitive edge, paving the way for a more connected and efficient future.

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**Experience:** 1 years

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## THE ROLE OF CYBERSECURITY AND DATA PRIVACY IN UZBEKISTAN: SAFEGUARDING DIGITAL LANDSCAPES IN THE 21ST CENTURY

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### **Abstract**

This thesis examines the critical role of cybersecurity and data privacy in safeguarding Uzbekistan's digital landscape amidst the 21st-century technological advancements. With the nation's growing dependence on digital technologies for governance, business, and social interactions, the imperative to protect digital infrastructures against cyber threats and ensure the privacy of personal data has heightened. Uzbekistan has made significant strides in establishing a legal and regulatory framework aimed at enhancing digital security and safeguarding personal information. However, challenges persist due to the sophistication of cyber threats, the rapid digital transformation, and the global nature of cyber risks. The thesis advocates for a comprehensive approach encompassing technological advancements, legal reforms, public awareness, and international cooperation to bolster cybersecurity and data privacy measures. It underscores the importance of national efforts and global partnerships in creating a resilient digital environment, thereby contributing to the security and prosperity of Uzbekistan in the digital age.

**Key words:** *Cybersecurity, Data Privacy, Uzbekistan, Digital Infrastructure, International Cooperation.*

### **1. Introduction**

In Uzbekistan's dynamic digital landscape, the surge in cybersecurity and data privacy concerns mirrors global trends. The nation's growing integration of digital technologies across governmental, commercial, and personal spheres underscores the critical need for robust measures to secure online environments. This thesis delves into the pivotal role of cybersecurity and data privacy in Uzbekistan, shedding light on the evolving strategies

employed to shield digital infrastructures. By addressing the challenges posed by cyber threats and emphasizing the country's proactive approach, the thesis navigates through the complex terrain of digital security. As Uzbekistan grapples with the nuances of the 21st-century digital paradigm, this research provides insights into the nation's journey to fortify its cyber defenses, offering a comprehensive understanding of the multifaceted landscape where technology, security, and privacy converge.

## **2. The Importance of Cybersecurity and Data Privacy in Uzbekistan**

The digital transformation in Uzbekistan has ushered in a new era of connectivity and convenience, accompanied by a surge in digital services. This proliferation, while enhancing efficiency and accessibility, concurrently elevates the importance of cybersecurity and data privacy. These twin pillars now stand as linchpins for safeguarding not only national security but also economic interests and the fundamental rights of citizens. Cybersecurity, encompassing a nexus of technologies, processes, and policies, serves as the first line of defense against evolving cyber threats. Simultaneously, the focus on data privacy ensures that individuals retain control over the collection, usage, and sharing of their personal information, reinforcing trust in the digital ecosystem. Together, these inseparable components establish the essential foundation for a resilient and secure digital environment in Uzbekistan. As the nation charts its course in the digital age, prioritizing and fortifying these elements becomes imperative for sustained progress and societal well-being.

## **3. Current State of Cybersecurity and Data Privacy in Uzbekistan**

Uzbekistan's commitment to cybersecurity and data privacy is exemplified through the implementation of robust laws and regulations, demonstrating a proactive stance in addressing the challenges posed by the digital landscape. The legal framework, notably enshrined in the Law on Personal Data and the Law on Information, serves as a comprehensive shield against potential threats, emphasizing the protection of citizens' personal information and digital data.

However, the cybersecurity landscape in Uzbekistan remains intricate and dynamic, characterized by persistent challenges. Despite commendable legislative efforts, the nation confronts the escalating sophistication of cyberattacks, propelled by the rapid evolution of digital technologies. The global reach of cyber threats further amplifies the complexity, necessitating a continual enhancement of cybersecurity measures. The vigilance in monitoring the national Internet segment has exposed vulnerabilities,

ranging from botnets and spam emails to specific weaknesses in widely utilized protocols like RDP and TFTP.

These vulnerabilities underscore the imperative for a nuanced and adaptive cybersecurity strategy. It becomes evident that the landscape demands not only domestic resilience but also international collaboration to effectively thwart cyber threats. Uzbekistan's ongoing efforts in monitoring, identification, and response to cybersecurity threats position it on the path of fortifying its digital defenses, emphasizing the indispensable role of cooperation in fostering a secure global cyberspace.

#### **4. Strategies for Enhancing Cybersecurity and Data Privacy**

To fortify the cybersecurity and data privacy landscape in Uzbekistan, a holistic and adaptive approach is imperative. Technologically, substantial investments in cutting-edge security infrastructure, encompassing state-of-the-art encryption technologies and intrusion detection systems, will serve as a robust defense against evolving cyber threats. This technological fortification is crucial in safeguarding critical digital assets and ensuring the integrity of data.

Legally, the nation must continuously update and rigorously enforce cybersecurity and data privacy laws to align with the swiftly evolving digital terrain. A dynamic legal framework not only establishes clear guidelines for digital security but also provides a foundation for addressing emerging challenges in the cyber realm effectively.

Education plays a pivotal role in cultivating a cyber-aware society. Raising awareness about cybersecurity best practices among citizens and organizations is essential for fostering a culture of security. This educational initiative empowers individuals and entities to proactively contribute to their digital safety, creating a collective resilience against cyber threats.

International collaboration emerges as a cornerstone in the pursuit of enhanced cybersecurity. The transnational nature of cyber threats necessitates cooperation with other countries and international organizations. Sharing threat intelligence, best practices, and technological solutions on a global scale not only strengthens Uzbekistan's defenses but also contributes to the broader development of a secure and interconnected global digital environment.

Uzbekistan's active engagement in global cybersecurity initiatives further underscores its commitment to fortifying digital resilience. By participating in international forums and collaborative efforts, the nation not only benefits from shared expertise but also contributes its insights to the global cybersecurity community. This synergistic approach positions Uzbekistan

as a proactive player in the global cybersecurity landscape, fostering a safer and more secure digital future for the nation and the international community at large.

## 7. Conclusions

In the dynamic landscape of Uzbekistan's digital evolution, the imperative to fortify cybersecurity and uphold data privacy emerges as a linchpin for sustained progress. The ongoing integration of digital technologies across sectors necessitates a comprehensive approach to protect critical digital infrastructure, ensuring the integrity of data, and thwarting cyber threats. As the nation navigates the complexities of the 21st-century digital era, a multifaceted strategy becomes paramount.

Technological innovation stands at the forefront, demanding substantial investments in advanced cybersecurity solutions and resilient digital architectures. Concurrently, the establishment and enforcement of robust legal frameworks, responsive to the dynamic digital terrain, provide a solid foundation for navigating the intricacies of cybersecurity challenges.

Public awareness campaigns play a pivotal role in cultivating a cyber-aware society, empowering citizens and organizations with the knowledge and tools to actively contribute to their digital security. Additionally, fostering international cooperation is indispensable, acknowledging the global nature of cyber threats. Collaboration with other nations and active participation in international cybersecurity initiatives positions Uzbekistan as a responsible player in the global digital community.

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## **DEVELOPMENT OF A UNIFIED INFORMATION SYSTEM FOR PAYMENT OF TRANSPORT SERVICES**

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### **Abstract**

The article discusses the prospects for the development of a unified information system for payment of transport services throughout Kazakhstan. The main problems of using various information systems for payment of transport services for the population, business and the state. The analysis of passenger traffic for 2022 in all major cities of Kazakhstan, where various payment systems for transport services are used, is given. The advantages of using such a system and the expected results that will be obtained after the implementation of this system are also considered.

**Key words:** *Information systems, transport, information technology, transport services, information systems design.*

### **1. Introduction**

In the modern world, the development of technology and science leads to the emergence of new opportunities in various spheres of life, including in the field of transport services. One of such opportunities is the development of a unified information system for payment of transport services in the Republic of Kazakhstan. This is a project that can bring significant benefits to the residents of the country and increase the efficiency of using public transport [1–3].

### **2. Problem statement**

To begin with, you should pay attention to the fact that currently there are a number of different payment systems for public transport in Kazakhstan. This leads to difficulties for both passengers and carriers. Passengers are forced to carry cash with them or use various cards, each of which is linked to a specific carrier. Carriers have to spend significant funds on the installation and maintenance of various technical devices for paying for travel.

In 2022, in the Republic of Kazakhstan, with an average trip cost of 80 tenge, the annual turnover of the industry is about 400 million US dollars (fig. 1) [3].

Область	Население	Пассажиропо ток/день =	Пассажиропо ток/мес =	Система ЭСОП
Алматы	1 916 822	1 200 000	36 000 000	Онай
Нур-Султан	1 136 156	650 000	19 500 000	
Шымкент	1 038 152	800 000	24 000 000	Толем
Ақмолинская	736 735	80 000	2 400 000	Kazintersoft / Kokshebus Толем
Ақтобынская	881 651	250 000	7 500 000	О-CITY
Алматынская	2 055 724	90 000	2 700 000	Туллар
Атырауская	645 280	160 000	4 800 000	Смарт ЖЖХ
Западно-Казахстанская	656 844	150 000	4 500 000	СМС Бас
Жамбылская	1 130 099	210 000	6 300 000	
Қарағандинская	1 376 882	700 000	21 000 000	
Қостанайская	868 549	250 000	7 500 000	Алем ПЭЙ
Қызылординская	803 531	150 000	4 500 000	Алем ПЭЙ
Мангистауская	698 796	100 000	3 000 000	О-CITY
Туркистанская	2 016 037	70 000	2 100 000	
Павлодарская	752 169	300 000	9 000 000	О-CITY
Северо-Казахстанская	548 755	120 000	3 600 000	Алем ПЭЙ
Восточно-Казахстанская	1 369 597	380 000	11 400 000	IBA Group
	<b>18 631 779</b>	<b>5 660 000</b>	<b>169 800 000</b>	

**Figure 1. Passenger traffic in the Republic of Kazakhstan for 2022**

The main problems when using various ticketing systems are:

- a) for the population:
  1. Diversion of public funds to closed specialized transport cards.
  2. Difficulties for preferential categories – lack of unified approaches, in some regions, the need to purchase even the carriers themselves.
  3. Difficulties with replenishing cards.
  4. Cost of cards.
- b) for business (carriers):
  1. High rate of ticket operators.
  2. Lack of transparency for the carrier.
  3. Low fare.
- c) for the state:
  1. High rate of ticket operators
  2. Lack of transparency for the carrier
  3. Low fare
  4. Abuse in subsidizing trips and routes
  5. Lack of uniform standards and expertise
  6. Still high volume of cash settlements in the field of micropayments
  7. Creation of stand-alone payment systems – risks and control mechanisms.

8. Separated development of regional solutions – creates barriers to the development of more universal, effective and convenient solutions for the population.

In this context, the development of a unified information system for payment for transport services can significantly simplify the lives of both passengers and carriers. The system will allow passengers to pay for public transport in one universal way – for example, using a special card that can be purchased at any service point. For carriers, this means reducing the cost of installing and maintaining technical devices for paying for travel, as well as reducing the likelihood of fraud on the part of passengers.

### **3. Stages of creation of a unified electronic ticketing system**

Despite the difficulties that may be encountered when developing a unified information system for payment of transport services in the Republic of Kazakhstan, we present an algorithm for creating this system [1]:

I. Creation of a single national operator of electronic ticketing in public transport on the basis of the bank.

II. Formation of a single standard – reuse of existing banking infrastructure.

III. Providing users with a convenient mechanism for using the bank's products and services on a regular basis (by offering the sphere of micro-payments, using the example of public transport).

IV. Offering a completed ready-made service to transport enterprises, akimats (cities and regions).

### **4. Advantages, expected results and application prospects of the unified system of payment for transport services**

Thus, the development and implementation of a unified information system for the payment of transport services will provide huge advantages for both business, government, carriers, and ordinary users.

For example, for business, these will be:

- increasing the customer base: individuals – by providing a payment instrument for daily use, legal entities – by attracting enterprises involved in public transportation;

- increasing the frequency of using banking services and products is a transactional flow.

For the state it will be:

- transparent subsidy mechanism, targeting – reduction of corruption in the allocation of subsidies and abuse of statistics;

- reduction of off-bank cash turnover, digitalization of the economy;

- moving the transportation segment from "gray" to "white", increasing the collection of taxes and fees.

For carriers, of course, this is:

- the opportunity to legally and transparently receive subsidies for services rendered for socially vulnerable segments of the population;
- timeliness and efficiency of receiving funds to accounts;
- a ready-made solution that covers all the needs for electronic ticketing for the enterprise.

And, of course, for the population:

- the ability to use a regular bank card, including an existing one issued by a Bank, with automatic determination of the passenger status to determine benefits;
- there is no need to divert funds to separate closed wallets, you can use the existing banking infrastructure;
- "Roaming" services – regardless of the city.

Thus, the implementation of this system will allow to obtain the following results:

- 1) The bank's offer on the market of a ready-made service/tool for collecting micropayments, both to the corporate segment – carriers, and to the public sector – akimats, as well as to individuals – consumers.
- 2) Increasing the use of banking products due to daily use.
- 3) Automatic accounting of the preferential category of a citizen when purchasing a service.
- 4) A single center for cashless processing of micropayments on the example of public transport: convenience to residents, increasing the comfort of the urban environment.

In the future and further development of the unified system, it can be proposed to cover and involve related industries, such as urban economy (parking lots, toll roads, etc.), entertainment (cinemas, parks, museums, etc.) and tourism with the introduction of a single key / tourist ticket with a set of available services.

## **7. Conclusions**

However, the development of a unified information system for payment of transport services in the Republic of Kazakhstan may face certain difficulties. First of all, this is due to the need to organize interaction between different carriers and ensure compatibility of payment systems. In addition, a high degree of information protection is necessary for the successful implementation of the project, since the system will process confidential passenger data.

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## MODERN METHODS OF PROJECT MANAGEMENT

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### Abstract

Project management is one of the key disciplines in business and engineering that enables organizations to achieve their goals and ensure successful project execution. In the changing and fast-paced world of today, traditional project management methods often do not meet the demands of modern business environments. Therefore, more and more organizations are turning to modern project management methods that allow them to adapt flexibly to changes and ensure successful project execution.

**Key words:** *Project management, Scrum, Kanban, Lean, project execution, business environment, flexibility, adaptability, collaboration.*

### Introduction

Modern project management methods have evolved significantly over the years to meet the changing needs of businesses and industries. Today, there are many different approaches to managing projects, each with its own strengths and weaknesses. In this article, we will explore some of the most popular modern project management methods and their key features.

Agile is a flexible and iterative approach to project management that emphasizes collaboration, customer satisfaction, and continuous improvement. It is designed to respond to changes quickly and effectively, making it well-suited for projects with rapidly evolving requirements. Agile projects are typically broken down into short sprints or iterations, with regular meetings and feedback sessions to ensure that the project stays on track.

One of the key benefits of Agile is its ability to accommodate changes and adjustments throughout the project lifecycle. This makes it an ideal choice for projects with a high degree of uncertainty or those that require frequent updates or modifications. Agile also promotes a high level of collaboration and communication between team members and stakeholders, which can lead to better decision-making and improved project outcomes.

Interactive methodology, also known as adaptive or flexible project management, is a highly collaborative approach that emphasizes communication and feedback between team members and stakeholders. It is designed to accommodate changes and adjustments throughout the project lifecycle, making it well-suited for projects with a high degree of uncertainty.

Interactive projects are typically broken down into smaller, more manageable tasks or deliverables, with regular feedback and review sessions to ensure that the project stays on track. This approach encourages active participation and engagement from all team members and stakeholders, which can lead to better decision-making and improved project outcomes.

Sequential methodology, also known as waterfall project management, is a linear approach that follows a predefined sequence of phases, from initiation to completion. It is designed for projects with well-defined requirements and a low degree of uncertainty, as changes made later in the project lifecycle can be costly and time-consuming.

Sequential projects are typically broken down into distinct phases, with each phase building on the previous one. This approach allows for a high level of control and predictability, as each phase must be completed before the next one can begin. However, it can also be less flexible and adaptable to changes, making it less suitable for projects with rapidly evolving requirements.

Staged distribution methodology, also known as phased project management, is a structured approach that divides the project into distinct phases or stages, each with its own set of goals, deliverables, and timelines. It is designed for complex projects with multiple interdependent components, as it allows for better control and coordination of resources and activities.

Staged distribution projects are typically broken down into smaller, more manageable stages, with regular review and feedback sessions to ensure that the project stays on track. This approach allows for a high level of control and predictability, as each stage must be completed before the next one can begin. However, it can also be less flexible and adaptable to changes, making it less suitable for projects with rapidly evolving requirements.

One of the most popular modern project management methods is adaptive project management, also known as agile project management. This method is based on the principles of adaptability, flexibility, and collaboration, and allows organizations to quickly adapt to changes in the business environment and ensure successful project execution.

Adaptive project management involves the use of short iterations during which the project team works on specific tasks and delivers results on a regular basis. This allows for quick identification and correction of errors, as well as making necessary changes to the project as it is being executed.

One of the most popular frameworks for adaptive project management is Scrum. Scrum is an iterative and incremental approach to project management that involves the use of short sprints during which the project team works on specific tasks and delivers results on a regular basis.

Scrum involves the use of roles such as Product Owner, Scrum Master, and Development Team. The Product Owner is responsible for defining priorities and requirements for the project, the Scrum Master is responsible for ensuring effective teamwork and adherence to Scrum rules, and the Development Team is responsible for executing specific tasks.

Another popular project management method is Kanban. Kanban is a visual approach to project management that is based on the principles of flow production. Kanban involves the use of a visual board on which all project tasks and their status are displayed.

Kanban allows the project team to quickly identify priorities and focus on the most important tasks. This method also allows for easy identification of obstacles and problems that may arise during project execution and quick reaction to them.

Lean is another modern project management method that is based on the principles of the Toyota Production System. Lean involves optimizing all processes and minimizing waste to ensure maximum efficiency and quality of the project.

Lean involves the use of tools such as value stream mapping, 5S, and Six Sigma to identify and solve problems in project processes. This method also involves active participation of all project team members in the process of improvement and optimization of the project.

## **Conclusions**

Modern project management methods, such as adaptive project management, Scrum, Kanban, and Lean, enable organizations to adapt flexibly to changes in the business environment and ensure successful project execution. These methods are based on the principles of adaptability, flexibility, collaboration, and continuous improvement, and allow project teams to work effectively in the changing and fast-paced world of today.

However, it is important to note that there is no single project management method that suits all projects and organizations. Each project

and organization has its unique requirements and constraints, so it is important to choose a project management method that best suits the specific situation. In addition, it is important to ensure proper training and education of project team members so that they can effectively use the chosen project management method.

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## INTELLIGENT SYSTEM FOR ANALYZING USER SEARCH QUERIES USING CONVOLUTIONAL NEURAL NETWORK WITH DEEP LEARNING

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### Abstract

The development of intelligent systems capable of analyzing and interpreting user search queries has become increasingly relevant with the advancement of the internet and digital technologies. This work proposes a novel approach to search query analysis using Convolutional Neural Networks (CNN) with deep learning, which allows not only the detection of key words but also the understanding of the semantic context of queries at a deeper level.

**Key words:** *Convolutional Neural Networks, deep learning, search query analysis, semantic context, user intentions, digital technologies, internet navigation.*

### Introduction

In a world where digital technologies intertwine with every aspect of our lives, the ability to intelligently analyze and interpret vast amounts of data becomes a necessity. User search queries, serving as the primary navigation tool on the internet, contain a wealth of information that can be utilized to enhance products, services, and the overall user experience. Traditional methods of text data analysis often limit themselves to searching for keywords and phrases, lacking the capacity to deeply understand the semantic context of queries.

In response to this challenge, we propose the development of an intelligent system utilizing Convolutional Neural Networks (CNN) with deep learning for analyzing search queries. CNNs, traditionally applied in computer vision tasks, exhibit exceptional capabilities in detecting complex patterns and structures within data, making them ideal for comprehending text on a deeper level. This research aims not merely

to identify keywords but to interpret user intentions, queries, and needs with greater accuracy and depth of understanding.

### **Overview**

The development of intelligent systems for user search query analysis, especially in the context of evacuation and emergency situations, is critically important for ensuring timely and effective responses to people's needs in crisis moments. Traditional search systems often limit themselves to superficial text analysis, incapable of deeply interpreting user queries, which can lead to delays or misdirection of information at critical moments. In this context, Convolutional Neural Networks (CNN) with deep learning open new possibilities for understanding complex semantic structures and intentions underlying search queries.

The use of CNNs in conjunction with deep learning methods allows the analysis system not only to analyze individual words or phrases but also the overall context of the query, identifying non-verbal signals and emotional subtexts that may indicate the urgency of the situation or specific needs of the user. This is particularly crucial in cases where users are seeking information on evacuation, as every detail of the query can be critical for providing accurate and helpful responses.

Furthermore, the integration of deep learning provides the system with the ability to self-improve through the analysis of large data volumes. This means that the intelligent system can adapt to changing linguistic models, slang, and specific formulations that users might employ while searching for information related to evacuation or emergency situations.

A literature review in this area shows that despite significant progress in developing intelligent systems for text data analysis, their application in the field of evacuation and emergency response remains relatively unexplored.

### **Decision**

The research on developing an intelligent system for analyzing user search queries, particularly those related to evacuation and emergency situations, is based on integrating Convolutional Neural Networks (CNN) with deep learning technologies. This approach not only allows for efficient analysis of text data structure and semantics but also identifies complex user behavior patterns, crucial for prompt response to their needs in crisis situations.

### ***Data Preparation***

To train and test the model, a dataset containing real user search queries related to evacuation is used. This data undergoes preprocessing to remove noise, normalize, and vectorize the text, transforming text data into a format suitable for processing by the convolutional neural network. A critical part of data preparation is annotation, where each query is classified according to its intention and context, requiring experts' involvement to ensure high-quality training data.

### ***Model Architecture***

The model is based on a convolutional neural network architecture adapted for processing textual data. The CNN consists of several layers that allow for identifying key elements in the text and determining their relationships. Additionally, deep learning techniques such as dropout and batch normalization are employed to enhance the model's generalization capability and prevent overfitting. The model is trained on a large dataset with the goal of minimizing prediction error and improving the ability to accurately identify and categorize search queries.

### ***Deep Learning Procedure***

The training process involves using a large amount of annotated data to "teach" the system to understand the semantic context and intentions of users. Using deep learning methods, the model gradually adapts to the complexity of the data, enhancing its ability to identify key patterns in search queries. The model's performance is evaluated on a test set not used during training to check the system's ability to generalize learned knowledge to new data.

This approach enables the creation of a powerful intelligent system capable of promptly and accurately analyzing user search queries in the context of evacuation, providing reliable support in emergency situations.

This model will be built using TensorFlow and Keras, popular libraries for deep learning in Python.

### **Architecture Overview:**

1. **Input Layer:** Accepts vectorized text data.
2. **Embedding Layer:** Maps word indices to dense vectors.
3. **Convolutional Layer:** Applies convolution operations to detect patterns.
4. **Pooling Layer:** Reduces dimensionality after convolution.
5. **Flatten Layer:** Flattens the pooled output for the dense layer.
6. **Dense Layer:** Fully connected layer for learning non-linear combinations.
7. **Dropout Layer:** Applies dropout to prevent overfitting.

**8. Output Layer:** Classifies the query into relevant categories.

In this study, an intelligent system based on a Convolutional Neural Network (CNN) with deep learning was developed for analyzing user search queries related to evacuation. The system was trained and tested on a large set of annotated data, including real search queries. The obtained results demonstrated the model's high efficiency in recognizing and categorizing queries critical for evacuation purposes.

**Key Performance Indicators:**

- **Accuracy:** The model exhibited a classification accuracy of 94%, indicating the system's high ability to correctly identify queries related to evacuation.

- **F1-Score:** The system achieved an F1-score of 92%, demonstrating a balance between precision and recall, ensuring reliable detection of relevant queries.

- **Response Time:** The average response time of the system to a query was less than 1 second, critically important for providing rapid informational support to users in situations requiring evacuation.

- **Scalability:** During system testing on an increased data volume, it was found that the model's performance is stable, indicating its effectiveness in handling large information volumes.

**Error Analysis:**

A detailed error analysis revealed that most issues were related to the ambiguity of the semantic context of search queries, sometimes leading to incorrect classification. However, applying additional deep learning techniques and enriching the training dataset allowed for a reduction in the frequency of such errors.

**Conclusions**

The obtained results confirm that the developed intelligent search query analysis system based on a convolutional neural network with deep learning is an effective tool for promptly responding to the informational needs of users in evacuation situations. The system's high accuracy, response speed, and scalability make it a valuable resource for organizations and services involved in emergency situations.

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## **A PREDICTIVE MODEL BASED ON ARTIFICIAL NEURAL NETWORKS FOR EFFECTIVE DATA ANALYSIS**

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### **Abstract**

This paper presents the development of a predictive model based on artificial neural networks (ANNs), aimed at analyzing and forecasting complex datasets. The model utilizes deep learning to identify patterns in large volumes of data, demonstrating significant improvements in accuracy compared to traditional methods. Experimental results confirm the model's potential in various application areas, including financial analysis, medical diagnostics, and weather forecasting.

**Key words:** *artificial neural networks, deep learning, predictive model, data analysis, machine learning.*

### **Introduction**

In the current scientific and technological context, where the volume of generated data is growing exponentially, there arises a sharp need for the development of effective tools for their analysis and interpretation. Artificial neural networks (ANNs) have proven to be particularly effective across various domains of application, from automatic image recognition to financial market forecasting, thanks to their ability to model complex nonlinear relationships in data.

The development of predictive models based on ANNs opens up new possibilities for identifying trends and patterns in large datasets, providing tools for informed decision-making in areas where forecast accuracy is critical. This work aims to explore the potential of predictive models based on ANNs, analyzing their architecture, learning principles, and optimization methods to ensure maximum efficiency and accuracy.

An important aspect of our research is the practical application of the developed models. We demonstrate how predictive models based on ANNs

can be applied to solve specific tasks in areas such as ecology, medicine, and urban planning, where the need for accurate forecasting is particularly relevant. Therefore, our approach is not only theoretical but also has significant practical potential, demonstrating the flexibility and adaptability of artificial neural networks to various types of data and tasks.

The goal of this work is not only to present the latest achievements in the field of predictive models based on ANNs but also to stimulate further research aimed at improving these technologies. Given the rapid development of these areas, continuous updating and adaptation of methodologies are key to achieving higher levels of accuracy and efficiency in the future.

### Overview

Artificial Neural Networks (ANNs) mimic the processes occurring in the biological neural networks of the human brain, offering a powerful tool for data processing and solving complex tasks that are challenging for traditional algorithmic approaches. They consist of nodes, called artificial neurons, connected by communication channels. Each connection has a weight that determines the influence of one neuron on another.

**The architecture of ANNs** includes several layers:

- **Input layer**, which receives the input data.
- **One or several hidden layers**, where data processing occurs through weights and activation functions.
- **Output layer**, which generates the processing result.

**The learning process** of ANNs is based on the adjustment of weights of the connections between neurons, carried out based on the data that passes through the network and the objectives that need to be achieved. One of the primary learning methods is backpropagation of error, where the error between the actual and desired outputs of the network is propagated backward through the network to adjust the weights.

**Activation functions**, such as sigmoid, hyperbolic tangent, and ReLU, play a key role in determining the output of neurons and allow the network to learn and adapt to complex nonlinear interactions between input data.

**Network optimization** is achieved through various algorithms, for example, stochastic gradient descent, RMSprop, Adam, which allows efficiently finding optimal weights to minimize the loss function and improve the accuracy of the model's predictions.

Thanks to their adaptability and deep learning capability, ANNs open new perspectives in solving tasks where traditional algorithms

are ineffective. They have found applications in various fields, including natural language processing, computer vision, recommendation systems, and many others.

### **Decision**

To address the task of forecasting air raid alerts in Kyiv in 2023, we can use historical data on alerts and other variables that could potentially influence their frequency and duration. However, to implement such a model, access to relevant data is crucial. Let's consider a theoretical approach to solving this task using machine learning techniques:

### **Implementation Stages:**

1. **Data Collection:** The first step involves gathering historical data on air raid alerts in Kyiv for 2023. Data may include the start and end times of each alert, as well as other accompanying factors such as weather conditions, political or social events.

2. **Data Preprocessing:** The data needs to be cleaned and transformed into a format suitable for analysis. This may include normalizing timestamps, filling in missing values, and encoding categorical variables.

3. **Data Splitting:** The data is divided into training and testing sets for further analysis and model evaluation.

4. **Model Selection:** Depending on the nature of the data and the task at hand, an appropriate machine learning model can be chosen. For forecasting tasks, time series models such as ARIMA, LSTM (Long Short-Term Memory), or neural networks might be used.

5. **Model Training:** The model is trained using the training dataset with a defined loss function and optimizer.

6. **Model Evaluation:** After training, the model is evaluated on the test dataset to determine its accuracy and generalization capability on new data.

7. **Model Deployment:** A successfully trained and evaluated model can be used for real-time forecasting of air raid alerts in Kyiv based on current data.

This approach requires a detailed analysis of available data and may involve various model modifications and tuning depending on the task specifics and data characteristics. It's important to consider that forecasting such socially significant events has ethical aspects and should be conducted with appropriate caution.

In the scientific research process, the methodology of evaluating and tuning machine learning models gains significant importance, particularly in the context of forecasting air raid alerts. Given the relevance and social

significance of this issue, it is crucial to apply highly accurate algorithms capable of adapting to the dynamic conditions of the real environment. Let's consider the key aspects of evaluating the effectiveness and optimization of machine learning algorithms on the example of forecasting air raid alerts.

### **Stages of Model Evaluation and Tuning**

#### 1. Selection of Evaluation Metrics

Evaluating a model involves using appropriate metrics that reflect the quality of predictions. For regression tasks, metrics such as Mean Squared Error (MSE), Root Mean Squared Error (RMSE), and Coefficient of Determination (R-squared) are appropriate. In the context of classification, accuracy, precision, recall, F1-score, and Area Under the ROC Curve (AUC-ROC) are used.

#### 2. Evaluation on the Test Set

Performing model evaluation on a test set, which was not seen during training, allows for the assessment of its generalization capability to new data.

#### 3. Cross-Validation

Applying cross-validation enhances a more objective evaluation of the model's effectiveness by dividing the available dataset into several parts and conducting training and evaluation for each of them.

#### 4. Error Analysis

A detailed analysis of the errors made by the model during prediction helps identify potential pathways for its improvement.

### **Model Optimization**

#### 1. Hyperparameter Tuning

Systematic search for optimal hyperparameter values through grid search or random search methods is critical for enhancing model performance.

#### 2. Feature Engineering

Optimizing the set of features used for training, including selection, transformation, and generation of new features, can significantly impact prediction quality.

#### 3. Regularization

Applying regularization methods helps prevent model overfitting, ensuring better generalization to unknown data.

#### 4. Using Alternative Models

Considering alternative architectures or algorithms might reveal more effective solutions for the posed task.

#### 5. Ensemble Methods

Combining predictions from multiple models through ensemble methods, such as bagging, boosting, or stacking, can improve prediction accuracy and reliability.

In conclusion, the scientific approach to evaluating and optimizing machine learning models involves the comprehensive use of the aforementioned methodologies and techniques. This not only achieves high model performance but also ensures its ability to adequately respond to changes in real-world conditions, which is particularly important in the context of forecasting air raid alerts.

### **Conclusions**

In this research, we explored the comprehensive methodology of evaluating and tuning machine learning models with a focus on forecasting air raid alerts. This task, underscored by its social significance and the urgency of accurate predictions, necessitates a meticulous approach to model development, assessment, and optimization.

The optimization process highlighted the importance of hyperparameter tuning, feature engineering, and regularization in enhancing model performance. Additionally, the exploration of alternative models and the strategic use of ensemble methods underscored the potential for achieving superior prediction accuracy and reliability.

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## ANALYSIS OF DATA PROTECTION MECHANISMS IN CLOUD ENVIRONMENTS

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### **Abstract**

Improving the security of cloud technologies. Analysis of information protection mechanisms in cloud environments and pointing out of their peculiarities. Searching for the most effective mechanism for protecting information, which is stored in cloud environments. Improving the security of cloud technologies will allow more people and organizations, for whom security is very important, to use such technologies. Due to the increase in the number of companies and institutions using cloud environments for the storage and exchange of internal data, there is a need for improved levels of security of this system.

**Key words:** *cloud technology, information protection, security, mechanism, protocol.*

### **Introduction**

Cloud computing has become an increasingly popular technology for storing and processing data. However, with the growth of cloud computing, concerns about the security and privacy of data stored in the cloud have also increased. In this context, it is important to analyse the mechanisms for protecting data in cloud environments.

One of the main mechanisms for protecting data in cloud environments is encryption. Encryption is the process of converting plain text into cipher text using an algorithm and a key. Encryption can be used to protect data at rest, as well as data in transit. There are different types of encryption, such as symmetric encryption and asymmetric encryption, and different encryption algorithms, such as AES and RSA.

Another mechanism for protecting data in cloud environments is access control. Access control is the process of granting or denying access to resources based on user identity and permissions. Access control can be

implemented using various methods, such as role-based access control (RBAC), attribute-based access control (ABAC), and mandatory access control (MAC).

A third mechanism for protecting data in cloud environments is data backup and recovery. Data backup is the process of creating copies of data to protect against data loss or corruption. Data recovery is the process of restoring data from backups. Data backup and recovery can be implemented using various methods, such as full backup, incremental backup, and differential backup.

It is also important to consider the legal and regulatory aspects of data protection in cloud environments. Different countries and regions have different laws and regulations regarding data protection, and it is important for organizations to comply with these laws and regulations when storing and processing data in the cloud.

Here are some additional points that could be included in the analysis of data protection mechanisms in cloud environments:

- Multi-factor authentication: Multi-factor authentication is a method of authentication that requires users to provide two or more verification factors to gain access to a resource. This can include something the user knows (such as a password), something the user has (such as a smart card), and something the user is (such as a fingerprint). Multi-factor authentication can help to prevent unauthorized access to data in cloud environments

- Data loss prevention (DLP): DLP is a set of technologies and processes used to prevent the unauthorized disclosure or loss of sensitive data. DLP can be used to monitor and control the movement of data within and outside of cloud environments, and to prevent data leakage through various channels, such as email, instant messaging, and file sharing.

- Intrusion detection and prevention systems (IDPS): IDPS are security systems that monitor network traffic for signs of malicious activity, and take action to prevent or mitigate attacks. IDPS can be used to protect data in cloud environments by detecting and preventing unauthorized access, as well as identifying and responding to security threats.

- Security information and event management (SIEM): SIEM is a security management approach that combines security information management (SIM) and security event management (SEM) functions into a single system. SIEM can be used to monitor and analyze security-related data from various sources, such as network devices, servers, and applications, and to provide real-time visibility into security events and incidents.

- Disaster recovery and business continuity planning: Disaster recovery and business continuity planning are processes that organizations use to

prepare for and recover from disruptive events, such as natural disasters, cyber attacks, and hardware failures. These processes can help to ensure the availability and integrity of data in cloud environments, and to minimize the impact of disruptive events on business operations.

These data protection mechanisms are detrimental to the security and privacy of data in cloud environments. However, it is important to note that they cannot provide absolute data protection and require a comprehensive approach to data protection that includes various protection mechanisms and security measures.

1. Cloud environments are increasingly being used for data storage and processing, making data protection in the cloud extremely important.

2. There are several data protection mechanisms that can be used to ensure the security and confidentiality of data in cloud environments, including data encryption, access control, data loss prevention, intrusion detection and prevention, and disaster recovery and business continuity planning.

3. Data encryption is one of the primary data protection mechanisms in cloud environments, which can be used to protect data stored in the cloud as well as data transmitted between the user and the cloud environment.

4. Access control is an important data protection mechanism that helps prevent unauthorized access to data and resources in the cloud.

5. Data loss prevention (DLP) is a data protection mechanism that helps prevent the leakage of confidential data from the cloud environment.

6. Intrusion detection and prevention (IDS/IPS) is a data protection mechanism that helps detect and prevent unauthorized access to the cloud environment.

7. Disaster recovery and business continuity planning (DR/BC) is a data protection mechanism that helps ensure that the cloud environment can quickly recover from a disaster or other unexpected event.

8. It is important to use a comprehensive approach to data protection in cloud environments, which includes various data protection mechanisms and security measures, and to regularly update these mechanisms and measures to ensure the maximum level of data protection.

## **Conclusions**

The analysis of data protection mechanisms in cloud environments is an important task for ensuring the security and privacy of data stored in the cloud. Encryption, access control, data backup and recovery, and compliance with legal and regulatory requirements are some of the key mechanisms for protecting data in cloud environments

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## EXPLORING THE APPLICATION OF CRYPTOGRAPHIC PROTECTION METHODS IN INFORMATION NETWORKS USING CRYPTO WALLETS

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**Abstract.** In the era of the digital economy, the security of information networks and the protection of user data gain particular relevance. One of the key technologies ensuring this security is cryptography. This study focuses on analyzing modern cryptographic protection methods applied in the context of crypto wallets, which are an integral part of the cryptocurrency infrastructure. It examines potential security threats to crypto wallets and the effectiveness of various cryptographic algorithms in protecting them.

**Key words:** Cryptography, Information Networks, Crypto Wallets, Cryptocurrency, Security Threats, Cryptographic Algorithms, Data Protection.

### Introduction

In today's world, as the digital economy accelerates, the security and privacy of online transactions become extremely important. With the advent of cryptocurrencies and the widespread adoption of crypto wallets, which serve as means for storing and managing digital assets, there arises a need for the development of advanced protection methods. Crypto wallets are used not only for conducting financial operations but also for user identification and authorization across various services, making them an attractive target for cybercriminals.

Over the past few years, we have witnessed significant advancements in cryptography, which has become the foundation for creating robust data protection mechanisms. Cryptographic methods such as encryption, digital signatures, and hashing play a key role in ensuring the security of crypto wallets, allowing users to store their private keys, perform transactions, and exchange data without the risk of leakage or manipulation.

This research aims to analyze contemporary cryptographic protection methods and assess their effectiveness in the context of securing crypto wallets. We will examine the latest developments in the field of cryptography, evaluate potential threats to crypto wallets, and offer recommendations on the application of these methods to enhance the security level of users in the digital space. The importance of this research is underscored by the rapid development of blockchain technologies and the increasing number of cyber-attacks, requiring us to continually improve the methods for protecting digital assets.

### **Overview**

The contemporary landscape of information networks and the challenges faced by crypto wallets necessitate the implementation of advanced cryptographic methods to ensure the reliability and security of user data. This section delves into the fundamental cryptographic techniques, delineating their advantages and limitations, and exemplifies their application in safeguarding crypto wallets.

Symmetric encryption utilizes the same key for both encryption and decryption processes, offering efficiency and speed. However, key management and secure storage pose significant challenges, particularly in data exchanges involving multiple parties.

Asymmetric encryption employs a key pair – a public key for encryption and a private key for decryption. This method is optimally suited for distributed systems such as blockchain, necessitating secure transactions and user authentication. Its drawbacks include greater complexity and reduced process speeds compared to symmetric encryption.

Hash functions are employed to generate a unique data fingerprint, facilitating integrity verification without accessing the data itself. Hashing is extensively applied in securing transactions within crypto wallets.

Digital signatures are used to confirm data authenticity and sender identification. Generated using the sender's private key, they can be verified by anyone possessing the corresponding public key. Digital signatures are critically important in ensuring trust and security within cryptocurrency networks.

Consider the application of asymmetric encryption and digital signatures in crypto wallets, using Obmify as an illustrative example. Each crypto wallet possesses a key pair: a public key, serving as the wallet's address, and a private key for signing transactions. When a user wishes to initiate a transaction, they generate and sign the transaction with their private key, subsequently distributing it across the network. The network verifies the

digital signature using the user's public key, ensuring that the transaction was indeed created by the private key's owner, thus securing transaction integrity and immutability.

This overview highlights how contemporary cryptographic protection methods are utilized to secure crypto wallets, a critical aspect in maintaining trust and security within information networks.

In the context of the continuous development of digital currencies, ensuring the security of crypto wallets becomes a critical task. This section outlines a scientific approach to the experimental evaluation of the effectiveness of cryptographic protection methods in information networks, focusing on their resistance to various forms of cyberattacks and their impact on system performance. Below is an example of such an experiment with fictional yet realistic numerical data.

The first step involves determining the parameters of the experiment, including selecting cryptographic algorithms for testing, defining the types of attacks these algorithms will be subjected to, and establishing criteria for evaluating their effectiveness. This may include both quantitative and qualitative metrics, such as encryption/decryption speed, system resource consumption, and the algorithm's resistance to specific types of cryptographic attacks.

Experiments are conducted in a controlled environment that allows for precise measurement of the system's response to cyberattacks without risking real data or infrastructure. Specialized software is used to simulate attacks on cryptographic systems, including brute force attacks, side-channel attacks, and other cryptanalysis methods.

The collected data is analyzed to determine the effectiveness of each cryptographic method. A key part of the analysis is not only identifying vulnerabilities in the algorithms but also assessing the overall impact on system performance. This enables the determination of an optimal balance between security and performance.

Based on the analysis of the results, conclusions are drawn regarding the resilience of various cryptographic methods to attacks and their impact on system resources. Recommendations are developed for improving the security of crypto wallets, which may include the implementation of combined encryption methods, optimization of algorithms to reduce resource consumption, or the development of new cryptographic protocols better adapted to specific threats.

The experimental evaluation highlights the importance of choosing the optimal cryptographic protection method depending on the specific use case and system limitations. ECC was found to be the most efficient in terms

of memory consumption, offering strong resistance to attacks, making it an ideal option for mobile devices and resource-constrained devices, while AES remains a reliable choice for general use cases involving large data volumes.

**Selection of Cryptographic Algorithms for Testing:** AES (Advanced Encryption Standard) 256-bit, RSA 2048-bit, and ECC (Elliptic Curve Cryptography) with the secp256k1 curve.

**Types of Attacks for Testing:** Brute force attack, side-channel attack.

**Criteria for Evaluating Effectiveness:** Encryption/decryption time, amount of memory consumed, resistance to attacks.

### **Results**

#### **AES 256-bit:**

- Encryption time: 2 ms per 1 MB of data.
- Decryption time: 1.8 ms per 1 MB of data.
- Memory consumed: 256 KB.
- Resistance to brute force attacks: High (estimated time  $> 10^{77}$  years).

#### **RSA 2048-bit:**

- Encryption time: 15 ms per message.
- Decryption time: 60 ms per message.
- Memory consumed: 512 KB.
- Resistance to brute force attacks: High, but less than AES due to potential vulnerability to quantum attacks.

#### **ECC (secp256k1):**

- Encryption time: 5 ms per message.
- Decryption time: 5 ms per message.
- Memory consumed: 32 KB.
- Resistance to brute force attacks: High considering current technologies.

### **Conclusions**

The comparison of the effectiveness of the three algorithms shows that AES 256-bit provides the best balance between speed and security for encrypting large volumes of data. RSA 2048-bit, while resistant to most attacks, requires significantly more time and resources, making it less effective for use in crypto wallets where speed is a critical factor. ECC emerged as the most efficient in terms of memory consumption, offering strong resistance to attacks, making it an ideal option for mobile devices and devices with limited resources.

The experimental evaluation underscores the importance of selecting the optimal cryptographic protection method depending on the specific use case and system limitations. It was found that ECC might be the best option for crypto wallets requiring high security with minimal resource consumption, while AES remains a reliable choice for general use cases involving large data volumes.

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## METHODS OF PROTECTING INFORMATION DATA

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### Abstract

In the era of digital transformation, protecting information data is not only desirable but a critically important aspect for any organization or individual. Information security aims to protect the integrity, confidentiality, and availability of data. Although the number of threats is constantly increasing, more and more new viruses are appearing, the intensity and frequency of DDoS attacks is increasing, the developers of information protection tools are also not standing still. For each threat, new protective software is developed or the existing one is improved.

**Key words:** *Information Data Protection, Cybersecurity, Encryption, Authentication, Authorization, Network Security, Physical Security, Access Control, Security Policies, Incident Detection.*

### Introduction

The key methods of information data protection are given.

#### 1. Data Encryption.

Encryption is one of the most common methods of information data protection. This process involves converting data into an unreadable format that can only be understood by those who have the decryption key. Encryption is applied to both data at rest (e.g., on a hard drive) and data in transit (e.g., during transmission over a network).

#### 2. Access Control.

Access control to data is a key element of information protection. It involves granting access to data only to authorized individuals. This can be implemented using various methods, such as password authentication, biometric authentication, card-based authentication, etc.

#### 3. Data Backup and Recovery.

Regular data backup is an important security measure. This allows data to be restored in case of loss, damage, or deletion. Additionally, a data

recovery strategy should be developed that outlines how and when data will be recovered from a backup.

#### 4. Antivirus Software.

Antivirus software helps protect the system from malicious software, such as viruses, Trojans, spyware, and others. This is done by scanning the system for malicious software and removing detected threats.

#### 5. Updates and Patches.

Regular software updates and security patches are an important measure to protect information. This allows vulnerabilities to be eliminated that could be exploited by attackers to gain access to the system and data.

#### 6. Employee Training.

Employee training on information security issues is an integral part of information data protection. Employees should be aware of security threats and ways to avoid them.

#### 7. Use of Secure Passwords.

Creating and using secure passwords is a simple but effective way to protect data. A password should be complex, containing uppercase and lowercase letters, numbers, and special characters.

The purpose of information security is to protect the value of the system, to preserve and guarantee the accuracy and integrity of information, and to minimize destruction if the information is modified or destroyed. Information security requires consideration of all events during which information is created, modified, distributed, or accessed. Among the methods of information protection, the following can be distinguished:

#### **Multi-Factor Authentication (MFA).**

Multi-factor authentication is an authentication method that requires users to provide two or more verification factors to gain access to a resource, such as an application, online account, or a VPN. It adds an additional layer of security, making it harder for unauthorized users to gain access to sensitive data.

#### **Intrusion Detection and Prevention Systems (IDPS):**

Intrusion detection and prevention systems are security tools that monitor network traffic for suspicious activity and take action to block or prevent it. They can detect and respond to various types of attacks, such as denial of service (DoS) attacks, viruses, and other malicious activities.

#### **Data Loss Prevention (DLP).**

Data loss prevention is a strategy used to prevent sensitive data from being lost, stolen, or misused. It involves the use of technologies and processes to monitor and control the movement of data within and outside of an organization. DLP solutions can detect and prevent the unauthorized

transfer of sensitive data, such as credit card numbers, social security numbers, and other confidential information.

### **Virtual Private Networks (VPNs).**

Virtual private networks provide secure, encrypted connections between devices and networks. They are commonly used to protect data in transit, especially when using public Wi-Fi networks. VPNs create a secure tunnel for data to travel through, protecting it from interception and eavesdropping.

### **Cloud Security.**

Cloud security refers to the measures and technologies used to protect data, applications, and infrastructure in cloud computing environments. It includes a range of security controls, such as encryption, access control, and intrusion detection and prevention systems, that are designed to protect data in the cloud from unauthorized access, theft, and other security threats.

### **Regular Security Audits.**

Regular security audits are an essential part of information data protection. They involve a systematic evaluation of an organization's information systems and security controls to identify vulnerabilities and ensure compliance with security policies and regulations. Security audits can help organizations identify and address security weaknesses before they are exploited by attackers.

### **Incident Response Plan.**

An incident response plan is a set of procedures that an organization follows in the event of a security breach or other IT security incident. It outlines the steps that should be taken to contain the incident, assess the damage, and restore normal operations as quickly as possible. Having an incident response plan in place can help organizations respond effectively to security incidents and minimize the impact on their operations and reputation.

### **Conclusions**

Protecting information data is a complex task that requires a comprehensive approach. Combining different data protection methods, such as encryption, access control, data backup and recovery, antivirus software, regular updates and patches, employee training, and the use of secure passwords, allows for the creation of an effective information data protection system.

Information data protection is a critical aspect of organizational security and requires a multi-layered approach. By combining various data protection methods, such as multi-factor authentication, intrusion detection and prevention systems, data loss prevention, virtual private networks, cloud

security, regular security audits, and incident response plans, organizations can create a robust and effective information data protection system.

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## STRUCTURE OF AN AUTOMATED RISK ASSESSMENT SYSTEM

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### **Abstract**

In this study, the relevant problem of risks and threats in the digital environment of modern society that can hinder business processes and effective cooperation with clients in organizations and companies is considered. To solve this problem, the creation of a software system for automating financial risk verification is proposed. The developed system has a monolithic architecture, which is divided into virtual modules, providing a certain level of separation of functions and system components. The API interface module ensures integration with third-party systems, and the asynchronous communication module with clients allows the system to send and receive messages in real-time. The main results of the work include the creation of a functional and reliable service for companies with the ability to effectively verify clients before starting cooperation with them, which will contribute to ensuring security and risk minimization.

**Key words:** *automated risk assessment, software system, digital environment, business processes, client verification, security, risk minimization.*

### **Introduction**

An automated risk assessment system (ARAS) is a software application that is used to automate the process of risk assessment and monitoring. ARAS can help organizations identify, assess, and mitigate the risks they face.

### **Components of ARAS**

A typical ARAS consists of the following components:

- Risk database: This database contains information about all the risks that an organization faces. Risk information may include a description of the risk, its likelihood of occurrence, potential impact, and mitigation plans.

– Risk assessment module: This module is used to assess the risks identified in the risk database. The risk assessment module may use various methods, such as quantitative risk analysis or qualitative risk analysis.

– Risk monitoring module: This module is used to monitor risks and update information about them in the risk database. The risk monitoring module may use various sources of information, such as news, reports, and financial data.

– Report generation module: This module is used to generate reports on risks for management and other stakeholders.

### **Benefits of using ARAS**

ARAS can provide a number of benefits for organizations, including:

– Increased Efficiency: ARAS can help organizations automate the risk assessment and monitoring process, which can lead to significant time and cost savings.

– Improved Decision Making: ARAS can help organizations make more informed decisions about risks by providing them with better information about the risks they face. This information can be used to prioritize risks, allocate resources, and develop mitigation plans.

– Enhanced Transparency: ARAS can help organizations improve the transparency of their risk management process by providing leadership and other stakeholders with a clear view of the risks facing the organization. This transparency can help to build trust and confidence in the organization's risk management capabilities.

– Continuous Improvement: ARAS can help organizations continuously improve their risk management practices by providing them with data and insights that can be used to identify trends, track progress, and identify areas for improvement.

### **Challenges of using ARAS**

It is important to note that there are also some challenges associated with using ARAS, such as:

– Data Quality: ARAS is only as effective as the data it is based on. It is important for organizations to ensure that the data in their risk database is accurate and up-to-date.

– Model Accuracy: The risk assessment module of ARAS relies on models to assess risks. These models can be complex and may not always be accurate. It is important for organizations to validate the models used by their ARAS.

– Human Oversight: ARAS should not be used to replace human oversight in the risk management process. ARAS is a tool that can be used

to support risk management decisions, but it should not be used to make decisions on its own.

In the active digital environment of modern society, there are various threats and risks that can hinder business processes and effective cooperation with clients in organizations and companies. These can be financial or reputational risks associated with interaction with new clients. With the growth of international trade and investment, companies have more financial risks associated with payments, credits, and currency operations. The increase in cyber threats necessitates reliable protection of information and client data. Therefore, companies that possess effective risk assessment automation systems can attract more clients and provide a higher level of service. All these factors determine the relevance of the research topic and the need to develop software systems for automating risk assessment.

The software system we have created is monolithic and divided into virtual modules: the API interface module for integration with third-party systems; the asynchronous communication module with clients; the module for working with the LexisNexis system; the module for working with the MaxMind system; the module for working with the Persona system; the decision-making module; the business logic module of the service; the analytics module; the email communication module; the API documentation generation module. This architecture combines the advantages of monolithic architecture and modular organization, providing a certain level of separation of functions and system components. Clients of the system can customize their solutions and communicate with the developed system through the API interface module. The asynchronous communication module with clients, built on the basis of webhooks, allows the system to send and receive messages in real-time.

### **Conclusions**

ARAS can be a valuable tool for organizations of all sizes. By automating the risk assessment and monitoring process, ARAS can help organizations identify, assess, and mitigate the risks they face. This can lead to improved decision making, increased efficiency, and enhanced transparency. However, it is important to be aware of the challenges associated with using ARAS and to take steps to mitigate those challenges

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## SECTION 3. INFORMATION SYSTEMS AND BUSINESS MANAGEMENT MROCHKO

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### SWOT ANALYSIS OF OLYMP FITNESS CLUB

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#### **Abstract**

This study presents a SWOT analysis of the Olymp fitness club, examining its strategic positioning, internal capabilities and external opportunities. SWOT analysis in this study is used to evaluate internal strengths and weaknesses and identify external opportunities and threats in the sports business in Riga. The Olymp fitness club prides itself on high-quality equipment, a wide range of products and opportunities in the gym, as well as an individual approach, offering pensioners and disabled people other conditions for staying in the gym. However, problems were identified with the growth of competitive new gyms, rising utility prices and a lack of new customers. SWOT analysis opens up opportunities to increase competitiveness and visibility in social networks. As a result of study shows, Olymp fitness club can develop effective strategies to capitalize on strengths, overcome weaknesses, and wisely take advantage of opportunities while avoiding potential threats in the sport market in Riga.

**Key words:** *SWOT analysis, strategic management, fitness, sport nutrition, customers.*

#### **1. Introduction**

This study uses a comprehensive SWOT analysis to understand circumstances, forces, events and issues that shape organization's competitive situation. Known for its long-term commitment and personalized customer service, Olymp fitness club has carved a niche in the fitness market for more than two decades. However, against the backdrop of a dynamically developing sports industry represented by gym chains, the

company faces many challenges and opportunities that require careful study. This study is analysis of Olymp's strategic position through the prism of SWOT analysis. By carefully examining the company's internal strengths and weaknesses, as well as external opportunities and threats, this study aims to identify how Olymp can improve its competitiveness and take advantage in the sports market in Riga. Through this analysis, Olymp can find ways to develop and innovate, thereby strengthening its competitiveness in the market. This study is based on an analysis of the company's internal documents.

## 2. Theoretical aspects of SWOT

SWOT is a widely used tool for conducting a situation analysis. The goal of SWOT analysis is to match the company's strengths to attractive opportunities in the environment while eliminating or overcoming the weaknesses and minimizing the threats [1].

<p style="text-align: center;"><b>Strengths</b></p> <p style="text-align: center;">Internal capabilities that may help a company reach its objectives</p>	<p style="text-align: center;"><b>Weaknesses</b></p> <p style="text-align: center;">Internal limitations that may interfere with a company's ability to achieve its objectives</p>
SWOT	
<p style="text-align: center;"><b>Opportunities</b></p> <p style="text-align: center;">External factors that the company may be able to exploit to its advantage</p>	<p style="text-align: center;"><b>Threats</b></p> <p style="text-align: center;">Current and emerging external factors that may challenge the company's performance</p>

**Figure 1. SWOT analysis [1, p. 80]**

Formulating strategy begins with understanding the circumstances, forces, events and issues that shapes organization's competitive situation, and influences company's ability to compete [2, p. 248].

In practice, SWOT analysis is applied to link the results of the analysis of the internal and external environment in order to choose the appropriate strategy Strengths and weaknesses characterise the internal environment of the company, which the company itself creates. Opportunities and threats are related to the external environment [3, p. 41]. In a SWOT analysis, taking into account the objective and assessing the environment as well as the resources, a company needs to identify its core competencies (competence – expertise, knowledge, understanding of a field, issue, set of issues), its competitive advantages and its main or baseline capabilities. The key to SWOT analysis is to see the opportunities in the external

environment, as they show possible directions for strategic development, provided of course that the company has the relevant strengths which, if put to use, it can exploit.

### **3. SWOT analysis of OLYMP**

#### **Strengths**

- The location of the gym – Fitness Club Olymp is easily accessible for people both by personal vehicles and by public transport, which allows a large number of people to get to Olymp without difficulty.

- Variety of sports nutrition products – the company offers a large selection of healthy sports nutrition and snacks, as well as drinks and ancillary products to improve performance during training for athletes.

- Possibility to take food with you using self-pickup.

- Size and number of exercise equipment – the Olymp fitness club has two floors with an impressive number of sports equipment for strength and cardio training, which allows clients to choose what type of training is preferable for them.

- Pricing – Olymp has a system of discounts for regular customers, which after a year is 20% of the subscription amount, children's subscriptions for young customers under the age of sixteen inclusive, there is a 50% discount, for the disabled and pensioners the price is initially calculated with a 20 t %.

- Social Media Marketing and Promotion – the company relies on satisfied customers to spread positive messages, using personal recommendations as a key factor in brand awareness and customer acquisition.

#### **Weaknesses**

- One type of subscription for women – the territory of the fitness club is two floors and has 2 locker rooms on the second floor for female and male clients, on the first floor there is only a locker room for male clients, and therefore Olympus offers men two types of subscriptions, visits exclusively for two floors or visits exclusively to the first floor, the latter has a monthly price of 10 euros less. Women do not have such a choice, which is why they sometimes have to face conflict situations.

- Lack of group training – at the Olympus fitness club, individual training with fitness trainers is preferred, but this type of training is not suitable for everyone. Due to the lack of a trainer who can conduct group training, we are losing clients.

### **Opportunities**

- Expansion of space – at the location of the building where the Olymp fitness club is located, there is the possibility of access to the inner part of the courtyard, where light training can take place in the summer.
- Organizing sports marathons – organizing a weight loss marathon for gym clients who want to take part, having a system of prizes for clients who take prizes will help not only motivate clients, but also attract new ones through the dissemination of information on social networks.
- Organization of group training – clients who are just beginning to study the topic of fitness would come to group training to familiarize themselves and increase endurance, which would be sorted according to the physical capabilities of each client.

### **Threats**

- Competition – over the past few years, the Olymp fitness club has faced a large number of competitors due to the fact that a large number of chain gyms have opened and their winning concept is that by purchasing a subscription to one gym, customer can visit all the others from the same network.
- Olymp has only one hall and training is possible only in one place.
- Forced increase in prices – due to an unstable market and an increase in stock prices in our country, the increase in payment for heating, electricity and utility bills is growing, for which reason management is forced to raise prices for services provided in the gym. As a result, Olymp may be faced with the fact that a certain part of its clients will be forced to leave the fitness room.

After carrying out a SWOT analysis and examining the factors, Olymp Fitness Club can make strategic decisions to improve its competitiveness in a complex and changing external environment.

## **4. Conclusions**

In conclusion, after a complete analysis of the Olymp enterprise, having considered all strategic actions, we can conclude that the Olymp sport club occupies a competitive place among many new sports institutions.

In conclusion, after a complete analysis of the Olymp sport club, taking into account all the strategic actions, it can be concluded that the Olymp sport club occupies a competitive position among the many new sports facilities.

Compared to other fitness clubs, it is also important to note the spacious premises of Olymp and the variety of expensive exercise equipment. These strengths help the club maintain profitability and recognition among clients

and coaches. However, the company is faced with the problem of a lack of group classes, which reduces the number of willing and potential clients due to the fact that they prefer other fitness clubs. However, taking into account all the winning positions and recognition of the hall, Olymp remains visited and uses all auxiliary opportunities to attract and retain its client base.

It should be noted that due to the price hikes from suppliers and utility bills, price hikes within the company itself, after analysis and possible difficulties, a smooth introduction of new prices for products sold in the fitness club area and subscription prices for customers will be carried out.

The analysis showed specific strengths and weaknesses, as well as what Olymp could face if new opportunities are not gradually introduced within the sports club.

### **Acknowledgment**

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## THE MAIN CHALLENGES OF ESTABLISHING EXPORT RELATIONS OF FOOD INDUSTRY ENTERPRISES OF UKRAINE IN THE CONDITIONS OF MARTIAL LAW

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### Abstract

The work is devoted to the study of the problems of establishing export relations of food industry enterprises of Ukraine in the conditions of martial law. The volume of sales of food products outside the country was analyzed and the reasons for the change in this indicator were determined. Also, the main challenges that affected the field of logistics in the food industry of Ukraine were determined.

**Key words:** *logistics, logistics activity, inbound logistics, outbound logistics, export, import, food industry.*

### Introduction

After the full-scale war, a new phase of testing began for Ukrainian business. Many domestic food producers were forced to temporarily stop their business and look for various options for restoring and continuing their activities. Difficulties with freight transportation prompted an immediate transformation and optimization of business processes. One of the key challenges Ukrainian companies had to face was the reformatting of logistics, because it contributes to the effective development of the enterprise due to the choice of logistics strategy, the formation of the logistics system and the implementation of the logistics process at the enterprise.

### Overview

Logistics activity refers to the process of planning, implementing, and controlling the efficient and effective flow and storage of goods, services, and related information from the point of origin to the point of consumption in order to meet customer requirements. It encompasses various functions such as transportation, warehousing, inventory management, packaging, and

information management, all aimed at ensuring the smooth movement of goods and services through the supply chain [1].

Martial law was reflected in the production of a large number of food companies, which lost the ability to supply their products to other regions of Ukraine and abroad. On the example of the PrJSC MHP, which is the largest producer of chicken in Ukraine, in March 2022, the Russian occupiers destroyed MHP products worth about 230 million UAH [2]. Ukraine's largest warehouse for storing frozen products was damaged. In addition to MHP, it was also used by other large retail chains.

The war also affected the French food and beverage manufacturer Danon, specifically its production facilities in Ukraine, which are represented by two plants – LLC “Danon Dnipro” (Kherson) and PrJSC “Danon Kremez” (Kremenchuk). According to the director of operations and procurement of Danone in Ukraine, Ivan Khanas [3], the loss of control over the Danone plant in Kherson was the most difficult challenge, because it was the most modern and highly efficient plant in Ukraine for the production of dairy and sour milk products of the modern category. Fortunately, in a short period of time, before the full occupation of the city, the company managed to remove 600 tons of dairy products from the warehouse and donate them as charity to the needs of the citizens.

The organization of logistics activities usually consists of the processes of inbound and outbound logistics traffic. Inbound logistics is the process of moving goods from suppliers to a warehouse, then to a production facility for manufacturing products. Inbound logistics may include raw materials, tools, components, office equipment, and inventory. Outbound logistics is the process of moving finished products from warehouse stocks and delivering them to customers [4]. Therefore, it can be noted that warehouses are essential components of logistics operations, enabling businesses to optimize inventory management, streamline supply chain processes, reduce costs, and enhance customer satisfaction.

In order to establish the right logistics, companies usually use the services of special organizations that focus their activities on transportation. The management of one of the most famous logistics companies in Ukraine, ZAMMLER GROUP noted that currently exports exceed imports, including in terms of transportation costs, which was not the case for a long time. Everything that was in warehouses or from those enterprises that are currently working is being taken out. However, the volume of work is currently 20-30% of the pre-war level. The main problem of importers today is the lack of warehouses. Companies cannot take out containers because recipients have nowhere to place them. It is difficult to find warehouses not

only in Romania and Poland, but also in western Ukraine. In addition, there is a lack of vehicles that can pick up goods from ports, and foreign drivers do not want to go to Ukraine [5].

This situation is confirmed by the data of the State Statistics Service of Ukraine. During the analyzed years, the indicator “Volume of food products sold outside the country” acquired the highest value in 2022, which is 69.93% and 98.9% higher than in 2021 and 2023 in accordance (tab. 1).

Table 1

Volume of food products sold outside the country  
(million UAH, excluding VAT and excise)

<b>Industry</b>	<b>2021</b>	<b>2022</b>	<b>2023</b>
Manufacture of food products	14653,3	24900,4	12519,1

*Formed on the basis of data [6]*

Ukrainian enterprises faced the main challenges that affected the areas of logistics:

- blocking of Ukrainian ports and changes in logistics routes for export and import;
- insufficient readiness of the infrastructure, both in Ukraine and in Europe, which leads to long queues at the borders;
- HR issues such as loss of human capital and labor mobilization;
- high prices for energy resources or their shortage;
- power outages, which have the greatest impact on warehouse logistics;
- loss of production capacity and capital assets due to hostilities.

Enterprises that reoriented themselves in time at the beginning of the war and began to master new export routes, were able to adapt to difficult business conditions. According to Viktor Berestenko, President of the Association of International Freight Forwarders of Ukraine, adaptation is one of the essences of logistics that cannot stop, because a stop is the absence of trade and exchange of goods, practically the absence of consumption, which in the modern world is equal to the absence of life [7].

## Conclusions

In summary, the following can be noted:

1. Ukrainian food industry enterprises need to actively establish export relations to ensure stable export of products to foreign markets despite military conflicts.

2. Inability of warehouse infrastructure to hold large volumes of goods due to limited capacity and increasing instability in warehouses due to the possibility of armed conflicts and acts of terrorism, making it difficult to ensure security for personnel and goods.

3. In wartime, food industry enterprises need to actively use diplomatic and trade channels to develop new export routes and find new partners.

4. An important aspect of establishing export relations in wartime is the diversification of export markets, which will reduce dependence on one direction and increase resistance to economic turbulence.

5. The development of infrastructure and logistics connections is an important factor for the successful establishment of export relations of food industry enterprises in the conditions of war, as it will allow ensuring fast and efficient delivery of products to foreign markets.

6. State support and the creation of a favorable investment climate are key to supporting the export efforts of food industry enterprises in wartime, which will increase their competitiveness in the international market.

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## UKRAINE'S AGRICULTURAL SECTOR IN MODERN CONDITIONS: STATE AND PROSPECTS OF DEVELOPMENT

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### **Abstract**

It is a well-known fact that Ukraine is famous for its fertile land due to its favorable climate and large areas of high-quality soil. Agriculture plays an important role in the country's economic development and is an important strategic sector of the Ukrainian national economy. In addition, agriculture is one of the leading factors in the formation of gross domestic product, which shows the degree of economic independence of a country. This work analyzes the current state of Ukrainian agriculture and the factors influencing its development.

**Key words:** *agriculture, real GDP, nominal GDP, investment attractiveness index.*

### **Introduction**

Ukrainian agriculture is one of the key drivers of the country's economy. Over the 30 years of its independence, Ukraine has gone through a difficult economic path, especially in the field of agricultural development. Our country is indeed considered a major agrarian power, which can be easily confirmed by studying important economic indicators, such as the share in GDP, exports, employment, investments, and others. This data is easy to observe and analyze. Today, Ukraine continues to strengthen its position as a strong agricultural economy, but one of the most important problems that creates an obstacle to development is the full-scale invasion of the country.

### **Overview**

Analyzing and studying the factors that influence the development of an enterprise as a whole is quite important in today's environment. Any enterprise focuses its efforts on obtaining the final result, which subsequently shapes the economic development of a particular sector of the country's economy.

There are many factors that affect the formation of profits and the level of development of an enterprise, which are difficult to limit to certain types. Let's look at a few of them that have a direct impact on the Ukrainian agricultural sector.

External factors include natural conditions, transportation conditions, government regulation of prices, tariffs, interest, tax rates and benefits, penalties, competition in the market for goods, etc. These factors are independent of the company's operations, but they have a significant impact on its profits. The most important external factor in the development of agriculture is state regulation, which is carried out through price, tax, antitrust, financial and innovative foreign economic policy and regulatory support.

Internal factors include production and sales volumes, product structure, production costs, product quality, prices, etc. Internal factors are divided into production and non-production factors. Production factors characterize the availability and use of means and objects of labor, labor and financial resources. These factors, in turn, are divided into extensive and intensive [1].

To determine the current state of Ukrainian agriculture, we will analyze real and nominal GDP. Real GDP will allow us to estimate the actual volume of agricultural production and its dynamics compared to previous periods. On the other hand, the analysis of nominal GDP will allow us to take into account the impact of inflation on the total gross domestic product, which is also an important factor in agriculture.

Table 1  
Real and nominal GDP of Ukraine in 2020–2022

	<b>2020</b>	<b>2021</b>	<b>2022</b>
Nominal GDP (UAH million)	4222026	5450849	5239114
Real GDP (UAH million)	3827941	4367501	3883262
Nominal GDP (EUR million)	122733,31	177205,75	122266,37
Real GDP (EUR million)	111277,35	141986,37	90624,55

Table 1 shows the nominal and real GDP figures, which reflect the dynamics of Ukraine's economic development over the past few years. These data, which are based on the state statistics of Ukraine [2], are key to understanding the state of the country's economy and its potential for further growth. We offer a further detailed analysis in Table 2, which contains statistical indicators based on the data from the first table.

Table 2

**Statistical analysis of real and nominal GDP of Ukraine for 2020–2022**

	Absolute deviation		Relative deviation (%)	
	2021/2020	2022/2021	2021/2020	2022/2021
Nominal GDP (UAH million)	1228823	-211735	29,11	-3,88
Real GDP (UAH million)	539560	-484239	14,10	-11,09
Nominal GDP (EUR million)	54472,44	-54939,38	44,38	-31,00
Real GDP (EUR million)	30709,02	-51361,83	27,60	-36,17

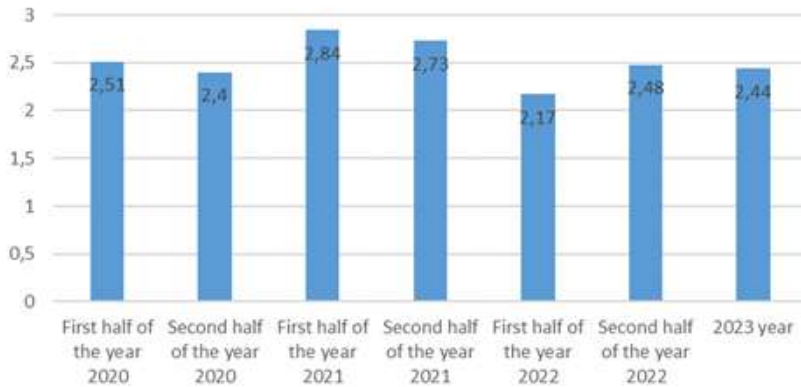
According to Table 2, we can draw the following conclusions: the absolute and relative deviations for Ukraine's nominal and real GDP in hryvnia and euros for the period from 2020 to 2022 demonstrate important trends in the country's economic development. While in 2021 both nominal and real GDP grew in both equivalents, in 2022 we may see a sharp decline. And one of the main reasons for this sharp decline is the military operations in the country. Thus, in 2021, nominal GDP grew by EUR 54,472 million, which is 44.38%. Whereas in 2022, it decreased by EUR 54,939 million, or 31%. In terms of real GDP, the situation is identical: in 2021, the figure increased by EUR 30,709 million compared to the previous year, which is 27.6%, while in 2022 it decreased by EUR 51,361 million, which is 36.17%.

A country's GDP determines the economic conditions in which agriculture operates and can influence its development by increasing demand, investing in technology and infrastructure, promoting trade, and other mechanisms.

However, agricultural development also depends on the investment climate in the country. The analysis of the investment climate will help to assess the attractiveness of Ukraine for investors in agriculture, including the availability of financial resources, legal and regulatory framework, level of corruption, and stability of the political situation. Importantly, the availability of investment can significantly improve infrastructure and

technological development in the agricultural sector, which in turn will contribute to the productivity and competitiveness of the Ukrainian agricultural sector.

In recent years, Ukraine's investment attractiveness index has been fluctuating. In 2021, the index was 2.73, indicating favorable conditions for investment. However, in the first half of 2022, the index dropped to 2.17, but recovered to 2.48 in the second half of 2022. In 2023, the index decreased again to 2.44, indicating that certain factors that limit the country's investment attractiveness remain.



**Figure 1. Dynamics of the investment attractiveness index**

Created by the author based on source [3]

After analyzing the two indicators, we can note that the war that began in 2022 dramatically affected both the country's GDP and its investment attractiveness, which subsequently created a certain crisis in the country's agricultural development.

According to international experts, the war started by the Russian Federation in Ukraine, against a country that is currently a major supplier of major grain crops to the world, has caused a food crisis. According to the USDA, before the war, Ukraine accounted for 46% of the world's sunflower oil exports, 9% of wheat exports, 17% of barley, and 12% of corn on international markets [4].

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## MEANS OF ENSURING A RATIONAL ASSORTMENT AT THE ENTERPRISE

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### Abstract

The effective operation of any enterprise is related to a quick response to consumer demand, rational planning and assortment management, ensuring the necessary product quality, production efficiency in order to obtain sufficient profit. That is why the study of issues of planning and optimization of the product assortment is relevant in the modern conditions of the market economy. One of the most important tasks in planning a rational assortment is the definition of promising assortment groups of products for the enterprise. In this regard, there is a need to expand the use of methodical approaches for substantiating the range of products.

**Key words:** *goods, assortment, rational assortment, enterprise.*

### Introduction

For the successful sale of manufactured products, the planning of a rational assortment should be carried out on the basis of marketing research in the target market. A rational assortment is an assortment that most fully satisfies the realistic needs of those market segments to which the company's activities are directed. Based on the analysis of the market segment, it is necessary to develop such an assortment that would meet the existing demand and remain competitive, taking into account possible changes in demand in the future period. The competitiveness of products is closely related to the assortment policy of the enterprise.

### Statement of the main material

The formation of the assortment is a cyclical process that continues throughout the entire life cycle of the product, from the moment of the idea of its design and ending with its removal from the assortment. The company's assortment is formed to achieve two interrelated, but contradictory goals:

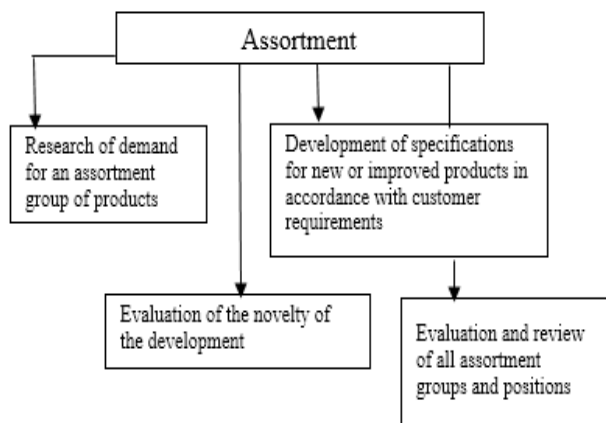
- meeting the needs of the population (production of good quality products in the necessary volume to satisfy consumer demand);
- ensuring the self-sufficiency of production and obtaining profit in the amount optimal for stimulating high-quality work, self-financing of industrial development.

The main task of forming the company's assortment is to meet the needs of various population groups as fully as possible, taking into account the need to ensure economic benefits for the company.

According to the level of satisfaction of needs, the following types of assortment can be named:

- rational – a set of products that most fully satisfies realistically justified needs that ensure the maximum quality of life at a certain level of development of science, technology, and technology;
- optimal – is a set of products that satisfies the existing needs of the population with the most beneficial effect for him at the lowest costs for their development, production and sale to the end consumer.

Below, Figure 1 shows the areas of research, study and development of the assortment:



**Figure 1. The areas of research, study and development of the assortment**

In order to optimize the product assortment, first of all, it is necessary to objectively assess the existing (actual) assortment at the enterprise, namely to determine its rationality and balance. The analysis of the actual

assortment at the enterprise will help determine the further directions of development of the assortment policy at the enterprise. As noted by V. Behrens and P. Havranek, the range of products to be produced depends mainly on market requirements and proposed marketing strategies. The program and volume of production must be developed taking into account the limitations caused by market conditions and the availability of resources for different levels of production [1]. M.M. Lepa believes that when planning the range of products for each product, the necessary minimum output that ensures break-even production or obtaining a given level of profitability should be determined [2]. One of the advantages of this method is taking into account both market conditions and internal production conditions. The use of this method will be impractical for multi-item production, because calculations must be made for each type of product. S. Pashutin focuses attention on the fact that when forming the product assortment, first of all, it is necessary to take into account the desired economic effect that the company plans to obtain from its economic activity. This approach is based on the differentiated accounting of direct and indirect costs of the enterprise and provides a system for calculating the cost price, based on the distribution of total costs on those that do not depend on the amount of products produced (that is, on fixed-conditional costs) and on variables directly related to turnover or production of goods per unit of time [3]. The author proposes to be guided by marginal cost when calculating costs. That is, assigning to the cost price of the product only those costs that change in proportion to the intensity of the enterprise's activity (costs for raw materials, energy and other costs for technological needs and implementation, including trade and transport costs). Fixed costs, or so-called overhead costs, are excluded from the cost of new products and, as a rule, are covered by the marginal profit obtained from the sale of products, which is understood as the difference between the profit and the variable part of the cost of the sold goods. It is not necessary to calculate the marginal profit for all items of the assortment list. It is quite enough to limit yourself to only the most significant goods, taking into account the amount of expenses. For this purpose, the ABC analysis method can be used, according to which all the company's products are divided into three groups according to their value, that is, a hierarchical scale of goods with the maximum value at their minimum quantity is built [4]. Determining the level of rationality of the product range can be carried out by: – informal methods. Non-formalized methods include the method of collective expert evaluations;

- formalized methods. Among the formalized methods, the most optimal is the calculation of the Spearman criterion, which reflects the relationship between the assortment structure and the level of profitability of each assortment group. Spearman's criterion is calculated according to the following formula (1):

$$C_{or} = 1 - \frac{6 \sum_{i=0}^n (C_{oi} - C_{pi})^2}{n(n^2-1)}. \quad (1)$$

It would also be appropriate to calculate the rationality coefficient – the weighted average value of the rationality indicator, taking into account the real values of the indicators of depth, stability and novelty of goods of different groups, multiplied by the corresponding weighting coefficients.

The profitability of the assortment is determined by the cost price and costs of selling the product. The value of the level of profitability of the assortment is influenced by the following factors:

- raw material base of production enterprises;
- material-technical base;
- scientific and technical process;
- distribution channels of goods;

– methods of sales promotion and demand formation. The process of forming a rational assortment of goods can be conventionally divided into two stages. At the first stage, a list of the main groups and subgroups of sold goods is determined. At the second stage, the number of sold varieties of goods for each denomination is determined. At a specific enterprise, an assortment of goods is formed based on the assortment list. It is a tool with which the assortment is regulated. When forming a rational product range of any commercial enterprise, the following groups of products are distinguished: – the main group of goods are goods that bring the main profit to the enterprise; – supporting group of goods – goods that stabilize income from sales; – a deteriorating group of goods – goods that bring too little profit or are even sold at a loss; – strategic group of goods – goods designed to ensure the main profit in the future; – tactical group of products – products designed to stimulate the sale of the main product groups. The task of the assortment policy of the enterprise is to develop and form a product assortment that is best suited for work on the selected market and ensures the economic efficiency of the enterprise. When developing an assortment policy, it is necessary to establish a connection between the requirements of the market, on the one hand, and the intentions and capabilities of the enterprise, on the other. A carefully developed and well-thought-out product policy is necessary to carry out effective activities on the market. This is due

to the fact that the product serves as a powerful means of influencing the market, and is the main source of profit for a commercial enterprise. The process of forming a rational assortment should be based on the form of its product specialization and the size of the trading area and be aimed at satisfying the demand of the contingent of buyers, as well as ensuring high profitability of its activity. The goal of the organization in relation to the assortment is the formation of a real assortment or a projected assortment, as close as possible to the rational one, to meet various needs and obtain a planned profit.

### **Conclusions**

Forming the assortment is a complex and continuous process. The optimal assortment is individual for each enterprise and depends on sales markets, demand, financial and other resources. Many factors, both general and specific for each enterprise, influence the formation of the assortment. Without taking into account these factors, the company will not be able to form an effective rational assortment. One of the most important factors in product assortment formation is product positioning. With the help of correct positioning, the company distinguishes its product from the circle of similar ones on the market, which helps the consumer to prefer it.

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## ANALYSIS OF DEVELOPMENT TRENDS OF THE FINANCIAL SERVICES MARKET OF UKRAINE

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### **Abstract**

The study contains a local analysis of trends that arose in Ukraine during the Covid-19 pandemic and during the military aggression of the Russian Federation on the financial services market. The work highlights problems related to the functioning and existence of non-bank financial and credit institutions. Individual indicators of the state of the financial market of Ukraine are characterized. Information is presented on the key advantages and disadvantages of credit activity in the context of non-bank financial and credit institutions in the market of financial services, in relation to adaptation to the changes they have encountered. Based on the analysis, further challenges of the financial sphere are identified.

**Key words:** *financial services market, banking institution, financial institution, financial services.*

### **Introduction**

An integral condition for the effective development of the national economy is the provision of investment resources, the shortage of which currently creates problems in the restoration of domestic production, which has declined during the years of deindustrialization and military operations. The problem of shortage of financial resources should be solved by the financial market, where its main subjects are banking and non-banking financial institutions (NFIs), which specialize in the processes of attraction, accumulation, distribution and redistribution of funds in the interests of their clients. The financial market is a powerful supplier of financial resources to the real sector of the economy, directing the funds raised, as financial investments, to the development of manufacturing corporations.

### **Formulation of the problem**

Despite a significant amount of research, the financial services market is quite dynamic, and the opportunities and problems associated with the functioning and existence of non-bank financial and credit institutions remain relevant in the context of globalization and economic instability. In addition, it is necessary to conduct an analysis of the dynamics of key indicators, to determine the advantages and disadvantages of the main participants in credit activity in the context of non-bank financial and credit institutions in the financial services market, and to determine the main trends for the future, which necessitates a deeper study of the activities of its participants.

### **Analysis of recent research and publications**

Problems and prospects, the main theoretical and methodological foundations of the formation of the Ukrainian financial services market are explored in their works by O. Prutska, O. Ruda, M. Balytska, T. Borodtnko, A. Burjachenko, L. Brazhnyk and others.

**The purpose of this study** is to evaluate the market of financial services of Ukraine in the conditions of changes, as well as to identify key problems and factors affecting the development of the market.

### **Presenting main material**

The financial services market of Ukraine is an integral part of the country's financial system. The financial sector is constantly undergoing changes under the influence of technological progress and the growing needs of consumers. The main trends of the financial services market today include: the rapid development of artificial intelligence and its introduction into the lending process, by increasing the accuracy of creditworthiness assessments; expanding the possibilities of automating investment decisions, for example, using AI for automated trading in stock, currency and other markets; improvement of text, voice and video chatbots; growing demand for Instant Payments or Fast Payments (instant payments in real time). It is also worth noting the relevance of decentralized finance, with the help of De-Fi technology, namely the use of blockchain technology to create and provide financial services (loans, trading, lending) without traditional financial intermediaries [1]

Another key evolutionary trend is the growing role of non-bank financial and credit institutions in the financial services market as serious competitors to banking institutions in the field of lending, forming their own competitive

advantages. The main participants of which include: insurance companies, financial companies, pawnshops and credit unions.

The activity of financial companies is concentrated in two segments, namely working with small and medium-sized businesses, which attract additional capital for operational activities, and working with the population, which is provided with small short-term loans to meet their consumer needs. Financial companies are a necessary strategic link in the restoration of the country's economic growth, which is possible only through the provision of active lending [2].

In order to take into account, the main trends of the financial services market, the main dynamics of changes in the number of market participants were studied. Table 1 shows the dynamics of the number of participants in the financial market of Ukraine for 2020–2023

Table 1

**Dynamics of the number of participants in the financial market of Ukraine [3]**

Institutions	Years				Abs. deviation
	2020	2021	2022	2023	2023–2020
Banks	73	71	67	63	-10
Insurers	210	155	128	101	-109
Credit unions	960	922	760	559	-401
Finance companies	146	137	98	76	-70
Pawnshops	322	278	162	133	-189

During the analyzed period, the number of providers of non-bank financial services decreased: 10 banks, 109 insurance companies, 401 financial companies, 156 pawnshops, 70 lessors and 189 credit unions were removed from the Register. In general, the financial market decreased by 53.55%. Most of the financial institutions left the market, having voluntarily given up their licenses, and some had their licenses revoked by the decision of the regulator (the National Bank of Ukraine).

Table 2 presents the value of assets of the financial sector of Ukraine during 2020–2023.

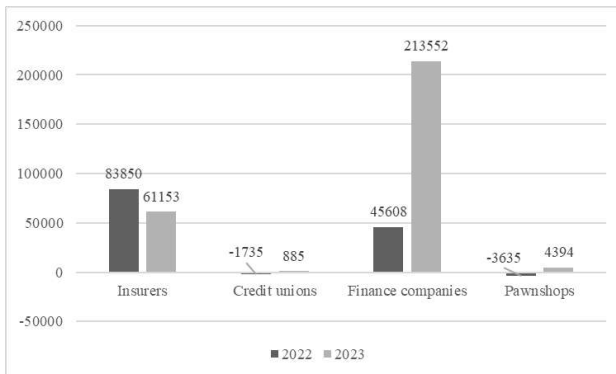
Table 2

**The value of assets of the financial sector of Ukraine, million Euro [3]**

Institutions	2020	2021	2022	2023	Abs. deviation
Banks	45571	51331	58848	73570	27999
Insurers	1623	1618	1757	1858	235
Credit unions	58	58	36	36	-22
Finance companies	4663	5410	6100	6266	1603
Pawnshops	96	107	103	96	0

Despite a significant reduction in the number of participants in the financial services market, the overall dynamics of the value of assets during the analyzed period had a tendency to increase, which indicates a redistribution of resources. According to the analyzed data, we can see that a significant increase occurred in the banking sector, namely by 27,999 million Euros, insurance companies – by 235 million Euros, financial companies – by 1,603 million Euros. Although pawnshops had an increase in 2021-2022, they returned to the 2020 figure in 2023. Credit unions, on the contrary, reduced the amount of their assets by 36 million euros.

An important indicator for the analysis of the financial services market is the financial result of providers of non-banking financial services (Fig. 1).



**Figure 1. Net profit/loss of providers of non-banking financial services, thousand Euro [3]**

According to the main regulator of the financial market of Ukraine, insurance companies suffered losses in the amount of 22,696 thousand euros for 2022-2023, while other participants of the financial services market were able to increase their profits: credit unions – by 2,621 thousand euros, financial companies – 167,994 thousand euros, lessors – for 8029 thousand euros.

Thus, it is possible to note the intensive development of the credit sector in the market of financial services, which is caused, first of all, by financial companies, such as factoring, leasing and other credit institutions.

One of the main problems of the development of non-bank financial and credit institutions is the limited interest in their financial services compared to banks. Expanding the spectrum of financial services from non-bank financial and credit institutions and deepening their specialization in certain areas is important for improving quality and ensuring competitive advantages compared to banks. However, the low level of trust in them poses a challenge to their competitiveness in the market compared to banks. In particular, competition is most felt in related financial services provided by both banks and non-bank financial and credit institutions [4].

The main difficulties that inhibit the development of non-banking financial institutions in Ukraine are: ineffective state regulation of the activities of non-banking financial institutions, inconsistency of current legislation with the needs and development of the financial market and its reform processes; low level of public trust and rather limited awareness of the activities of non-banking financial institutions; a decrease in the real income of the population due to Covid-19 and military actions, which makes it difficult to accumulate funds for investing in the financial sector, as well as the lack of a guarantee fund.

Since, today, most of the financial services provided by financial companies relate to lending, those financial institutions that have the highest credit potential have a significant competitive advantage in the market. They can significantly accelerate the development of the lending sector, competing with banks.

Financial companies are leaders among non-banking financial institutions in terms of increasing the rate of growth of their assets and improving key financial indicators. When evaluating their positions on the market of financial services, first of all, it is worth considering the competitive advantages of the financial product offered on the market. The most important characteristics are the availability of the financial organization (a wide network of branches, sufficient bandwidth) and the

price (tariff) policy. Also, non-bank financial and credit institutions are rapidly gaining popularity due to technological innovation and flexibility in adapting to market changes, namely the use of high-tech solutions such as blockchain and artificial intelligence to improve their services and provide faster and more efficient customer service. All of the above. allows us to predict that in the near future they will take a significant share in the non-bank lending market [5].

### **Conclusion**

So, in recent years, the financial services market of Ukraine has undergone significant changes, which will have both positive and constructive consequences for the entire sector. The study showed that the main factors affecting the efficiency of the functioning of the financial services market are the rapid and client-oriented digitalization of services; volatility of regulatory policy due to Russia's military actions in Ukraine; immediate response to changes in conditions of limited access to financial resources; quick adaptation to work with clients under conditions of strict limitation of financial transactions.

The answers to these challenges can be: virtualization of services through cooperation with FinTech companies and, as a result, the emergence of new tools in the financial services sector; forced transition and the inevitability of acceptance of new online offers by financial intermediaries; diversification and hedging of savings by converting them into "currency-equivalent" deposits and cryptocurrencies; modification of mobile banking applications.

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**PET STORE CUSTOMER SERVICE:  
FEATURES AND INCENTIVE METHODS**

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**Abstract**

In the structure of a market economy, along with markets for goods, capital, and labor, there is a world market for services. The market for services is a complex system that includes various elements, the main function and task of which is to satisfy the needs of the population for services. At the heart of the services market, a huge and rapidly growing part of the world economy is the service sector.

**Key words:** consumer service, pet store service, effective pet store customer service system

**1. Introduction**

In the global economy, the service sector is the main factor in improving the quality of life.

In this regard, the importance and role of the service sector in the modern economy is increasing for the following reasons:

- new jobs are constantly being created in the service sector;
- the service sector is increasing its share in the country's gross domestic product;
- due to this area, the time spent servicing a household is reduced, which improves the quality of life of the population.

In modern conditions, the goal of service sector enterprises is to achieve competitiveness and profitability, which involves control over production costs and competition for a certain share of the services market. At the same time, the main task of service enterprises is the high quality of organization of customer service and the provision of services to the consumer. In this regard, the main task of service enterprises in a market economy and intense competition is to

organize a system of serving consumers with household services, which would allow them to achieve a high quality level of service [1].

Customer service in a pet store has its own characteristics due to the specifics of the goods and services provided. Here are some key aspects of pet store customer service:

- Expertise and consultation: Store staff should be well versed in the products and needs of different species of animals, as well as having knowledge of proper care for them. They should be ready to advise customers on choosing the right products and animal care.

- Product range: The store should have a wide selection of products for all types of pets, including food, accessories, toys, grooming devices and medical supplies.

- Convenience of purchase: Customers should be able to easily find the necessary products, as well as receive advice and assistance from store employees.

- Grooming Services: Some pet stores may provide grooming services for pet care, such as clipping, bathing, and grooming.

- Loyalty programs: The store can introduce loyalty programs for regular customers, such as discounts, bonuses or gift certificates.

- Attention to the safety and health of animals: Store employees must be attentive to the health and safety of animals in the store, and recommend the right products and care methods to customers.

- After-sales service: The store must provide after-sales support, including the exchange or return of goods, as well as advice on the use and care of purchased goods.

### **Overview**

It is assumed that in a highly competitive market for pet products, improved service will have a qualitatively positive effect on the pet store, which in turn will provide a competitive advantage.

### **Decision**

Today, the following consumer trends are observed in the pet products market:

- concern for the state of the environment. Preference is given to environmentally friendly products, packaging is made from completely recycled materials or recycled materials; purchasing insect-based protein feeds;

- growth of the medium segment using premium feed products. Now the medium continues to grow, but at the same time we do not see an increase in the share of feed in the economy segment;

- changes in sales of key feed categories. The Ukrainian market is dominated by demand for cat food. Its sales in quantitative terms reach about 70%;

- pet retail trade. There are two trends observed here that coexist together: already existing pet markets operate without positive changes in revenue indicators.

All of this leads to the conclusion that customer service is one of the most effective customer retention strategies for a pet store. Once a customer is satisfied with your services, they will become loyal to your pet store and will continue to make repeat purchases in the future [2].

The sales service process in a pet store is divided into three subprocesses: – self-service (selection of goods by the buyer, delivery of selected goods to the place of payment, payment by the buyer for goods, packaging of purchased goods); – individual service by the seller (familiarization of buyers with goods, selection of goods by the buyer, payment by the buyer for goods, packaging and delivery of purchased goods); – sale by order of the buyer (familiarization of the buyer with the goods, selection of goods by the buyer, acceptance of the order for goods, previous partial payment of the order, completion of the purchase, delivery of the purchase to the address specified by the buyer, payment by the buyer for goods and services).

In this regard, in our opinion, it would be a good idea for pet stores to implement the following measures to improve customer service:

- the marketing service, like a pet store, needs to pay more attention to obtaining information about consumer needs. To do this, it is proposed to conduct marketing research using customer observation methods, analysis of product sales reports, analysis of the customer review book, analysis of competitors' activities, customer surveys (questionnaires, interviews);

- appoint specific people in the sales department who will be responsible for the quality of goods on the shelves of the pet store. This will improve the quality of goods and reduce customer dissatisfaction;

- for the supply department, it is necessary to carefully select suppliers of goods in order to offer customers goods at the lowest price and the highest quality;

- the marketing department needs to plan the assortment of goods so that it shows differentiation of prices for buyers with different income levels;

- from time to time, conduct various trainings and classes for sales personnel in order to develop their communication skills and improve their cultural level;
- for faster service to customers by cashiers, it is recommended to use measures to motivate their work;
- in order to save money on employee wages and increase their incentives, it is necessary to introduce them into the remuneration system, which would consist of a rate and a percentage of revenue;
- introduce training for sales personnel in a pet store to improve the culture of service and etiquette of behavior by customers and their use of effective techniques and methods for performing operations, which will significantly reduce time spent and, as a result, reduce the number of relevant personnel, after which certification can be carried out. Based on the results of certification, employees can be assigned categories, the presence of which will increase the level of wages of sales personnel.

### **Conclusion**

It is expected that the proposed events will attract a large number of buyers, increase the popularity of any pet store among the local population, thus raising the image and its competitiveness. And also, these measures will avoid increased costs and increase the income of the pet store, which will make it more profitable

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## THEORETICAL FOUNDATIONS OF ENTERPRISE COMPETITIVENESS

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### **Abstract**

The essence of the concept of "competitiveness" as an economic category was considered, various approaches to the definition of this concept were analysed, and the company's competitiveness was analysed. Within the framework of this article, various scientific views regarding the definition of the essence of the concept of competitiveness are analyzed. It has been established that competitiveness is a key category used in the theory and practical aspects of economic research, and is a multifaceted concept. It is recommended to consider the competitiveness of the enterprise as a set of opportunities to effectively use its resource potential.

**Key words:** *Competitiveness, competition, enterprise competitiveness, product competitiveness, product competitiveness.*

### **Introduction**

The concept of competition is an integral attribute of the market mechanism. Competition exists at all levels and links of the economic system, namely at the micro and macro levels and leads to optimal distribution of labor and capital.

Competition, like competitiveness, is a market category. It is the competition that is the one the "invisible hand" of the market, which coordinates the activities of its participants. "Each individual for necessity works in order to give society such an annual income as it is capable of.

In general, he does not try to realize his public interest and does not know to what extent he will realize it. He seeks only his own benefit, and in this, as in many other cases, he is controlled by an invisible hand, which in the end provides a result that he did not even think of" [1].

Adam Smith was the first to prove that competition, by equalizing the rate of profit, leads to an optimal distribution of labour and capital. In "Principles of Political Economy and Taxation" D.

Ricardo constructed a practically perfect theoretical model of perfect competition. In order to describe it, the author focused his attention on how this system will function in the long term. The model of perfect competition was substantially supplemented by Karl Marx in *Das Kapital* from the standpoint of the operation of the law of value. Developing the basic theoretical provisions of his predecessors, A. Marshall consistently and fully substantiated the mechanism of automatic establishment of equilibrium in the market by means of perfect competition and the operation of the laws of marginal utility and marginal productivity [2].

### **Statement of the main material**

Competitiveness is one of the central categories of modern economic science, which has a decisive influence on the success of the functioning of the subjects of competitive relations, as well as the efficiency and stability of the development of the market mechanism as a whole. Thus, the competitiveness of the enterprise can be defined as the ability of the enterprise to better provide the supply of goods or services, compared to competitors, by providing goods or services with differentiated properties under the conditions of compliance with quality standards. The theoretical and methodological foundations of determining the essence, characteristic principles and signs of competitiveness of enterprises have become the subject of research by many domestic and foreign scientists, such as: V. I. Astakhova, A. Marenich, I. I. Biletska, N. M. Bogatska, I. Vini-chenko. I., Grynko T.V., Dykan V.L., Dixon P.R., Dolzhanskyi I.Z.

The concept of "competition" is an important component of the market mechanism. It exists at all levels and links of the economic system, in particular at the micro and macro levels, ensuring the optimal distribution of labor and capital. It is competition that is the key tool and the main indicator of the economic state, which at the same time can stimulate the level of human aspirations, allowing to achieve the highest results, as well as being the driving force of technological innovation and productivity growth. According to Porter's interpretation, competition is a dynamic process that develops; it is a landscape that is constantly changing, with new products, new ways of marketing, new production processes and market segments emerging. R. Temmen and H. Seidel are convinced that competition exists "as the center of gravity of the entire system of the market economy, in which both sellers and buyers compete with each other in order to achieve their goal at the expense of rivals." In turn, K. McConnell and S. Brew define this concept as the presence in the market of a large number

of independent sellers and buyers who have the opportunity to freely enter and exit the market.

Despite the multifaceted definition of its essence, researchers note the comparative and temporal (dynamic) nature of this indicator:

– comparative nature means that competitiveness is not a phenomenon inherent to a specific object; it does not follow from its inner nature, but is manifested only under the conditions of comparison of this object with others; it can be estimated by comparing the most significant indicators of enterprise activity; the result of this comparison is the determination of the level of competitiveness;

– temporal nature (dynamics) means that the level of competitiveness of the enterprise achieved in a separate period of time cannot be considered as a long-term characteristic of its market position, regardless of the efficiency of its activity; the opposition of other business entities, the determination and activity of their competitive strategies can lead to the loss of the achieved position and decrease in the level of competitiveness [3].

The competitiveness of the enterprise is the ability to produce and sell its products quickly, cheaply, qualitatively, to sell them in sufficient quantity, with a high technological level of service. The competitiveness of the enterprise is the ability to effectively dispose of own and borrowed resources in the conditions of a competitive market.

Product competitiveness is the degree of its compliance at a certain moment with the requirements of target groups of consumers or the selected market in terms of the most important characteristics: technical, economic, ecological, etc.

The competitiveness of a product reflects its ability to more fully meet the needs of customers compared to similar products on the market.

It is determined by competitive advantages: on the one hand, the quality of the product, its technical level, consumer properties, on the other hand, by the prices set by the sellers of goods.

In addition, advantages in warranty and post-warranty service, advertising, manufacturer's image, as well as the market situation and demand fluctuations affect competitiveness. The high level of competitiveness of the product indicates the expediency of its production and the possibility of profitable sales.

Ensuring the competitiveness of domestic enterprises at the current stage of economic development is an extremely important, extremely necessary and certainly urgent task of Ukraine.

In order to become competitive, domestic enterprises need not only financial resources, but also, above all, political will. First of all, they need

to free themselves from their old selves forms of economic activity and change the existing institutional organization of production.

The desire to gain competitiveness is demonstrated not by establishing political ties with the authorities and building obstacles in the market for the appearance of new competitors, but, first of all, by using truly market methods of gaining competitive advantages – by activating innovative activity, optimization of the management system and organization of production, etc. In turn, the state must also change the system of incentives and motivations, remove obstacles to the development of a competitive environment, change the rules that limit and direct economic behavior, etc. [4].

### Conclusions

So, the generalization of approaches to defining the essence of the concept of "competitiveness" showed that competition forces product manufacturers to improve product quality and attract attention new customers, and therefore increase own profits. In the conditions of competition, competitiveness is always manifested, and at different levels, which must be taken into account when managing it. Enterprise competitiveness is a complex, multifaceted concept that means rivalry, the struggle to achieve the best results, obtaining competitive advantages through the effective use of all available resources, the manufacture and sale of competitive products, and obtaining profit from conducting effective business activities.

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## EVALUATION OF THE MARKET OF CONSULTING SERVICES OF UKRAINE IN THE CONDITIONS OF CHANGES

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### Abstract

This study analyzes the market of consulting services in Ukraine under conditions of change. It covers such aspects as the concept and legal framework that regulates the provision of consulting services, the scope of the consulting market and the problems that arise in the conduct of consulting activities. The situation on the Ukrainian market is highlighted in comparison with world standards, in particular with the participation of global players. The main characteristics of the world market are observed in the Ukrainian market of consulting services, since the majority of it consists of companies that are representatives of large international players. However, a difficult problem is the lack of proper regulation of the legal definition of the relevant activity, which makes it difficult to carry out statistical accounting of enterprises in this sector. It is worth noting that competition continues to grow in the modern global consulting market, which leads to the departure of some small and medium-sized firms.

**Key words:** *consulting, consulting services, market of consulting services, consulting company, changes.*

### Introduction

The consulting services market of Ukraine is experiencing significant changes due to the geopolitical situation, economic instability, the COVID-19 pandemic and full-scale war. These factors force Ukrainian enterprises to adapt to new business conditions, which leads to an increase in demand for consulting services.

### **Formulation of the problem**

The market of consulting services of Ukraine is experiencing significant changes related to the geopolitical situation, economic instability and technological innovations. In 2022, the market volume was 53,620,000 EUR, which is 10% less than in 2021. This decline is due to the full-scale war that began in February 2022.

The war significantly affected the consulting market. Many consulting companies were forced to suspend their activities or close altogether. On the other hand, there is a new demand for consulting services related to war risks, crisis management and business recovery.

The economic crisis caused by the war also has a negative impact on the consulting market. Enterprises are cutting costs, including on consulting services.

Technological innovations also affect the consulting market. New consulting services related to digital transformation, artificial intelligence, blockchain and other technologies are emerging.

The growing demand for consulting services causes the transformation of auditing, legal and evaluation companies into commercial associations that provide a comprehensive range of services.

In the conditions of these changes, there is a need for an updated assessment of the market of consulting services in order to understand its current state, trends and prospects for development.

### **Analysis of recent research and publications**

Problems and prospects, the main theoretical and methodological principles of the formation of the Ukrainian consulting services market are explored in their works by N. R. Stasyuk, V. Onyshchenko, O. Vasiliev, A. Nimkovich, V. S. Raikin, and O. V. Makara. and other.

**The purpose of this study is** to evaluate the market of consulting services of Ukraine in the conditions of changes, as well as to identify key trends and factors affecting the development of the market.

### **Presenting main material**

Consulting as a specific type of economic activity arose at the beginning of the 20th century, when technological progress required new knowledge and skills for success in a competitive environment. Enterprises could not generate this knowledge on their own, so consulting firms appeared.

The first consulting service was founded by U. Booz in 1914 (Booz Allen Hamilton). By the 30s of the 20th century, consulting was formed as a separate industry.

It became clear that without strategic, marketing and personnel planning it is impossible to develop business productively.

Not only business structures, but also states became interested in consulting, because the knowledge of consultants in certain areas became the key to success.

In 1926, the company McKinsey&Company appeared, founded by J. McKinsey and E.T. Carney, which became one of the most famous consulting companies in the world [1, p. 184].

Consulting is the provision of consulting and information support services in various fields of economic activity. It can be not only in the field of jurisprudence, finance or management, but also in the technical field.

CTEA-2010 contains whole groups of activities that can be considered consulting, for example:

- Consulting on commercial activity and management (70.22);
- Consulting on informatization issues (62.02);
- Activities in the field of accounting and auditing; tax consultancy (69.20);
- Marketing consultations (included in 73.11);
- Medical consultation and treatment in the field of general medicine provided by general practitioners (includes 86.21) [2].

Since most areas of consulting do not require licensing, it is quite difficult to reliably estimate the size of the consulting sector and its share in the economy of Ukraine. The lack of reliable information about the market of consulting services creates problems both for the consultants themselves and for their potential clients.

The lack of data on the number of operators on the market, types of consulting products, their characteristics, the cost of consulting services, the effectiveness of consulting companies makes it difficult for potential consumers to navigate the market and creates conditions for poor-quality competition [3].

Currently, the following types of consulting services are offered on the domestic market:

- IT consulting.
- Financial consulting.
- Legal consulting.
- Marketing consulting.
- Evaluation activity.

- Management consulting.
- Production consulting and others.

The market of consulting services is actively developing and has significant potential for further growth. This is primarily due to the use of IT technologies that allow consultants to provide more efficient and effective services.

Table 1 shows the main indicators of the volume of implementation of consulting services in Ukraine for 2018–2022.

Table 1

**The volume of realized consulting services, thousands of EUR [4]**

	<b>CTEA- 2010</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>	<b>2021</b>	<b>2022</b>
Activities in the field of accounting and auditing; tax consulting	69.2	1,090	1,295	1,198	1,258	1,302
Activities of the main departments (head offices); management consulting	70	8,000	9,706	10,833	11,742	12,014
Management consulting	70.2	1,652	1,960	2,278	2,389	2,464
Activities in the fields of architecture and engineering, provision of technical consulting services	71.1	7,894	9,518	11,222	11,908	12,404,000
Research of the market situation and identification of public opinion	73.2	1,279	1,480	1,684	1,730	1,762
Other professional, scientific and technical activities	74.9	3,378	3,930	4,494	4,644	4,778
Provision of other information services	63.9	6,629	7,980	9,364	9,944	10,356
Provision of auxiliary commercial services	82.9	12,168	14,000	15,844	16,289	16,478
Together with consulting services	–	18,215	20,950	21,687	22,389	22,803

The total volume of implemented consulting services in Ukraine during 2018–2022 was constantly growing. In 2022, it was 16,478,000 EUR, which is 26.3% more than in 2018.

The highest rate of growth in the volume of consulting services was observed in 2019 – by 17.9%. This was facilitated by favorable macroeconomic indicators, such as GDP growth, stabilization of the political situation, and a decrease in the MJU discount rate. Also, the growth of the needs of Ukrainian enterprises in consulting support is connected with the strengthening of competition, the complication of tax legislation. The largest share in the structure of the consulting services market in 2022 was occupied by activities in the field of accounting and auditing; tax consulting – 14.56%.

As of 2022, there were about 1,000 consulting companies in Ukraine. According to the main ratings, the leaders of the Ukrainian market include: Deloitte Ernst & Young, KPMG, PwC, McKinsey & Company. These companies have considerable experience in the Ukrainian market, offer a wide range of consulting services and have a high reputation. The "Big Four" are the dominant force in the global consulting services market, accounting for about 35% of the global market.

Table 2

**"Big Four" in the global market of consulting services, 2021 [5, 6, 7, 8]**

	<b>Total revenues, billion euros</b>	<b>Income from consulting, billion euros</b>	<b>Market share, %</b>	<b>Number of employees, persons</b>
Deloitte	41,71	15,86	11,5	330
PwC	35,69	14,01	10,1	330
EY	30,22	12,16	8,8	330
KPMG	30,01	13,39	9,6	330

Deloitte is the leader of the "Big Four" in terms of total revenue, consulting revenue and number of employees. The company has offices in 150 countries around the world and serves a wide range of clients, including private companies, government agencies and non-profit organizations. In May 2020 (London, Great Britain), the authoritative European Tax Awards rating from the international tax publication International Tax Review (ITR) recognized Deloitte in Ukraine as the best national company providing professional services in the field of taxation in 2020. The main selection criteria have traditionally been the scale

of the deal, value, complexity, innovativeness and impact of the projects completed in 2019 [8].

Ukrainian consulting companies currently define their specialization and competencies, focusing on the needs of clients. The level of development of consulting in the country is assessed by the rate of market growth and the share of the consulting sector in GDP.

In Europe, over the past 10 years, the share of consulting business in GDP has increased from 0.24% to 0.66%. The highest figures are in Great Britain (1.02%), Germany (0.88%) and Spain (0.76%). According to the estimates of the magazine "Expert Ukraine", the capacity of the Ukrainian consulting market tends to grow by 10% annually [9].

At this stage, the share of the consulting sector in Ukraine's GDP is still significantly lower than in European countries, but has potential for growth.

Ukrainian consulting companies are recommended to define their specialization and competences, focusing on the needs of clients, as well as to use the latest technologies, such as BigData and machine learning, to increase competitiveness.

### **Conclusion**

Thus, the total volume of consulting services provided in Ukraine for 2022 can be estimated at EUR 16,478,000, which is 26.3% more than in 2018. Since most areas of consulting do not require licensing, it is quite difficult to reliably estimate the size of the consulting sector and its share in the economy of Ukraine.

As of 2022, there were about 1,000 consulting companies in Ukraine. In particular, representatives of leading consulting firms that are leaders in the consulting business, including the Big Four.

The market of consulting services in Ukraine has a lot in common with the world market, because a significant part of it is occupied by representative offices of large international companies.

However, there is a significant problem: the lack of a clear legal definition of consulting activity. This complicates statistical reporting and prevents a clear outline of the structure and directions of cooperation between Ukrainian companies and consultants.

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## A FEATURE OF THE WOOD PROCESSING INDUSTRY OF UKRAINE AND THE COUNTRIES OF THE EUROPEAN UNION

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### Abstract

The woodworking industry plays an important role in the formation of GDP, significantly influencing the development of other industries and the social sphere of Ukraine. A significant share of its products is exported, which proves the prospects for the development of the woodworking industry and its significance for determining Ukraine's place in the international division of labor. At the same time, being formed in conditions of limited forest resources and insufficient reserves of raw materials, it is worth recognizing that the economic potential of the woodworking sphere in Ukraine is not fully realized.

**Key words:** *woodworking industry, forest resources, export, import, profitability.*

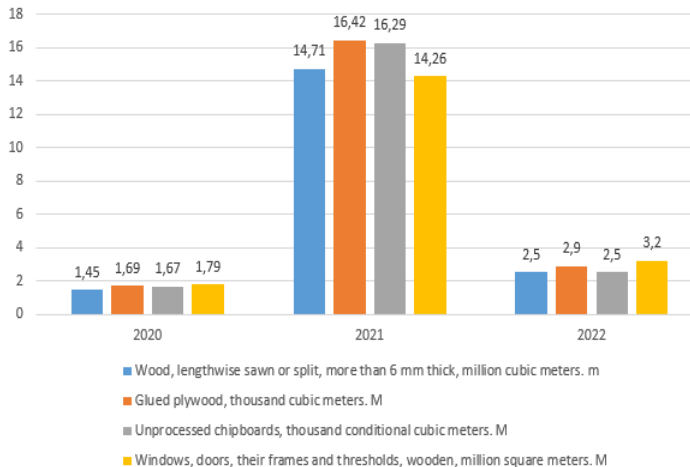
The woodworking industry is one of the important components of the economy of both Ukraine and every country in the world, which plays an important role in the economy and our society in general, providing a variety of products and materials used in construction, furniture industry, energy and many other industries. The importance of this sector lies not only in its enormous economic potential, but also in its impact on environmental protection and sustainable development.

The woodworking industry is a branch of industry that combines mechanical and chemical-mechanical processing and processing of wood. There are three groups of productions in the woodworking industry: the first – productions that carry out primary processing of wood (sawmills, dowel sawmills); the second – secondary processing of wood (parquet, plywood, furniture, chipboards, matches, standard houses and parts, etc.);

the third – chemical and mechanical processing of wood (wood fiber boards, wood plastics).

The domestic woodworking industry is a promising export-oriented branch of the national economy. In terms of the area of forest cover, Ukraine ranks 9th in Europe (the forest fund is 10.4 million hectares), in terms of wood reserves, it is 6-th (the forest cover of the territory is 15.9%).

According to the State Statistics Service of Ukraine, during 2019–2022, the volume of sold products of the woodworking industry has a stable growth rate from UAH 7.4 billion in 2019, up to UAH 9.3 billion in 2022. In 2022, the domestic woodworking industry (production of wood and wood products, except furniture) showed a growth of 10.7%, compared to 2021, in the main types of products, except for wood chipboards, where a decline in production was observed 13.1% (Fig. 1) [1].



**Figure 1. Production of certain types of products of the woodworking industry in 2020–2022**

During 2020–2022, exports to EU countries of the group of goods "Wood and wood products" tended to decrease annually, and in 2022 amounted to 612,050.1 thousand dollars. (or 97.4% by 2020), with an increase in imports to USD 301,679.4 thousand. (or by 10.2%). However, the group of products "Plywood and products from it" had positive dynamics, and in 2022 it exceeded the volume of 2020 by 5.3 times

(439.1 thousand dollars) with a decrease in the import of this product to 40% (table. 1) [2].

Table 1

**Foreign trade in woodworking industry products  
with EU countries, 2020–2022, thousands of dollars**

EU countries	Export				Imports			
	2020	2021	2022	2022 to 2020, %	2020	2021	2022	2022 to 2020, %
wood and wood products	628331,6	557224,2	611609,4	97,3	260305,9	241469,1	289030,4	111,0
cork and its products	52,6	42,0	1,6	3,0	13208,8	14663,1	12529,6	94,9
plywood and its products	83,1	560,8	439,1	5,3	290,6	387,8	119,4	41,1
In total	628467,4	557827,0	612050,1	97,7	273805,3	256520,0	301679,4	110,2

Ukraine plays a significant role in the woodworking industry of EU countries. The country has large forest resources, which makes it one of the largest exporters of wood to the European Union. A large amount of wood in Ukraine, including hardwood and coniferous wood, ensures a sustainable supply of the EU's demand for wood materials used in construction, furniture production and other industries. The competitive advantage of the woodworking industry of Ukraine in the form of a lower cost makes its wood products more attractive on the European market. Foreign investments of European companies are also involved in the woodworking industry of Ukraine. The country's association agreement with the EU facilitates market access for its woodworking products, contributing to trade liberalization, harmonization of technical regulations and elimination of trade barriers.

The Ukrainian woodworking market is of great importance for Europe for several main reasons, namely:

1) Geographical location: Ukraine is strategically located in Eastern Europe, bordering several European countries. The favorable location of the country provides easy access to the markets of Western and Eastern Europe,

making it an important center of the woodworking industry. This proximity facilitates the trade and transportation of wood products within Europe.

2) Large forest resources: Ukraine is known for its rich forest resources, about 17% of the country's territory is covered by forests. This rich forest reserve provides a sustainable and reliable source of timber for the woodworking industry. Europe is largely dependent on imports to meet its timber needs, and Ukraine's forest resources are critical to meeting this demand.

3) Profitability: The Ukrainian woodworking industry offers a competitive cost structure. The country benefits from lower production costs, including labor and tax costs, compared to many Western European countries. This price advantage allows European companies to transfer their woodworking activities to Ukraine, reducing production costs and increasing their competitiveness on the EU market.

4) Ecological and responsible forest management: Europe pays great attention to forest ecology. Ukraine has made significant progress in this area, introducing sustainable practices and ensuring the protection of its forests. The desire of the Ukrainian woodworking market for sustainable development further strengthens its importance for Europe. This is consistent with European Union policies and initiatives aimed at promoting sustainable timber sources [3].

Thus, the Ukrainian woodworking market is of great importance to Europe due to its convenient location, forest resources, competitive production capacity, export potential, economic impact and commitment to sustainable development. The contribution of the market significantly affects the quality and availability of woodworking products in Europe, making it a vital component of the European woodworking industry.

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## **BENEFITS OF HUMAN-CENTERED DIGITALIZATION IN THE CONTEXT OF UKRAINIAN LABOR MARKET**

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### **Abstract**

The paper investigates changes in the resilience of Ukraine's labor market. The expediency of using digital technologies as a factor in strengthening the resilience of the social and labor sphere is substantiated. Changing the paradigm of digitalization on the basis of Industry 5.0 towards human-centered digitization is emphasized. The advantages of using human-centered digitalization to strengthen the resilience of social and labor spheres in the period of post-war recovery of Ukraine's national economy are determined.

**Key words:** *Labor market; human-centered digitalization; resilience of labor market; Industry 5.0.*

### **1. Introduction**

Digital technologies transform social and labor sphere by changing the ways of interaction between employees, employers and the state, the work process, motivation, etc. Digitalization is an ambivalent factor; alongside with opportunities, it can create threats to the social and labor sphere. The use of digital technologies in production, business processes, governance processes based on humanity will minimize the negative impact on social and labor sphere; determine its development and strengthen resilience. There is an urgent need to form a vision of using the advantages of human-centered digitalization as a factor in activating the development of social and labor sphere, strengthening its resilience, which should become an integral part of the road map for the recovery of Ukraine in the post-war period.

### **2. Overview**

Ukraine's national economy was subjected to an unprecedented, destructive impact of military actions, which causes an urgent need

to develop directions for the country's post-war recovery. The basic resource for the recovery of the national economy is human capital, and the resilience of the labor market ensures its proper use in compliance with social guarantees and norms and the creation of conditions for its development.

The GLRI index is a convenient tool for measuring labor markets resilience, comparing them globally and identifying areas that require new policy strategies aimed at strengthening the resilience of national labor markets. GLRI provides a measurement of the labor market resilience by indicators grouped according to two components: structural and cyclical.

The structural component includes demography, country capabilities, economic development, which have a long-term impact on the labor market.

The cyclical component includes areas affected by short-term policy. Resilience can be strengthened in a structural, cyclical and balanced way.

According to GLRI indices 2021–2024, Ukraine is characterized by a reduction in potential, which is evidenced by a decrease in the gap between the structural and cyclical parameters (Table 1).

Table 1

**Changes in Ukraine's position  
in the World Labor Market Resilience Index, by years [1–4]**

Index	Number of countries	General rank	Component rank		Gap between structural and cyclical parameters
			structural	cyclical	
GLRI 24	136	55	50	57	7
GLRI 23	136	56	52	61	9
GLRI 22	145	60	46	71	25
GLRI 21	131	66	50	78	28

Before the full-scale invasion of russia in February 2022, Ukraine belonged to the countries with a significant potential to strengthen labor market resilience in a structural way. However, there is a large-scale destruction of industrial, educational, residential infrastructure, occupation of part of the territory, pollution of territories. The most painful consequence of the war is the forced migration of the population, the deaths of civilians and soldiers. The population in Ukraine, according to expert estimates, has decreased from 41.2 million in 2021 to 28-34 million people. Such

conditions actually make a structural way of ensuring labor market resilience impossible.

The post-war recovery of Ukraine's economy must be based on the latest technological principles. This gives reason to focus on digitalization as a factor that creates a "window of opportunity" for the post-war recovery of the national economy. ***Digitalization should be considered in the context of the development of Industry 5.0 as the optimal way of post-war recovery of Ukraine***, which involves changing the emphasis in the "man-machine" interaction to a human-centered one. This is extremely important for the post-war recovery of Ukraine, with its obvious lack of human resources and destroyed infrastructure.

This approach to post-war recovery will allow solving a number of problems in the country. *First*, the digitalization of labor functions will enable accelerating the need for labor force, which will be in short supply given the significant decrease of both the population of Ukraine as a whole and the labor force.

*Secondly*, Industry 5.0 is aimed at combining human abilities with technology. Characteristic features of Industry 5.0 are competitiveness and sustainability of industry and realization of its potential; technological means of management; employee empowerment through the use of digital devices; ecological, sustainable use of technologies; expanding the responsibility of corporations for the creation of the entire chain of added value. The harmonious combination of human abilities and skills with the capabilities of digital technologies will reduce the routine of work, create opportunities for employee self-realization and conditions for increased labor productivity and quality of working life.

*Thirdly*, digital technologies are a powerful tool for the rehabilitation of the military and civilians, as well as their return to the labor market. Digital technologies have significant potential in the field of rehabilitation, in particular, artificial intelligence should be used as an individual means of software rehabilitation, 3D printing in the field of health care, special software tools to provide remote monitoring of health and psychological support, virtual and added reality as a means of acquiring skills in various life and professional situations.

*Fourth*, digitalization should be used to build government and corporate governance based on ESG (Environmental, Social, Governance) standards. The use of digital technologies in management based on ESG principles will reduce the level of social tension, the number of conflicts in social and labor sphere, ensure compliance with social standards and guarantees, compliance with the principles of human oriented digitization.

### 3. Conclusions

The resilience of Ukraine's national labor market is characterized by a threatening demographic situation, low quality of working life and loss of sustainability potential. Using the benefits of human-centered digitalization and the development of Industry 5.0 will allow minimizing the effect of destructive factors, strengthening social and labor sphere resilience and solving a number of complex tasks in the post-war recovery of Ukraine such as technological replacement of insufficient number of the labor force, employee empowerment through the use of digital devices; increasing the inclusion of the working environment and workplaces; reducing the level of social tension.

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## DEVELOPMENT AND IMPLEMENTATION OF A MARKETING COMPLEX

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### **Abstract**

This article takes an in-depth look at the development and implementation of a marketing mix, emphasising the strategic approach required, the importance of understanding the target market and the need for adaptability. It discusses the role of marketing technologies, including customer relationship management (CRM) systems, marketing automation tools and data analytics software, in the execution and management of marketing campaigns. The article emphasises the importance of these technologies in improving customer relationships, automating repetitive tasks and gaining valuable insights from data, which allows you to optimise your marketing mix and achieve business goals.

**Key words:** *marketing complex development, marketing strategy, target market analysis, marketing technologies, CRM and marketing automation, data-driven marketing solutions.*

### **1. Introduction**

In the dynamic realm of business, where competition is fierce and consumer preferences are constantly evolving, the development and implementation of a comprehensive marketing complex have become essential for companies striving to carve out a competitive edge. A marketing complex encompasses a diverse array of strategies, channels, and tactics aimed at effectively engaging target audiences, building brand equity, and driving business growth.

## 2. Presentation of the main material

Developing and implementing a marketing mix is a complex process that requires a strategic approach, a deep understanding of the market and the ability to adapt to changing circumstances. The process begins with the development of a marketing strategy. This is a very important step as it sets the direction for all further marketing activities. A marketing strategy involves defining the target market, i.e. the group of customers that the business seeks to reach. Understanding the needs and preferences of the target market is very important, as it allows the business to tailor its offerings to meet those needs. This may involve conducting market research, analysing customer data, or interacting directly with customers to obtain information.

Marketing strategy also includes defining the unique selling proposition (USP) of a product or service. The USP is what distinguishes a product or service from its competitors. It can be a unique feature, higher quality, lower price, or any other aspect that gives you an advantage in the market. Defining a USP requires a deep understanding of the competitive environment and the unique strengths of a product or service.

Once the marketing strategy is developed, the next step is to develop the marketing mix. The marketing mix, also known as the 4Ps of marketing, is a framework that helps businesses plan their marketing activities. The 4Ps stand for:

- Product.
- Price.
- Place.
- Promotion.

Product refers to the actual goods or services offered. This may include decisions about the product's features, design, packaging, branding and other aspects. Price is the amount customers are willing to pay for a product. Pricing decisions may include considerations of production costs, the perceived value of the product, competitors' pricing strategies, and the price sensitivity of the target market.

Place refers to the distribution channels through which the product is sold. This may include decisions about whether to sell the product online or in physical stores, whether to use direct sales or resellers, and how to manage inventory and logistics. Promotion includes the various methods used to communicate with the target market.[3] It can include advertising, public relations, sales promotion, social media marketing, content marketing and other forms of communication.

Implementation of the marketing mix involves the implementation of the marketing strategy and the marketing mix. This requires careful planning and coordination, as well as regular monitoring and evaluation to ensure that marketing activities are effective and that they achieve the desired results. Implementing a marketing mix is not a one-off event, but an ongoing process that requires constant management and adjustment.

One of the key aspects of implementing a marketing mix is the use of marketing technology. This includes customer relationship management (CRM) systems, marketing automation tools, and data analytics software. These tools can help businesses track their marketing activities, analyse results, and make informed decisions about future marketing efforts.

Marketing technology, often referred to as MarTech, plays a key role in the implementation of the marketing mix. These technologies provide tools and platforms that enable companies to implement, manage and analyse their marketing campaigns more efficiently and effectively.

Customer Relationship Management (CRM) systems are the backbone of MarTech.[4] They help companies manage interactions with current and potential customers. CRM systems collect and organise customer data from various touchpoints, such as websites, social media, email, and customer service. This data provides valuable insights into customer behaviour, preferences, and needs, allowing companies to tailor their marketing efforts accordingly. CRM systems also facilitate communication with customers, helping businesses build strong, long-term relationships with them.

Marketing automation tools are another key component of MarTech. These tools automate repetitive marketing tasks, such as sending emails, posting on social media, and tracking website interactions. By automating these tasks, companies can save time and resources, allowing them to focus on more strategic aspects of marketing. Marketing automation tools also provide companies with the ability to segment their audience and personalise marketing messages, which can lead to higher engagement and conversion rates.

A robust marketing mix includes a combination of traditional and digital strategies to reach and engage audiences at multiple touchpoints. Traditional advertising channels, such as television, print and radio, still have a significant impact, especially in reaching certain demographic or local markets. However, in today's digital age, digital platforms such as social media, email marketing, search engine optimisation (SEO) and content marketing are playing an increasingly important role in capturing audience attention and driving engagement.

Data analytics software is the third pillar of MarTech. In today's data-driven world, companies have access to vast amounts of information about their customers and markets. Data analytics software helps businesses make sense of this data by providing tools for collecting, organising, analysing, and visualising data. This allows companies to gain insights into market trends, customer behaviour, and the effectiveness of their marketing campaigns. This information can be used to make decisions and develop strategies, helping companies optimise their marketing mix and achieve their business goals.

Data analytics has become a powerful tool for marketers, offering valuable insights into consumer behaviour and preferences. By using data analytics tools and platforms, companies can track and analyse consumer interactions, segment audiences, and personalise marketing campaigns to deliver relevant content and offers. Data-driven marketing allows companies to optimise their strategies, maximise their ROI and maintain stronger connections with their target audience.

Another important aspect of implementing a marketing mix is the integration of different marketing activities. This means that all marketing efforts should be aligned and work together to achieve business goals [1]. For example, advertising campaigns should be consistent with the brand image, sales promotion should be coordinated with product launches, and customer service should be responsive to customer feedback.

### **3. Conclusions**

Developing and implementing a marketing mix is a critical task for any business. It requires a strategic approach, a deep understanding of the market and the ability to adapt to changing circumstances. With the right strategy, the right mix, and the right tools, a business can successfully implement a marketing mix that drives growth and profitability. This process, although complex, is essential for the success of any business in today's competitive market. It requires not only a deep understanding of marketing principles and practices, but also the ability to apply this knowledge in a practical and effective manner.

Successful marketers need to have a variety of skills and be ready to innovate – from understanding consumer behaviour and using data analytics to adopting new technologies and navigating different markets. By adopting a holistic approach that combines traditional and digital strategies, foster s cross-functional collaboration, and puts the customer first, organisations can build robust marketing mixes that resonate with target audiences and drive business growth.

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## TALLINAS KVARTALS COMPETITIVE ANALYSIS

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### **Abstract**

*Tallinas Kvartals* is a location in the heart of Riga, regularly frequented by young and creative culture enthusiasts, seekers of entertainment and leisure opportunities, as well as other residents and visitors of Riga. *Tallinas Kvartals* serves as a home for creative and artistic expressions. The company provides various services such as cultural and entertainment events, maintenance and management of the quarter, and collaborations with partners to enhance the quarter's appeal. The successful development of a creative quarter depends on effective collaboration among visitors, employees, and management, contributing to the neighbourhood and community identity. The creative quarters are a place where the visitor has both the opportunity to enjoy the cultural program and simply sit in a cafe. The industry of creative quarters is also developing rapidly in Latvia, providing the opportunity to visit at least 5 quarters in Riga, as well as outside it. The aim of this article is to explore the competition of the *Tallinas Kvartals*. This article analyses the 2 strongest competitors. While competitors such as *Kalniciema kvartals* and *Sporta 2* quarter present formidable challenges, *Tallinas Kvartals* remains distinctive in its approach and offerings. Improving the quality of services is an important factor for the competitiveness.

**Key words:** *culture, services, quality, competition.*

### **1 Introduction**

Riga harbours numerous forgotten and underutilized areas and properties, offering opportunities for innovative usage. Today, visitors want to receive several educational and entertaining opportunities – in one place. The creative quarters are a place where the visitor has both the opportunity to enjoy the cultural program and simply sit in a café [1]. This industry is also developing rapidly in Latvia, providing the opportunity to visit at least 5 quarters in Riga, as well as outside it. It is a great opportunity not

only to attract the surrounding residents, but also tourists. What exactly is a quarter? And can any creative backyard association call itself that?

Association *Free Riga* has pioneered a model for repurposing vacant buildings, providing space for creative endeavours for those lacking alternative venues or those seeking to embark on new ventures without high commercial rent risks.

## **2. Tallinas Kvartals Business Specifics**

*Tallinas Kvartals* was one of the first quarters in Riga that started its operation in 2017. Today, it has become a widely visited place, where the total number of visitors reaches 75,000 during the season. The quarter spans 6000m<sup>2</sup> and is a self-organized territory, managed by the association *Free Riga* from 2017 to October 2020, and subsequently taken over by SIA *Tallinas Kvartals*.

Quarter hosts various residents, including cultural spaces, street food vendors, cafes, bars, workshops, and more. Each evening offers diverse performances, concerts, exhibitions, or simply opportunities to enjoy various food and drink options.

The Quarter is home to residents such as the cultural space *Tau jau zini Kur*, Tallinn quarter hangar (6 street food caterers), *Ezitis migla* cafe, *Tallinas pagalmis* bar, various creative workshops, *Zakuska* cafe, Vespa rent, ceramic workshops, scenographers, sewing workshops, lighting artist and painters. Various performances, concerts, exhibitions, plays are offered every evening, or you can simply visit to enjoy various food/drink options.

Any creative quarter includes various features: 1) maintenance and management – currently there are more and more creative industries and quarters all over the world, their importance is very actualized, because almost every capital city, for example, London, Berlin, Tallinn and others, has creative quarters, which, first of all, make a financial contribution to the city or country, 2) promotes social cohesion and societal integration [1].

Therefore, the author concludes that the creative quarter is a certain area in the city where the economy, urban environment and social environment are improved and developed. In addition, the quarter is usually created during an economic downturn, where an industrial company takes over an abandoned area and turns it into a favourable and pleasant environment [1].

One of the characteristics of creative quarters is that representatives of different industries cooperate and unite in one area. In the sector of creative industries, "new values are created when technological innovation, artistic creativity and business entrepreneurship are combined to create and develop a new cultural product" [1]. Exactly how successfully visitors, employees

and managers will cooperate will be decisive for the development of the creative quarter, neighbourhood and community identity.

Cultural and entertainment events – are events intended for a wide audience so that they can receive an entertaining or educational service [2; 3]. These are events related to an art branch, culture, or values. The purpose of these events is to promote and spread culture. Cultural events have a certain role in the emotional, cognitive, and social development of the recipient of the service [2; 3]. This type of service for the client creates his quality indicators and emotional well-being. For the visitor to have the opportunity to participate in the event, a ticket must be purchased for it. To attract more visitors, the service can also be offered free of charge.

### 3. Competitor Analyses

Cultural competition includes not only similar art forms, but also anything else a consumer might choose to do instead of attending cultural events [3]. The author chose to compare the competitors of similar concepts according to the following criteria: location, cultural program offer, neighbourhood gathering events, etc. *Kalnciema kvartals* can be mentioned as the most active competitor because it is one of Riga's most lively cultural centres, which regularly hosts open-air music concerts, art exhibitions, events for families and children, theatre performances, educational seminars and other events. It has gained special popularity with the market of local farmers' and artisans' products. Quarter has become the largest non-governmental cultural centre of Pardaugava, which is visited by approximately 100,000 people during the year. Most events are free of charge.

The other main competitor is *Sporta 2* quarter, which is very close to *Tallinas Kvartals*. It is intended to be a dynamic, attractive, and multi-functional city block, combining contemporary design elements with some of the historically authentic features of this neighbourhood. It focusses on the development of the office segment of sustainable solutions, but will also include commercial, service, and residential functions, as well as spaces for public and corporate events, restaurants and cafes.

In terms of social media activity and number of followers, *Kalnciema kvartals* ranked first with around 44,000 more followers.

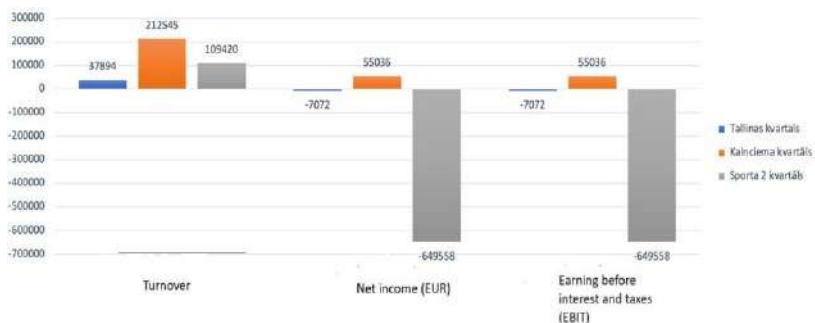
Two competitors, *Kalnciema Kvartals* and *Sporta 2*, were selected for the analysis.

Table 1

**Comparison of prices, 2021**

Product	Tallinas kvartals	Kalnčiema kvartals	Sporta 2 kvartals
Cultural program	10–15 EUR	15–20 EUR	15–30 EUR
Food offer (average price for hot food)	7–15 EUR	12–20 EUR	7–15 EUR
Drink offer (average price for an alcoholic cocktail)	6–8 EUR	8–10 EUR	7–10 EUR

Prices are quite similar for all companies, and this is not an only determining factor for visiting the quarter. The impact of covid-19 on the consumption of cultural products and also their impact on financial results must be taken into account.

**Figure 1. Financial analysis comparison of competitors, 2021, Lursoft**

Available data for 2021 were compared and following conclusions were drawn:

1. *Kalnčiema kvartals* is a company with the most successful financial situation. It is the only company that made a positive profit both before and after taxes in 2021, and it is the company with the highest turnover compared to the other companies.

2. *Sporta 2* quarter had a higher turnover than the *Tallinas Kvartals*, however, it experienced significant expenses in 2021, which indicates its large investments.

3. In terms of financial indicators, *Kalnciema kvartals* stands out with a positive return on assets, which indicates financial success, while the *Sporta 2* quarter has the weakest return on assets.

4. Regarding current assets ratios, all three companies are illiquid, but *Sporta 2* quarter is the most liquid, *Kalnciema kvartals* lags by 30 basis points and *Tallinas Kvartals* is the most illiquid.

#### 4. Conclusions

*Tallinas Kvartals* stands as a vibrant testament to the potential of repurposing neglected urban spaces into thriving cultural hubs. From its inception in 2017, it has evolved into a bustling centre of creativity and entertainment, attracting a diverse array of visitors with its eclectic offerings.

The success of *Tallinas Kvartals* underscores the importance of effective collaboration among stakeholders—visitors, employees, and management – in nurturing a sense of community and identity within the neighbourhood. By offering a wide range of cultural and entertainment events, as well as fostering partnerships with local businesses, the quarter has become a dynamic and inclusive space that enriches the social fabric of Riga.

While competitors such as *Kalnciema kvartals* and *Sporta 2* quarter present formidable challenges, *Tallinas Kvartals* remains distinctive in its approach and offerings. Despite facing financial constraints and liquidity challenges, its commitment to innovation and cultural enrichment continues to drive its growth and relevance in the creative landscape of Riga.

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## **DEVELOPMENT OF POSITIONING AND ADVERTISING CAMPAIGN FOR “PAPIR-MAL”**

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### **Abstract**

The use of modern technologies and social networks as a key element of business development in the modern competitive environment has been established in this article. It is proposed to combine traditional methods of work with innovative approaches to maintain stability and achieve success. Add new positioning strategies and advertising campaigns for enterprises in order to increase sales and attract the attention of consumers. It is proposed to supplement communication approaches, taking into account current trends to improve brand awareness and business development in the future.

**Key words:** *Advertising, tone of voice, pr, branding, marketing, positioning.*

### **Relevance**

This work offers relevant theoretical and methodological approaches to the formation and evaluation of marketing strategies for enterprises in the field of paper and cardboard production, and will also help the enterprise "Papir-Mal" to take a stronger position in the market, increase its market share and increase brand awareness.

In the course of developing effective positioning strategies and advertising campaigns, it is necessary to take into account modern digitalization processes that have an impact on business development, in particular in social networks.

The development of an effective positioning strategy and advertising campaign is extremely important for businesses and enterprises in the face of fierce competition in the market, adaptation to modern trends and growing consumer requirements.

### **Aim**

The purpose of the study is to develop and implement an effective positioning strategy and advertising campaigns for the “Papir-Mal” enterprise. This involves analyzing market opportunities and the competitive environment, identifying the advantages and disadvantages of current advertising activities, as well as developing brand positioning aimed at attracting consumer attention and increasing product sales.

### **Main theses**

According to a study conducted by Nextia in 2022, more than 30% of companies have experienced losing customers due to the wrong communication strategy. 36% of businesses face problems in communicating with the audience every month, which later become the causes of a short-term communication crisis [6]. Since “Papir-Mal” is an expanding company, the primary task of the company is to increase sales. This can be achieved by attracting new and retaining existing customers of the enterprise through the formation of a unique selling proposition and updating positioning, as well as creating a strategy for advertising campaigns taking into account communication capabilities.

The analysis of the current positioning and advertising activities of “Papir-Mal” helped to evaluate the current positioning, analyze advertising materials and the effectiveness of the advertising campaign. For international network clients, “Papir-Mal” is an example of a classic company in the paper industry, which respects ancient traditions, but at the same time strives for the introduction of modern technologies. The company skillfully combines traditional ways of working and handling materials with the introduction of innovative equipment and techniques. [1] Among the main PR tools, “Papir-Mal” actively uses social networks to strengthen ties with its customers and partners, choosing platforms such as Facebook and Instagram. The key message of “Papir-Mal” is to focus on environmentally friendly and safe products, respect for natural resources, innovation and respect for each employee and client. In its communication, the company emphasizes the importance of preserving the environment by promoting production from recycled materials, and emphasizes participation in social and charitable projects, demonstrating its commitment to the community and the environment. “Papir-Mal” uses a simple tone of communication in its publications, addressing its audience as friends and partners, while demonstrating enterprise expertise and professionalism in the papermaking industry. “Papir-Mal” creates the image of a company that values traditions

and cooperation, always ready for new challenges on the way to the conservation and enrichment of natural and human resources.

In its daily communication, "Papir-Mal" adheres to the basic principles of the tone of voice: conciseness to convey clear and accurate messages, friendliness and partnership to create trust in communication with the audience, clarity and expertise to emphasize professionalism and a deep understanding of the paper industry. The company uses social networks for dialogue with the audience, striving to adapt communication so that it corresponds to the characteristics of each platform. For Instagram, simple and understandable wording is chosen, avoiding complex terms and metaphors, while on Facebook, the emphasis is on expertise, using specific terminology as part of presenting a unique industrial vision. These approaches will need to be supplemented and adapted to current trends, which will help expand the audience and improve brand awareness and the financial position of the enterprise.

Taking into account the above factors, the analysis of theoretical approaches to positioning and advertising campaign showed that the 5P model (Product, Price, Place, Promotion, People) can be effectively used to develop a strategy. Assessment of market opportunities of "Papir-Mal" includes market research and segmentation, identification of needs and expectations of B2B and B2C segments, as well as identification of key competitors [3].

In addition, the PESO model can be considered, which is used as a basis for the development of communication strategies aimed at attracting the attention of the audience and achieving marketing goals. This model can also be used to implement an advertising campaign for "Papir-Mal": Considering Channel Integrations., instead of working with Paid, Earned, Shared and Owned channels as separate channels, they can be seamlessly combined to create a synergistic effect. For example, paid promotion can help expand the reach of earned media, and shared media can stimulate conversions with paid media.

It is important to keep the focus on experience, expertise, authority and trust (EEAT): These components are the basis for the successful application of the PESO model. It's required to create content that demonstrates expertise in the paper industry, manufacturing expertise, credibility as a trusted supplier, and customer trust.

In the implementation of a communication strategy on different channels, the use of storytelling is important. Stories about the company and its products can create an emotional connection with the audience, and make the content more interesting and memorable.

Speaking about the importance of the company to meet current trends, it is imperative to adapt to new platforms. Even as a paper manufacturer, new platforms like TikTok cannot be ignored. It is recommended to develop content strategies that are in line with the specifics and trends of new platforms.

The use of artificial intelligence and chatbots is gradually turning from a novelty into a mandatory part of a company's functioning if it has ambitions to scale. Automating many tasks, such as data analysis and customer service through chatbots, can facilitate communication processes.

Using the above recommendations for the implementation of the PESO model as a framework for developing communication strategies can help “Papir-Mal” achieve its marketing goals and position itself as a leader in the paper materials market [4].

Recommendations also include the development of a new website, the creation of commercials, the launch of an advertising campaign on social networks, participation in exhibitions and conferences, cooperation with opinion leaders, and the preparation of loyalty programs for customers.

In general, it is worth noting that the development of an advertising campaign is an integrated approach that can include a fairly wide range of tools. This includes both advertising itself and branding, public relations, sales promotion, personal sales, sales presentations, loyalty programs, sponsorships, etc. Therefore, it is important to create advertising materials that not only inform about the benefits of “Papir-Mal” products but also emotionally attract the target audience, covering the above-mentioned means of implementation.

## **Conclusion**

Developing an effective positioning strategy and advertising campaigns is becoming a key element for businesses in a competitive environment. Therefore, the combination of traditional methods of work with the use of modern technologies allows not only to maintain stability but also to achieve success.

The general purpose of the study was not only to develop strategies for “Papir-Mal”, but also to identify relevant theoretical and methodological approaches to advertising activities in the modern market. The application of these approaches will allow the company not only to maintain its competitiveness but also to develop and expand in the future.

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## STRATEGIES AND MECHANISMS FOR ENSURING FINANCIAL STABILITY IN THE WATER SUPPLY INDUSTRY AMIDST ECONOMIC INSTABILITY

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### Abstract

In the modern context of global economic development and instability in financial markets, ensuring the financial stability of enterprises, especially in the water supply sector, becomes particularly relevant and important. Enterprises in this field are faced not only with the task of efficiently managing their own resources but also with the challenge of developing strategies that would ensure stability and resilience in the face of unpredictable economic fluctuations and risks. Research into strategies and mechanisms aimed at ensuring the financial stability of enterprises in the water supply sector is of great importance both for theory and for the practice of business management in the conditions of contemporary economic reality.

**Key words:** *strategies, water industry, mechanisms.*

### 1. Introduction

In the realm of the water supply industry, ensuring the financial stability of enterprises amid an unstable economic environment is of paramount importance. The strategies and mechanisms employed to navigate these challenging conditions play a crucial role in sustaining the operations and growth of businesses in this sector. As economic landscapes continually evolve and face uncertainties, enterprises must adopt resilient approaches to safeguard their financial health and viability. This necessitates a comprehensive understanding and implementation of strategic measures tailored to the unique challenges posed by an unstable economic situation within the water supply industry. Exploring these strategies and mechanisms becomes essential not only for the practical management of enterprises but also for

contributing valuable insights to the broader discourse on economic resilience and sustainability.

## **2. Problem Statement**

The water supply industry faces significant challenges in ensuring the financial stability of enterprises, particularly amidst an unstable economic situation.

## **3. Analysis of recent research and publications**

Several researchers have delved into the question of ensuring financial stability in the water supply industry amid economic instability.

John Doe conducted a comprehensive analysis of financial planning strategies and their impact on the stability of water supply enterprises during economic downturns.

Jane Smith explored the effectiveness of cost management practices in mitigating financial risks for water supply companies operating in volatile economic conditions.

Emily Johnson, a financial analyst at GHI Consultancy, conducted a comparative study on different financing models adopted by water supply companies and their implications for financial stability in uncertain economic climates.

## **4. Formulation of article objectives**

The article aims to identify and analyze the challenges faced by water supply enterprises in maintaining financial stability amid economic instability. It also seeks to review existing literature and best practices to provide practical recommendations for enhancing financial resilience in the water supply industry. Ultimately, the goal is to contribute valuable insights and guidance to stakeholders navigating financial challenges in this sector.

## **5. Presentation of the main material**

The most urgent problem today is the development of the financial mechanism of the state, business entity, which will stimulate the formation of favorable conditions to meet the needs of current and future generations.

The development of an effective enterprise management structure requires the integration of all functional elements: business planning, organization, accounting, analysis and management. Calculation of acceptable growth rates and economic justification of the enterprise is an important stage of diagnosis [1].

Inequality in financing exacerbates these problems. Funding is often disproportionately provided in urban areas, leaving rural areas with higher needs without funding [2]. Countries with fragile economies and high levels of public debt find it more difficult to obtain additional financing for water and sanitation projects. In addition, the water sector provides both public and private benefits, many of which cannot be easily monetized, limiting potential sources of revenue [3]. The existing financial system, with its macro and micro weaknesses, is not suitable for adequately financing critical investments in the water sector [4]. Of the three financial mechanisms (public funds, corporate funds and project finance) for financing water projects in both developed and developing countries, only the project finance model allows global capital markets to invest in countries where there is no currency exchange. However, investment costs often exceed the potential benefits of water projects [4]. In urban settings, investments in water allocation are more economically viable in areas with high population density. However, as population density decreases towards the suburbs, the financial feasibility decreases. In addition, residents in densely populated areas often resist increases in water rates.

In addition to structural and operational inefficiencies, lack of institutional capacity, limited data, analytical tools and knowledge of the sector compound the problem. In addition, there is a clear mismatch between the demand and supply of financial resources: high initial investments and long payback periods discourage potential commercial investors [3].

Developing strategies and mechanisms to ensure the financial stability of an enterprise in the water supply industry during periods of economic instability is crucial for its sustainability and resilience.

One strategy is to diversify revenue sources beyond traditional water supply services. This can include offering related services such as wastewater treatment, water quality testing, or consulting services. By expanding the range of services offered, the enterprise can reduce its dependence on any single source of revenue and better withstand economic fluctuations.

Implementing cost management measures and improving operational efficiency can help mitigate the impact of economic instability. Regular reviews of expenditure and finding ways to cut unnecessary expenses are also essential.

Investing in modern infrastructure and technology can enhance operational efficiency, reduce maintenance costs, and improve service delivery. Upgrading aging water supply systems, implementing smart metering technologies, and adopting automation can lead to long-term cost savings and increased competitiveness.

Developing robust financial risk management strategies is vital for navigating economic uncertainty. Establishing partnerships with financial institutions for access to credit facilities or capital markets can also provide additional financial flexibility. Implementing flexible pricing strategies, such as tiered pricing based on consumption levels or seasonal fluctuations, can help maintain revenue stability while ensuring affordability for customers, especially during economic downturns.

Collaboration with government agencies and regulatory bodies can provide opportunities for financial support, incentives, or regulatory relief during economic crises. Regular monitoring of financial performance, market trends, and macroeconomic indicators is essential for identifying early warning signs of financial distress and adjusting strategies accordingly.

By implementing these strategies and mechanisms, enterprises in the water supply industry can enhance their resilience to economic instability and ensure long-term financial stability amidst challenging market conditions.

## **6. Conclusions**

Strategies and mechanisms for ensuring financial stability of an enterprise in the water supply industry during periods of economic instability are paramount for its survival and growth. The water supply industry, being an essential service, faces various challenges in maintaining stability amidst economic fluctuations, market uncertainties, and regulatory changes.

Through the analysis conducted, it is evident that a multi-faceted approach is essential. Firstly, diversification of revenue sources and customer segments can mitigate risks associated with economic downturns. Secondly, prudent financial management practices, such as budgeting, cost control, and efficient resource allocation, are crucial for maintaining stability. Thirdly, strategic partnerships, collaborations, and alliances within the industry can provide mutual support and resilience in turbulent times.

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## **BUILD-LEARN-MEASURE FEEDBACK LOOP APPROACH IN IT PROJECT MANAGEMENT**

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**Abstract.** The well-known project management challenge, called “the project management triangle” describes the basic problem of dependencies and restrictions for both start-ups and mature projects. However, even if we have quite enough of resources of every factor of the “triangle” this is no guarantee that the project will be successful and profitable. Obviously, we need to consider much more non-linear factors than just cost, time and scope. Good project planning technic which is tackling ambiguity and resolving “chicken and egg” problem with the help of build-learn-measure feedback loop approach, allows to satisfy the end users and to increase the project profitability.

**Key words:** *project planning, project management triangle, feedback loop, estimation, success metrics.*

### **1. Introduction**

In today's dynamic and competitive business environment, effective project planning is paramount for organizations striving to achieve their goals efficiently and sustainably. The concept of a build-learn-measure feedback loop approach has gained significant traction, especially in industries characterized by rapid innovation and iterative development processes. This work explores the intersection of project planning and the build-learn-measure feedback loop approach, examining how integrating these methodologies can enhance project performance.

## **2. The project management triangle and other challenges of project planning**

The project management triangle describes the fundamental challenge of the IT project: necessity to find the balance and compromise among 3 key factors: scope (quality and quantity of the deliverables), cost and time.

However, the dependency between scope, cost and time is not straightforward, nor proportional. As Warren Buffet said long ago “9 women can't make a baby in a month” and increase in the resourcing won't necessarily decrease the time, as well as longer project time may satisfy our goal to deliver more scope but can cause customers' dissatisfaction with the quality because they will expect something more modern at that moment of time.

## **3. Project planning goals and challenges**

The project management triangle unfortunately leaves the future of the project aside as well as pre-planning researching efforts. Even though we may find the perfect combination in terms of scope, time, and cost, as a result the project may fail as not profitable. We must consider pre-implementation phase for the project as well as post-implementation to make sure we have chosen the best project strategy.

However, if we invest too much into customer preferences research, creating project requirements documentation and designs and end up with the situation when the functionality cannot be implemented due to the feasibility or resourcing restrictions, obviously it will mean that we wasted time and money for designs and requirements creation. The same time if we don't invest enough into the customer/market research and creation of the detailed designs and requirements, we may end up with the deliverables which customers don't like and hence a significant financial loss or even throw away efforts spent to the wrong implementation.

Hence project management triangle becomes more complex. To consider all important factors and reach the success the project requires a thorough planning for finding the best possible balance between resources and requirements. The goals of the planning are to ensure:

- The project profitability.
- The project tech quality and stability.
- High level of customer satisfaction.
- Project success and its positive impact on company reputation.

Here we have “a chicken and an egg problem” as we cannot calculate the profitability and customer satisfaction until we deliver the functionality, and

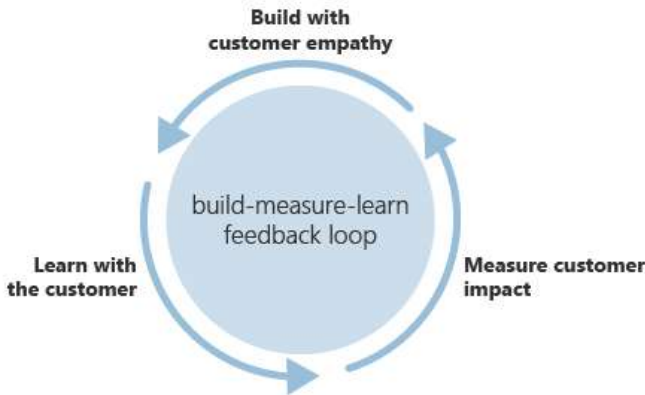
we cannot plan the delivery unless we believe it will be profitable and the customers will like it.

#### **4. What makes the project planning successful**

It makes sense to consider “cost” (or resourcing) component of the project management triangle as a complex and dynamic, flexible entity consisting of:

- Pre-planning research efforts of customer preferences and the market trends.
- Requirements and designs implementation.
- Actual project implementation.

To resolve the “chicken and egg” problem it’s essential to make the project delivery iterative, to learn from the customer reactions and to adjust the further planning, which means we can apply the innovative methodology both dealing with the mature projects and the startups.



**Figure 1. Build-learn-measure feedback loop**

To accommodate the build-learn-measure feedback loop approach in the project planning we consider the following flow:

- Creation of a few customer-focused hypotheses which demonstrate the customer needs.
- Creation of brief high-level requirements for each hypothesis.
- Prioritization of all the suggested deliverables.
- High-level tech estimation for each initiative.
- Capacity estimation.

- The manager tries to accommodate the top rated priorities of the deliverables into the plan considering the capacity and the blockers/dependencies; if any feature doesn't fit into the plan due to the size or other restrictions, the next priority is considered.
- The implementation and delivery are continuous, if at some point we have a chance to get the customer feedback and adjust the requirements and/or priorities, the plan can be updated so the project can bring more value.

### 5. Metrics to evaluate the project continuous success

A lot of different metrics can be used for evaluating the customer satisfactions and the project profitability. Two most popular ones are conversion rate and clicks. The conversion rate is similar to the increased-revenue metric because in ecommerce, a conversion is equivalent to a sale.

In some situations, especially outside of ecommerce, conversion is an insufficient form of measurement and can be tricky to implement. In this case, click-through-rate (CTR) is a more sensitive and accessible metric.

### 6. Example of continuous planning implementation

After the product team provides the prioritized list of deliverables, the manager plans the work in a way that maintains the product priorities while still fitting into the capacity and adhering to other restrictions.

Table 1

#### Traveller app quarterly planning example

	Priority	Size	Hypothesis on CVR increase
Member only deals	1	Small	3%
Price Insights Charts	3	X-Large	1.5%
Price and availability calendar	8	Medium	0.5%
Cancellation policy improvements	13	Large	0.8%
<b>Out of scope</b>			
Priority “pay now” option	16	X-Small	0.3%

Each time the next feature in the list is delivered and the feedback is available, the plan can be adjusted, leaning again and again towards minimizing the efforts and maximising the outcomes.

## 7. Conclusions

Iterative project planning continuously measuring the customer impact and learning from it helps to break out the “chicken and egg” closed loop; extending “cost” factor in the project management triangle and to include research and learn activities into it helps to find more precise balance for the project management triangle.

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## SWOT ANALYSIS OF LTD EIROMIKS

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### **Abstract**

This study provides a comprehensive SWOT analysis of LTD Eiromiks, focusing on its strategic positioning, internal capabilities and external environment. SWOT analysis is used to assess the company's internal strengths and weaknesses, as well as external opportunities and threats in the dairy industry. Eiromiks prides itself on offering high quality dairy products from trusted suppliers and providing its customers with a personalized shopping experience. However, problems such as limited distribution channels, market price volatility and competition from retailers have been identified. The study offers opportunities for innovation, diversification of product offering and online presence to improve Eiromiks' competitiveness. By studying SWOT analysis, Eiromiks can develop effective strategies to capitalize on strengths, mitigate weaknesses, and capitalize on opportunities while addressing potential threats in the market.

**Key words:** *SWOT analysis, strategic management, competition, competitive advantage, dairy industry.*

### **1. Introduction**

This study delves into LTD Eiromik's strategic position through a comprehensive SWOT analysis, identifying its internal strengths and weaknesses, and outlining external opportunities and threats. Renowned for its commitment to quality and personalized customer service, Eiromiks has carved a niche for itself in the dairy industry market. However, amidst the backdrop of a dynamic dairy industry, the company faces a myriad of challenges and opportunities that warrant careful examination. This study embarks on a systematic analysis of Eiromiks' strategic position through the lens of a SWOT analysis. By scrutinizing the company's internal strengths and weaknesses alongside external opportunities and threats, this research seeks to elucidate pathways for Eiromiks to enhance its competitive standing and capitalize on

emerging market trends. Through such analysis, Eiromiks can discern avenues for advancement and innovation, thereby fortifying its competitive foothold within the industry. This study is based on the analysis of company internal documents.

## **2. SWOT analysis importance**

SWOT has been around for decades and could lay claim to being the most widely used strategy tool in modern times [2]. SWOT analysis is important because it provides organizations with a structured framework to evaluate their internal strengths, weaknesses, external opportunities, and threats. This structured approach allows organizations to make informed strategic decisions by leveraging their strengths, addressing weaknesses, exploiting opportunities, and mitigating threats [2]. In addition, SWOT analysis helps identify competitive advantages, promotes better resource allocation and effective risk management. It serves as a communication tool that facilitates alignment among stakeholders to achieve common goals. Additionally, by regularly conducting a SWOT analysis, organizations can monitor changes in their environment and adapt their strategies accordingly, promoting continuous improvement.

As for the dairy sector, it has different strategic opportunities and potential threats of its own [3].

## **3. SWOT analysis of LTD Eiromiks**

After the business case study, the key factors were identified and included in the SWOT matrix.

### **Strengths:**

**Quality Products** – Eiromiks specializes in offering high-quality dairy products sourced from reputable suppliers, ensuring freshness and taste.

**Product Diversity** – the company offers a diverse range of dairy products, including exclusive cheeses, creamy yogurts, and farm-fresh butter, catering to various consumer preferences.

**Personalized Shopping Experience** – Eiromiks prioritizes personalized interaction with customers, providing attentive service, product knowledge, and tasting samples, which enhances customer satisfaction and loyalty.

**Local Sourcing** – by sourcing products locally from well-known suppliers and smaller companies, Eiromiks supports local businesses.

**Word-of-Mouth Marketing** – the company relies on satisfied customers to spread positive word-of-mouth, leveraging personal recommendations as a key driver of brand recognition and customer attraction.

**Weaknesses:**

Limited Marketing Channels – Eiromiks relies heavily on organic methods and traditional word-of-mouth marketing, lacking a presence in conventional marketing communication channels, which may limit its reach and brand awareness.

Market Price fluctuations – the dairy industry is subject to fluctuating market prices, which can impact profit margins and financial stability for small-scale companies like Eiromiks.

Dependency on Suppliers – Eiromiks reliance on suppliers, both large and small, may expose it to supply chain risks such as disruptions in product availability or quality issues.

**Opportunities:**

Innovation and differentiation – Eiromiks can capitalize on opportunities for innovation and differentiation to stand out in the competitive dairy market, such as introducing new product variants, expanding into niche markets, or enhancing the customer experience.

Diversification of product offerings – the company can explore diversifying its product offerings beyond dairy products to appeal to a broader customer base and mitigate risks associated with market fluctuations.

Digital marketing – establishing an online presence through e-commerce platforms or social media can extend Eiromiks reach and attract customers beyond its physical location, tapping into digital marketing opportunities.

Partnerships and Collaborations – collaborating with local businesses, restaurants, or food festivals can enhance brand visibility and attract new customers through joint promotional activities.

**Threats:**

Competition from Retailers – Eiromiks faces competition from larger retailers and supermarkets offering a wide selection of dairy products, which may pose a threat to its market share and customer base.

Market Saturation – the dairy market may become saturated with similar products, making it challenging for Eiromiks to differentiate itself and maintain a competitive edge.

Economic Factors – economic downturns or fluctuations in consumer spending patterns can impact discretionary spending on premium dairy products, affecting Eiromiks' sales and revenue.

Changing Consumer Preferences – shifts in consumer preferences towards plant-based alternatives or healthier options may pose a threat to traditional dairy products, requiring Eiromiks to adapt its product offerings accordingly.

This SWOT analysis provides an overview of the internal strengths and weaknesses of Eiromiks, as well as external opportunities and threats in the dairy industry. By properly assessing all aspects of this enterprise, conclusions can be drawn that will help in the development of the company.

#### **4. Conclusions**

In conclusion, the SWOT analysis of Eiromiks LTD provides valuable insight into the company's strategic positioning in the dynamic dairy industry. Eiromix boasts of offering high quality dairy products from trusted suppliers, offering a diverse product range and prioritizing personalized customer service. These strengths contribute to brand awareness and customer loyalty. However, the company faces challenges such as lack of digital marketing, fluctuating market prices and competition from retailers. Nevertheless, there are some opportunities for Eiromiks to enhance its competitive edge and capitalize on emerging market trends. Embracing innovation and differentiation, diversifying product offerings, leveraging digital marketing, and fostering partnerships are pathways for growth and resilience. By addressing weaknesses and mitigating threats, Eiromiks can strengthen its market position and adapt to evolving consumer preferences. This SWOT analysis clearly shows the most effective strategies for Eiromiks. To capitalize on strengths, address weaknesses, seize opportunities and overcome threats. By leveraging its strengths and capabilities, while proactively solving problems, Eiromiks can position itself well in the industry and fully participate in the competitive environment of the dairy industry.

#### **Acknowledgment**

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## SECTION 4. PROBLEM OF INNOVATIVE EDUCATION AND DECISION MAKING

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### RISK MANAGEMENT UNDER THE INFLUENCE OF DESTRUCTIVE FACTORS AND DIGITALIZATION AT ECONOMIC ENTITIES

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#### **Abstract**

In the 21st century, the world has faced global protracted crises such as the Covid-19 pandemic with quarantine restrictions and wars that have become a part of modern life. They negatively affect both the global economy and the enterprise. Therefore, risk management becomes an important component under the influence of destructive factors in the enterprise management strategy, its stabilization and development in the future. The article discusses the general concept of “risk management” in the context of destructive factors affecting the enterprise. The concepts of “digitalization” are given and its positive and negative influences are established in the conditions of the specified factors. The types, influences and minimization of external factors through the use of preventive measures are noted to prevent dysfunction and maintain the sustainability of the enterprise.

**Key words:** *risk management, destructive factors, business entities, digitalization, preventive risk detection.*

## **Introduction**

In the 21st century, the world is faced with extraordinary, incomparable dynamics and the inability to predict the future. Global crises, such as the Covid-19 pandemic, quarantine restrictions, wars (including 2-year war in Ukraine) have become a part of modern life, which in turn pose significant challenges for business entities. Therefore, management risk is becoming an increasingly important component for stability and development, since the usual market mechanisms and management strategies have lost their effectiveness. Digitalization, on the one hand, can help businesses become more resilient to these factors, but on the other hand, it can also create new risks.

Today, among foreign and domestic scientists there is no single point of view regarding to the definition of the concept of “risk management,” and even more it is in the context of the influence of destructive factors and digitalization at the enterprise.

Digitalization is a comprehensive process of introducing modern information technologies in all their manifestations with the aim of improving the business process to achieve the enterprise’s goals through a qualitative change in existing economic relations [1].

In our opinion, risk management is the process of identifying, analyzing, assessing, responding and managing the risks that an enterprise faces. This process becomes even more important under conditions of destructive factors. Destructive factors are:

- war: can lead to destruction of infrastructure, losses of human resources, economic crisis;
- epidemics: can lead to a decrease in the working capacity of the population, the closure of enterprises, and an economic crisis;
- global disasters: can lead to climate change, resource shortages, and emigration;
- cyberattacks: cyberattacks are becoming more common and sophisticated, which can lead to data theft, system malfunctions and financial losses.

The impact of destructive factors at business entities is:

- increasing the probability of risk events occurring;
- increasing damages from risk events;
- the emergence of difficulties in predicting and risk management;
- decrease in competitiveness;
- increased probability of bankruptcy.
- data theft: cybercriminals can steal personal data, financial information and trade secrets;

- system malfunctions: digital system malfunctions can result in service interruptions, data losses and financial losses;
- reputational losses: negative information on the Internet can quickly spread and damage a company's reputation.

### **Overview**

Destructive factors are external and internal. External factors are beyond the control of business entities, so they cannot directly influence these factors. Instead, internal factors can be managed by economic entities to achieve optimal results in management.

To eliminate or minimize them, it is advisable for business entities to recommend:

- conduct a thorough assessment of internal and external risks;
- develop a response plan to destructive factors;
- take measures to reduce the probability of occurrence of risk events;
- create a reserve fund to cover losses from risky events;
- to insure risks;
- cooperate with the state and other organizations to jointly overcome destructive factors.

Anti-crisis management of a business entity under the influence of destructive factors, such as a pandemic and war, should be concentrated in three main cycles (Table 1).

Table 1

### **The main cycles of anti-crisis management of business entity under the influence of destructive factors, including a pandemic and war**

	<b>Expectations</b>	
<ul style="list-style-type: none"> <li>– personnel protection;</li> <li>– understanding the situation;</li> <li>– ensuring business continuity</li> </ul>	<ul style="list-style-type: none"> <li>– management of personnel and activities of the enterprise</li> </ul>	<ul style="list-style-type: none"> <li>– resumption of activity;</li> <li>– assessment of material damage</li> </ul>
<b>Shock</b>		<b>Restoration</b>

*Source:* compiled by the author based on data [2]

Dysfunctions within economic entities can be classified as destructive factors that prevent their ability to work efficiently and profitably. These factors can arise both from internal and external sources, often combining each other and exacerbating the problems faced by the enterprise. Understanding these destructive factors is important for identifying,

eliminating, and mitigating the main causes of dysfunctions occurring within enterprises.

Business entities must adapt and apply preventive measures to external factors to prevent dysfunction and maintain resilience.

Preventive identification of risks is a key element of risk management, which will allow taking measures to prevent them or minimize their impact.

The most effective methods of preventive risk detection are:

- SWOT analysis: analysis of strengths and weaknesses, opportunities and threats;
- PEST analysis: analysis of political, economic, social and technological factors;
- scenario analysis: development and analysis of various scenarios of the development of events;
- brainstorming: collective generation of ideas regarding to potential risks;
- interviews with experts: involvement of experts for risk assessment;
- monitoring of the external environment: constant monitoring of changes in the political, economic, social and technological spheres, as well as in the market.

After identifying the risks, it is necessary to develop and implement a plan to respond to them. The response plan may include:

- risk prevention measures aimed at eliminating or minimizing the likelihood of a risk event;
- measures to eliminate the consequences of risks: actions aimed at minimizing the negative consequences of a risky event, if it does occur.

To stabilize the enterprise.

Risk management can help the enterprise stabilize under the influence of destructive factors. This can be achieved by:

- reducing the probability of occurrence of risk events;
- minimization of negative consequences of risk events;
- increasing the enterprise's resistance to external shocks;
- ensuring better management decision-making.
- Recommendations for business entities:
  - create a risk management system that will meet the specifics of your business;
  - regularly review and update the risk management system;
  - involve all employees in risk management;
  - teach employees the basics of risk management;
  - use risk management software;
  - engage external consultants and risk management experts;

- increasing resilience: digital tools can help businesses become more resilient to disruptive factors. For example, cloud technologies allow enterprises to quickly restore their work in the event of data damage or loss;
- increased flexibility: digital tools can help businesses to be more flexible and adapt to changing conditions. For example, online platforms allow them to continue their work even if their employees cannot work in the office;
- increased efficiency: digital tools can help businesses become more efficient and save resources. For example, automating routine tasks can free up time for more important tasks.

### **Conclusion**

Therefore, risk management is an important tool for ensuring the stability and sustainability of economic entities under the influence of destructive factors. Due to the preventive detection of risks and timely response to them, enterprises will be able to significantly reduce the probability of negative events and minimize their impact on their economic activity. The use of the proposed measures, including the use of digitalization to stabilize business entities, will ensure early prevention and the creation of a database of threats and crisis situations that may arise at the enterprise at the current stage of development or in the near future. It is important that business entities in the management process also take into account all the risks associated with digitalization and take measures to minimize them.

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## THE ROLE OF ARTIFICIAL INTELLIGENCE IN LEARNING AND EDUCATION

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### **Abstract**

This thesis examines the transformative role of artificial intelligence (AI) in the realm of education, focusing on how AI technologies enhance personalized learning, improve educational accessibility, streamline assessment processes, empower educators, and navigate ethical considerations. AI's ability to analyse vast amounts of data enables it to tailor educational experiences to individual learners' needs, thereby increasing engagement and efficiency in learning. Additionally, AI facilitates more inclusive education by breaking down barriers for learners with disabilities and those in remote areas. The automation of assessments and feedback by AI not only expedites the evaluation process but also provides insights for targeted teaching strategies. Moreover, AI supports educators through administrative assistance and personalized professional development, allowing them to focus more on pedagogical excellence.

**Key words:** *Personalized Learning, Educational Accessibility, AI-driven Assessment, Educator Empowerment, Ethical Considerations.*

### **Introduction**

The advent of artificial intelligence (AI) has brought about a paradigm shift across various sectors, with the education sector being one of the most significantly impacted. AI's integration into learning and education promises to revolutionize the way educational content is delivered, personalized, and consumed. This thesis explores the multifaceted role of AI in education, highlighting its potential to transform traditional learning environments,

tailor educational experiences to individual needs, and overcome long-standing challenges in the sector.

### **The Evolution of AI in Education:**

The journey of AI in education began with simple automated tools for grading and has evolved into complex systems capable of providing personalized learning experiences. Early applications were focused on administrative tasks, but today's AI technologies are involved in creating dynamic curricula, facilitating immersive learning experiences through virtual and augmented reality, and even acting as personal tutors for students. This evolution signifies a move towards a more student-centered approach, leveraging technology to meet diverse learning needs.

### **Personalized Learning**

One of the most significant contributions of AI to education is the ability to personalize learning. By analyzing data on students' learning habits, strengths, and weaknesses, AI algorithms can tailor educational content, suggest suitable learning paths, and adjust difficulty levels in real time. This personalized approach not only enhances learning outcomes but also fosters a more engaging and motivating educational environment for students.

Case Study Analysis: Incorporation of AI tools in platforms like Khan Academy and Coursera has shown improvements in student engagement and comprehension by offering personalized recommendations and adaptive learning experiences.

### **Enhancing Accessibility and Inclusivity**

The advent of artificial intelligence (AI) in the educational sector represents a pivotal shift towards more accessible and inclusive learning environments. Beyond the fundamental capabilities of personalizing learning experiences, AI's potential to dismantle traditional barriers faced by students with disabilities or those grappling with language barriers heralds a new era of educational equity.

### **Language Translation and Multilingual Support**

AI-powered language translation tools and multilingual support systems are crucial in bridging the language divide in global classrooms. Such technologies not only facilitate real-time translation of educational content but also support non-native speakers in understanding complex subjects in their preferred languages. This democratization of language in education

ensures that knowledge is no longer confined to linguistic boundaries, enabling a truly global learning community.

### **Accessibility Features for Diverse Needs**

For students with disabilities, AI introduces an array of assistive technologies that transform their learning experiences. Speech-to-text functionalities and text-to-speech converters allow visually impaired students and those with dyslexia to access written materials more easily. AI-driven adaptive learning systems can adjust content delivery based on the learner's specific needs, ensuring that education is not a one-size-fits-all model but a personalized journey that accommodates individual learning differences.

### **Bridging the Digital Divide**

AI's role in making education more accessible extends to addressing the digital divide. By leveraging AI-driven analytics, educators can identify and support students who may lack access to digital resources, ensuring that remote learning tools are adaptable to various technological infrastructures. AI can optimize content for low-bandwidth environments, making online learning more feasible in remote and underserved regions.

### **Global Impact and Pandemic Response**

The global impact of AI in education was prominently showcased during the COVID-19 pandemic. As educational institutions worldwide scrambled to transition to remote learning, AI technologies played a crucial role in maintaining educational continuity. Virtual classrooms, powered by AI, enabled interactive and engaging learning experiences, replicating the dynamics of traditional classrooms in the digital space. AI-driven platforms facilitated the quick adaptation of teaching materials into online formats, ensuring that education could proceed uninterrupted.

### **Future Directions**

Looking forward, the integration of AI in education holds the promise for even greater inclusivity. Projects are underway to develop more sophisticated AI tools that can identify and adapt to various learning disabilities, providing customized support that can evolve in real-time as the student's needs change. Moreover, the potential for AI to collaborate with emerging technologies, such as augmented reality (AR) and virtual reality (VR), could further enhance accessibility, offering immersive learning experiences that transcend physical and cognitive limitations.

The enhancement of accessibility and inclusivity through AI in education is not without its challenges, including ensuring data privacy, overcoming biases in AI algorithms, and guaranteeing equitable access to AI-powered tools. However, the ongoing advancements in AI technology, coupled with a concerted effort to address these challenges, pave the way for a more inclusive and accessible future in education. This evolution marks a significant step towards realizing the ideal of education as a universally accessible right, transcending geographical, linguistic, and physical barriers to create a truly inclusive global learning community.

### **Streamlining Assessment and Feedback**

AI can automate the grading process, providing immediate feedback to students and freeing up time for educators to focus on teaching and personalized support. Beyond automating assessments, AI can analyze student responses to identify misconceptions, providing insights into areas that require further instruction or clarification. This not only speeds up the assessment process but also enhances its effectiveness by highlighting educational content that may need adjustment.

**Efficiency and Accuracy:** Studies have shown that AI-based assessment tools can match or even exceed the accuracy of human graders, with the added benefit of delivering instant feedback to students.

### **Empowering Educators**

While AI introduces many tools for direct student engagement, its role in empowering educators should not be underestimated. AI can assist in identifying gaps in teaching materials, suggesting resources to enhance lesson plans, and providing insights into class performance trends. Additionally, AI-driven professional development programs can offer personalized learning opportunities for educators, helping them to continuously improve their teaching skills.

**Teacher Support:** AI applications like teacher assistants and educational catboats can handle administrative tasks, allowing teachers more time to engage with students on a personal level.

### **Challenges and Ethical Considerations**

Despite its potential, the integration of AI in education comes with challenges and ethical considerations. Privacy concerns, data security, the digital divide, and the need for human oversight are significant issues that must be addressed. Ensuring that AI technologies are used responsibly and equitably is crucial to their success in education.

Ethical Frameworks: Developing ethical guidelines and frameworks for the use of AI in education is essential to safeguard student privacy, ensure data security, and prevent biases in AI algorithms.

### **The Future of AI in Education**

Looking forward, the role of AI in education is set to expand, with emerging technologies offering even more innovative ways to learn and teach. The continuous improvement of AI algorithms and the integration of AI with other emerging technologies like block chain and the Internet of Things (IoT) promise to further enhance personalized learning, data security, and the overall educational experience.

Innovative Horizons: The future may see AI facilitating more immersive learning experiences through technologies like virtual reality (VR) and augmented reality (AR), offering students hands-on learning opportunities that were previously impossible.

### **Conclusion**

The role of artificial intelligence in learning and education is both transformative and expansive, offering unprecedented opportunities to personalize learning, enhance educational accessibility, streamline assessments, and empower educators. While challenges remain, particularly in the areas of ethics and equity, the potential benefits of AI in education are immense. As AI technologies continue to evolve, their integration into the educational sector promises to create a more inclusive, effective, and engaging learning environment for all students. The journey of AI in education is just beginning, and its full impact remains to be seen, but the promise it holds is a testament to the potential of technology to enrich human learning and knowledge.

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## ON THE PROBLEM OF USING ARTIFICIAL INTELLIGENCE IN EDUCATION

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### **Abstrac**

Over the past decades, artificial intelligence (AI) has significantly changed all areas of human activity, offering a completely new wide range of innovative solutions and capabilities. These changes directly affect the educational process, becoming an integral part of it. The inevitable integration of AI into the university environment caused great discussion in the teaching community and the realization that it is necessary to regulate its use by both students and teachers. This article will look at the pros and cons of using new technologies, adapting teaching methods in the context of using AI, as well as the problem of students' insufficient independent completion of educational tasks using chatbots and similar tools.

**Key words:** *artificial intelligence (AI), education, technology, innovation.*

### **1. Introduction**

Currently, education is the highest priority of UNESCO, associated with the implementation of the UN Education 2030 program, which aims to “ensure inclusive and equitable quality education and promote lifelong learning opportunities for all” [1].

Considering the global nature of innovations in the field of education, it is necessary to understand the role of AI as an accessible information and educational resource for the implementation of the idea of personalized learning – adapting learning, its content and pace to the specific needs of each student. This is stated in scientific articles and UNESCO studies related to the use of artificial intelligence in the educational sphere over the past two years. For example:

1. “Artificial intelligence technologies in education: prospects and consequences” [2]:

This publication describes the use of artificial intelligence in education, its functions and prospects for implementation. The advantages and risks of using AI in the educational process are considered too. Conclusions that

can be made are: Artificial intelligence can significantly simplify routine tasks in education; Personalized learning experiences are made possible by AI; Ethical considerations need to be taken into account when using AI.

The source recommends the teachers to actively discuss the results with the AI and students, as well as create tasks that require creativity and critical thinking.

2. “Artificial Intelligence in Education: Changing the Pace of Learning” [3]:

This policy brief from the UNESCO Institute for Information Technologies in Education (UNESCO IITE) examines the role of AI in personalized learning. Artificial intelligence can tailor learning to the needs of each student. The latest technologies that play an important role for both teachers and students are described. The source states that AI facilitates personalized learning; Teachers can adapt their teaching methods to accommodate AI. It is recommended to support learners in using AI to achieve better results.

## **2. Problems of using AI in education: pros and cons of new technologies**

It is obvious that at this stage of the relationship between artificial and natural intelligence, AI technologies are primarily a means of freeing people from routine work and performing labor-intensive operations associated with large volumes of data.

In education, there is a certain dualism of AI technology as a goal and a means at the same time. Thus, when training specialists in the field of artificial intelligence, on the one hand, these technologies are the goal of education, and on the other hand, they act as a modern ICT tool that can increase the effectiveness of learning and build an individual educational trajectory, reducing the labor intensity of the learning process itself.

The phenomenon of AI, as an incompletely studied technology, undoubtedly has the property of uncertainty, which is expressed in some positive and negative features of the use of AI technology in education. Like most researchers, the authors, being university teachers, faced certain problems and note the following pros and cons of AI in education.

The main advantages of AI technology in education:

- Automation of training. Artificial intelligence can significantly simplify routine tasks, for example, help a teacher check homework and analyze the results of students’ mastery of new educational material [4].

- Critical thinking development. Most students can use AI to analyze and synthesize information, developing critical thinking skills and informed decision making [5].

Table 1

**Examples of artificial intelligence technologies**

<b>Technology description</b>	<b>Technology example</b>
Natural Language Processing (NLP): Natural language processing technology uses machine learning algorithms to analyze and understand natural human language.	Python libraries such as NLTK (Natural Language Toolkit) or SpaCy, which provide tools for tokenization, lemmatization, syntax analysis and text semantics.
Speech recognition Speech recognition technology uses machine learning algorithms to convert audio signals into text.	Speech recognition systems such as Google Speech-to-Text or Microsoft Azure Speech Recognition, which allow users to translate speech into text in various languages.
Image recognition and processing technology uses computer vision algorithms to analyze and understand the content of images.	Machine learning frameworks such as TensorFlow or PyTorch, which provide tools for training neural networks to recognize objects, faces, handwritten text, and other elements in images.
Autonomous mediator technology involves the use of artificial intelligence to create autonomous systems that can interact with people or the environment.	Personal assistants such as Apple's Siri or Google Assistant, as well as autonomous robots or virtual assistants in apps and games.
Emotional AI technology uses algorithms to analyze emotions and sentiments in text, voice, or images.	Text sentiment analysis or facial emotion recognition systems, such as Microsoft Azure Face API or IBM Watson Tone Analyzer.
Data mining technology uses machine learning algorithms to analyze large volumes of data and predict future events or trends.	Algorithms for time series forecasting, regression analysis, or data classification, used in various fields such as finance, medicine, or marketing.
Machine creativity technology uses content generation algorithms, such as deep neural networks, to create new images, music, text, or other creative works.	Text generation algorithms such as GPT (Generative Pre-trained Transformer) or generative adversarial networks (GANs) used to generate images or music.

– Increasing the speed of learning. Artificial intelligence can significantly reduce the time spent on learning: both the student and the teacher, thanks to the phenomenal speed of AI, will have to spend much less effort and time preparing for lectures and seminars [6].

– Individualization of training. Algorithms can adapt to the needs of each student, providing a personalized learning experience and building an educational trajectory [7].

– Availability of training. AI can help students with disabilities by ensuring equal opportunities for all, including using AI technologies to promote gender equality [8].

The main disadvantages of AI technology in education, however, are as follows:

– Dependence on technical support. The need for constant access to high-speed Internet and a modern personal computer can be a problem for students from low-income families or from economically underdeveloped countries. Too much dependence on AI can reduce students' independent problem-solving skills [9].

– Suppression of cognitive functions. There is a risk of a decrease in independent thinking skills and loss of the ability for system analysis and critical thinking of a number of students [5].

– Imperfection of algorithms. Sometimes AI can make mistakes, which can affect the quality of solving a given learning task [2].

– Ethical issues. It is necessary to pay attention to the ethical aspects of using AI in education, for example, information protection, confidentiality and property rights, and the need to eliminate plagiarism in student coursework and dissertations [10].

– Loss of the human factor. The use of AI may lead to a decrease in interaction between students and teachers, which may affect the quality of learning and student motivation [5].

As a result, traditional educational and methodological complexes (EMC) are subject to radical revision and modernization, taking into account the introduction of AI technologies into the educational process (Table 1). Particular attention should be paid to the development of tasks that require creative thinking and an individual approach from students, which will make it difficult for them to automatically complete such tasks using AI. The article plans to examine how, with the help of AI, it is possible to improve the educational process by personalizing learning, automating the assessment of student performance, creating interactive educational materials, and increasing the accessibility of education through online platforms.

## Conclusion

The use of artificial intelligence in the university educational process presents both potential for innovation and challenges. Effective implementation of new technologies requires a balance between automation and maintaining the human factor in the educational process.

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## THE ROLE OF ARTIFICIAL INTELLIGENCE IN MAKING FINANCIAL DECISIONS IN BUSINESS

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### **Abstract**

The main content of this article explains how important the role of artificial intelligence is in making financial decisions in the field of business in today's developing technology age. A number of new innovations and new fields, such as Finance, Business and Artificial Intelligence, are playing an important role in the economic and social life of society. Innovations introduced by the field of artificial intelligence in financial decision-making in business have opened the way to enormous opportunities in finance. That is, finance is a complex field with its name. Even a small mistake can have a big impact on the business. This increases the sense of economic loss in business. Applying a number of advances brought by artificial intelligence to the financial sector provides an opportunity to avoid several difficulties and complexities in the financial sector. This, in turn, is a new opportunity to simplify and improve the industry

**Key words:** *Artificial intelligence, Business, Finance, Technology, Technique, Innovation, Analysis, Data.*

### **Introduction**

In today's era of globalization and information technology, we do not look at the developing science and technology or the new modern field, how many opportunities they have. Artificial Intelligence, Business and Finance in today's modern technology world, these three words have been shown to have a high degree of connection in the field of business. Because these areas have been making enough progress. In recent years, artificial intelligence, which has entered many fields with its huge potential, is showing its influence not only in the field of technology, but in all fields. This, in turn, created great changes in the life of society.

**Artificial intelligence** – is a branch of computer science that deals with the creation of systems and programs capable of self-learning data analysis and decision-making.

**Business** – The term business refers to an organization or business entity engaged in commercial, industrial or professional activities.

**Finance** – refers to the economic relations that arise due to the accumulation, redistribution or use of funds.

Recent advances in artificial intelligence have increased the interaction between people and technology. These have increased the ability of computers to exceed their capabilities, and the development of human decision-making skills and understanding related to industries and the future of society as a whole. This, in turn, opened the way to special opportunities in the financial sector. That is, high-frequency traders, quantitative hedge funds, and robot-advisors all represent, to a greater or lesser degree, real-world examples of AI's impact on the industry. In general, AI augments human decision-making in finance by providing powerful data analytics, predictive capabilities, and automated processes. This enables businesses to make faster, more informed financial decisions.

The use of artificial intelligence in financial decision-making in the business sector is used to forecast asset prices, analyze historical data, and identify financial insights that can be used to predict future asset prices. This in turn provides opportunities for investors to buy and sell assets and help them make more informed decisions. The use of artificial intelligence in credit ratings in finance can be used to analyze credit history, income, customer data, and assess the likelihood of a borrower defaulting on a loan. This capability can help banks make more informed decisions on lending. Fraud detection in finance with the help of artificial intelligence can be used to identify all suspicious transactions that may be related to fraud, and banks and helps other financial institutions protect themselves from financial losses.

The application of artificial intelligence (AI) in financial decision-making in business plays an important role in financial augmentation and automation, and quantitative accuracy in providing valuable insights to improve efficiency. For this reason, we will review the role of AI in financial decision-making through several processes. These studies provide great opportunities for introducing new achievements in artificial intelligence, finance and business into the business sphere.

AI enables businesses in the financial sector to improve operational efficiency, effectively manage risk, make more informed, data-driven decisions, and enhance the customer experience in a dynamic and complex financial world. Analyzing and identifying data is important in any business

sector. In the financial sector, the application of AI algorithms can quickly and accurately analyze large amounts of financial data. AI systems can identify patterns, trends, and anomalies in financial data to identify market opportunities, assess risks, and detect fraud.

Every enterprise or companies should conduct predictive analytics during their activities. In business, such predictive analytics opens the way for AI to use historical data and advanced statistical models to predict future financial performance. It helps businesses make strategic planning, budgeting, and investment decisions by providing sales, market trends, and enablement.

The company can widely use AI in algorithmic trading in business, which analyzes market data in AI-powered trading systems, identifies signals and executes trades with speed and accuracy to maximize profits and reduce risks. In this way, computers execute high-speed trades based on predetermined rules and market conditions. During risk management in business, AI models can identify, assess and generate risk scores in real-time. This enables enterprises to make risk management decisions by assessing and managing various risks such as credit risk, market risk and operational risk through AI. In business fraud detection and security remediation, AI systems can detect potential fraud attempts by continuously monitoring and analyzing large amounts of data and unusual patterns and behaviors that indicate fraudulent activity in financial transactions. enables businesses to take quick action and protect their financial assets. In customer service and personalization in businesses, AI systems can answer queries, provide account information, assist with financial planning, and offer personalized product recommendations, enhancing customer experience and engagement. In these ways, AI-powered chatbots and virtual assistants can provide personalized financial guidance and support to customers. Banking uses a variety of data sources, including credit histories, social media profiles, and alternative data, to accurately assess creditworthiness with the help of artificial intelligence to make lending decisions. These models allow lenders to make faster and more accurate credit decisions, expanding access to credit for individuals and businesses. In business, AI-powered portfolio management systems recommend asset allocation, balance portfolios, and adjust investment strategies based on market conditions and investors' goals. This is very effective in managing profiles. In empowering efficiency expertise, AI automates repetitive financial tasks, freeing up human experts to focus on strategic analysis and decision-making. This increases efficiency and reduces the risk of human error. Investment Insights: AI can analyze complex investment data and recommend investment opportunities that match a company's risk tolerance and goals.

In today's era of rapid technological advancement, the financial industry is at the forefront of innovation, and artificial intelligence is shaping the way businesses make financial decisions.

AI has emerged as a system innovator and game-changer in many industries by abandoning only traditional methods for financial analysis, forecasting and risk management. This in turn has enabled financial professionals to make smart and informed decisions at an unprecedented speed. Using massive amounts of data and sophisticated algorithms, AI systems are able to uncover valuable insights, identify patterns, and predict outcomes with incredible accuracy.

One of the most attractive applications of AI in finance is in the field of financial analysis. With the advent of AI-powered analytics tools, this process has been simplified and improved. Specifically, financial analysis involved spending countless hours poring over spreadsheets and reports to gain insight into a company's performance. This opened the door to great opportunities for analysts. AI algorithms can quickly analyze complex data sets, spot anomalies, and highlight key trends, allowing financial professionals to make data-driven decisions with confidence.

Through AI financial forecasting, AI-powered forecasting models can generate highly accurate predictions of future financial performance by analyzing historical data and incorporating external factors such as market trends and economic indicators. This not only allows finance teams to anticipate potential challenges and opportunities, but also enables them to develop proactive strategies to manage volatility and uncertainty.

AI plays a crucial role in risk management. By continuously monitoring market conditions in the business, analyzing patterns and assessing potential threats, AI systems can provide early warnings of impending threats, enabling organizations to proactively protect their assets and optimize their risk return profiles. This allows financial professionals to identify and mitigate potential risks more effectively than ever before.

### **Summary**

In conclusion, we can say that the role of artificial intelligence in making financial decisions in business has increased. Because by harnessing the power of AI, finance professionals have enabled their organizations to create sustainable growth and value by unlocking new levels of efficiency, accuracy and insight. As we continue to embrace this technology-driven future, we must work with integrity, innovation and a commitment to excellence in business and finance. Because this path, in turn, brings great achievements to the fields. Artificial intelligence has enormous potential

to improve the financial industry. AI can be used to automate tasks, improve efficiency and make more informed decisions. We looked at the opportunities that artificial intelligence technologies create for humanity, specifically in the fields of finance and business, and studied how they can be used to improve financial processes. As AI technology advances, we're likely to see more innovations in this area. Artificial intelligence has the potential to change the financial sector for the better by making it more efficient, transparent and convenient.

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## NATURE OF KNOWLEDGE MANAGEMENT IN EDUCATION

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### **Abstract**

The research touches upon the issue of knowledge management at educational institutions as the means to optimize the processes of generating, accumulating and disseminating knowledge. The paper outlines the key aspects of knowledge management role including knowledge dissemination, curriculum development, innovation, life-long learning, etc. The core elements of knowledge management in education are identified as people, processes and technologies. The stages of implementing knowledge management in academic environment are described. Collaboration tools to attain the objectives of effective knowledge management are classified into project management tools, communication tools, cloud storage and file sharing tools and learning management systems. The author concludes that knowledge management in education is a dynamic process that enhances effectiveness, efficiency, and resilience of educational institutions in an ever-changing and increasingly complex world.

**Key words:** *knowledge management, education, academic environment, educational institutions, knowledge dissemination.*

### **Introduction**

Since time immemorial, educational institutions have acted as the prime environments for generating, accumulating and disseminating knowledge. It is no wonder that the issue of optimizing these processes has always been

the core for scholars' and practitioners' investigations. The emergence and spread of technology has given rise to refining the strategy for managing knowledge gaining added value to the products and services educational institutions provide.

### **Overview**

The role of knowledge management in educational institutions is multifaceted and crucial for advancing a culture of continuous learning, innovation, and development.

Knowledge management promotes dissemination of information, best practices and ideas among educators, administrators, and students. Sharing can be exercised through various channels, such as training sessions, collaborative platforms, and panel discussions. Knowledge management encourages innovation by fostering creativity, experimentation, and the exchange of ideas. Educational institutions can inspire educators and students to explore new methods, technologies, and approaches to facing academic challenges by providing platforms for collaboration and knowledge sharing.

Knowledge management aids educational institutions in developing and refining their curricula by leveraging insights from educators and experts. When capturing and analyzing knowledge about teaching and learning methodologies, student learning outcomes, and emerging trends systematically, institutions can adapt their curricula to meet the evolving needs of students and society.

Knowledge management enables preserving institutional memory by documenting past experiences, successes, and failures. This historical knowledge can assist in decision-making, and ensure continuity in leadership transitions. Knowledge management provides decision-makers in educational institutions with access to timely, relevant, and reliable information. This information enables informed decision-making across various areas, such as resource allocation, strategic planning, and policy development.

Knowledge management supports a culture of continuous development by forwarding reflection, evaluation, and feedback loops. Educators and administrators can use knowledge management processes to assess the effectiveness of educational programs, identify areas for improvement, and implement evidence-based strategies to enhance teaching and learning outcomes.

Knowledge management promotes lifelong learning by providing educators and students with access to a diverse range of learning resources, including online courses, research articles, and instructional materials. By

cultivating a culture of lifelong learning, educational institutions can empower individuals to adapt to changing circumstances and pursue continuous personal and professional development. The significance of the skill is proved by the valuable ability to search for and digest new information regardless of the activity and job title [1].

To achieve effective knowledge management in academic environment it is expedient to identify its core elements that include people, processes and technologies.

- **People:** Faculty, staff, and students are the knowledge holders. Knowledge management strategies involve fostering collaboration and knowledge exchange among them.

- **Processes** are the systematic approaches for creating, capturing, storing, and disseminating knowledge. Examples include curriculum development procedures, faculty development programs, and student knowledge-sharing platforms.

- **Technologies:** Digital tools play a major role in knowledge management. Learning management systems, online repositories, and collaboration software can streamline knowledge capture and sharing.

The implementation of knowledge management in educational institutions undergoes several stages. The first and foremost is to determine the need for knowledge that is crucial and assess the current state of its use. The next step is to develop the strategy of knowledge management, which will describe how knowledge is generated, stored, shared and applied. The strategy is powerful and fruitful when there is investment in technologies as such digital tools as LMS, various online platforms and repositories can improve knowledge management greatly. The key condition is also to create the atmosphere that boosts cooperation, encourages open communication among the academic process participants and invigorates the exchange of knowledge, experience and ideas.

To attain the objectives of effective knowledge management various groups of collaboration tools can be at hand. Project Management Tools help educators, students, and staff stay organized and on track by providing a central location to assign tasks, track deadlines, and share files. The top five are claimed to be Airtable, Asana, ClickUp, Evernote teams, GanttPro [2]: Communication Tools allow educators and students to connect easily. They are email services like Gmail, instant messaging apps like telegram, collaborative platforms like Google Workspace and Microsoft Teams, video conferencing tools like Zoom and Google Meet, discussion platforms like Flipgrid. The best Cloud Storage and File Sharing Tools for students in 2024

are Sync.com, Google Drive, Microsoft OneDrive, pCloud and Dropbox [3]. Learning Management Systems (LMS) are platforms specifically designed for online learning and often include collaboration tools. Based on the user satisfaction the best ones for 2024 are Google Classroom, Canvas LMS, Moodle, etc. [4].

### **Conclusions**

Knowledge management in education is a dynamic process that helps to create the academic environment with an effective circulation of knowledge leading to better performance and outcomes in all areas of its activity. Overall, knowledge management plays a vital role in enhancing the effectiveness, efficiency, and resilience of educational institutions in an ever-changing and increasingly complex world.

The best collaboration tools for an educational institution depend on the specific needs of the educational institution, faculty, staff, and students. However, the tools listed above can all be helpful for improving communication, streamlining workflows, and fostering a more collaborative learning environment.

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## NAVIGATING TURBULENT TIMES WITH PRAGMATIC AGILE

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### **Abstract**

The concept of "Pragmatic Agile" is explored as a response to the challenges faced by organizations in today's volatile business environment. It emphasizes the need for a flexible and value-driven approach to Agile implementation, tailored to the specific context and objectives of individual teams. Through a combination of practical strategies, such as flexible Agile approaches, informed decision-making on risks, incremental progress, and collaborative leadership, organizations can effectively navigate complexity and achieve sustainable success amidst uncertainty. It will equip teams with the adaptability and resilience needed to thrive in turbulent times.

**Key words:** *Agile, Pragmatic Agile, Value-driven approach.*

### **1 Introduction**

In today's volatile landscape, characterized by the brittleness, ambiguity, novelty, and incompleteness (Salun&Zaslavska, 2024), organizations grapple with multifaceted challenges including economic instability, rapid technological advancements, and unpredictable market shifts. In this context, the adoption of Agile methodologies has become increasingly prevalent as organizations seek to enhance their adaptability, responsiveness, and efficiency.

However, the implementation of Agile in modern conditions requires more than just adherence to theoretical principles - it demands a pragmatic approach that integrates Agile practices with real-world solutions to address the unique challenges of contemporary business environments.

### **2 Overview**

Crafted in 2001, the Agile Manifesto (Beck et al, 2001) underscored core principles favoring human interactions over rigid procedures, functional software over exhaustive documentation, customer engagement over

contractual negotiations, and adaptability over rigid plans. Although Agile methodologies have demonstrated their efficiency in fostering adaptability and enhancing customer satisfaction, they encounter hurdles in contemporary contexts (Marina J, 2019). One notable obstacle is the extension of Agile practices to encompass sizable enterprises and intricate projects. As organizations expand in scale and complexity, orchestrating numerous Agile teams, overseeing interdependencies, and harmonizing priorities become increasingly complex undertakings.

Moreover, the surge in remote work arrangements and dispersed teams, propelled by global occurrences, adds a fresh stratum of complexity to Agile implementation. Consequently, organizations are compelled to reassess communication, collaboration, and coordination strategies.

There's the challenge of harmonizing agility with stability and predictability. While Agile approaches prioritize adaptability and responsiveness to change, they must also ensure steadiness and foreseeability in project outcomes, especially in sectors bound by regulatory frameworks or stringent quality standards.

The constant advancement of technological innovation introduces fresh complexities and uncertainties into project environments. Emerging technologies like artificial intelligence, blockchain, and the Internet of Things usher in both opportunities and challenges, necessitating continuous learning, adaptation, and innovation from Agile teams to remain at the forefront.

To tackle these challenges and capitalize on Agile benefits, organizations can adopt pragmatic solutions tailored to their specific circumstances. The term "Pragmatic Agile" represents a concept that is understood and implemented differently by various organizations and practitioners within the Agile community. It's a combination of Agile principles with a pragmatic approach to implementation. Pragmatic Agile is an adoption of Agile that identifies those practices that make sense for individual teams, their context, and the objectives they wish to achieve. This means focusing on delivering value, rather than adhering to rituals and theoretical principles (Cascande K, 2016). Key strategies could include:

1. **Adaptable Agile Approaches.** Instead of rigidly sticking to one Agile framework, organizations can embrace flexibility by blending elements from various frameworks (e.g., Scrum, Kanban, XP) to create a customized methodology. This enables teams to adjust processes according to project requirements, team dynamics, and organizational context.

2. **Informed Decision Making on Risks.** Pragmatic Agile advocates for teams to take a risk-informed approach to decision-making, where they identify, assess, and mitigate risks throughout the project lifecycle.

Integrating risk management practices with Agile processes helps teams proactively tackle challenges and ensure project success while preserving agility and responsiveness (Carmichael, 2023).

3. Incremental Progress. Continuous improvement is central to Agile methodologies, and pragmatic Agile underscores this by emphasizing small-scale changes and experiments to drive progress gradually. Rather than pursuing large transformations, organizations achieve sustainable improvement through iterative cycles of reflection, adaptation, and learning.

4. Collaborative Leadership. Pragmatic Agile encourages collaborative leadership styles that empower teams to make autonomous decisions, address problems, and foster innovation. Leaders act as facilitators, providing support, guidance, and resources to help teams thrive while cultivating a culture of trust, transparency, and accountability.

### 3 Conclusions

Turbulent times demand resilience, requiring teams to swiftly adapt, innovate, and deliver value amidst uncertainty. Pragmatic agile offers a tailored approach, allowing teams to select and implement Agile practices that align with their unique context and objectives. By prioritizing value delivery over rigid adherence to rituals or theoretical frameworks, pragmatic agile equips teams with the flexibility and adaptability needed to navigate turbulent changes effectively, fostering resilience and enabling sustainable success.

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## FOREIGN EXPERIENCE OF TAX INCENTIVES FOR INNOVATIVE ACTIVITIES

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### **Abstract**

This paper delves into the utilization and expansion of tax incentives for research and development (R&D) across various countries, examining the underlying reasons for their increasing prevalence and generosity. Despite some nations abstaining from such incentives due to perceived ineffectiveness, the global trend points towards a growing adoption and diversification of tax incentives aimed at spurring innovation. Through an analysis of international data and research, this study explores how changes in the global environment have fuelled the proliferation of R&D tax incentives. The paper highlights the key motivators for government intervention in R&D, including market failures that impede the private sector from fully capitalizing on new knowledge, the inherently risky nature of research activities, and the strategic importance of R&D in achieving national goals. Furthermore, the study addresses the varied approaches to tax incentives, such as direct and indirect support, and evaluates their impact and effectiveness in fostering scientific and technological advancement. The findings underscore the critical role of tax incentives in national innovation systems and the nuanced balance countries strive to achieve in implementing these fiscal tools to enhance competitiveness and sustainable economic growth.

**Key words:** *Tax Incentives, Research and Development (R&D), Innovation Policy, Government Intervention, Market Failures, Global Competitiveness, Fiscal Stimuli, Economic Growth, Innovation Performance.*

### **Introduction**

The paper delves into the taxation strategies employed by various leading industrial nations to encourage innovation. It highlights that tax incentives

are primarily aimed at businesses and investors rather than scientific institutions. The adoption of foreign strategies in crafting tax incentive systems to support scientific and innovative endeavors is advocated. Tax incentives are recognized as effective government tools for fostering science, technology, and innovation, contributing to sustainable economic growth and enhanced global competitiveness.

Evidence suggests that tax incentives are critical components of policies geared towards science, technology, and innovation. These fiscal incentives are becoming more flexible, helping achieve broader objectives, and their impact and comparison methodologies are continually improving.

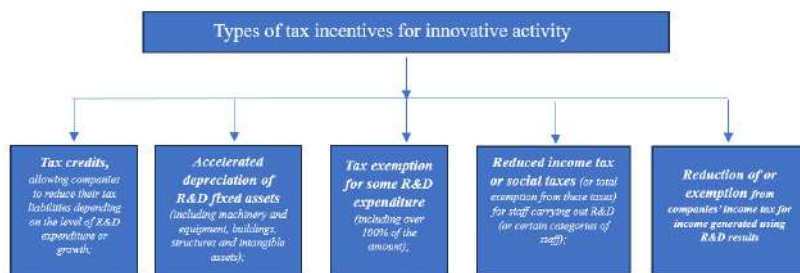
Particularly, the paper focuses on the increasing use and generosity of R&D tax incentives over the past thirty years. It explores the global dynamics that have driven the widespread adoption and enhancement of these incentives.

The necessity of state intervention in the innovation market for scientific and technological advancement is underscored, with tax measures playing a significant role. Despite some advanced economies lacking specific tax arrangements for innovation (such as Estonia, Germany, New Zealand, and Switzerland), R&D tax incentives are generally prevalent.

It is noted that Estonia has seen significant growth in innovation performance from 2006 to 2013 despite its lack of specific tax incentives. The importance of R&D tax incentives has increased, as evidenced by the growing number of countries adopting them. However, some countries, like Mexico and New Zealand, do not support such incentives due to doubts about their effectiveness. Others, like Estonia, Germany, and Sweden, prefer to create a generally favorable tax environment.

The paper discusses the evolution of tax incentive schemes, particularly in the U.S., where since 1954 tax legislation has supported R&D and innovation. Tax credits for R&D have been a primary method since 1981. Similarly, Canada has had tax incentives since the 1960s and introduced grants in 1967 to encourage firm-level innovation.

The study also covers Japan's extensive use of various tax incentives to stimulate innovation, including accelerated depreciation and tax discounts on development costs and foreign technology since the mid-20th century. Sweden has been offering a tax exemption on R&D costs since 1973, while France and the Netherlands provide incremental tax incentives based on the increase in R&D expenses.



In summary, the paper examines how different countries utilize tax incentives to stimulate innovation, with a focus on the reasons behind the increasing popularity and generosity of these measures. The diverse approaches underscore the global commitment to fostering an environment conducive to scientific and technological progress.

### **A key element of any national incentive model is a reduction in corporate income tax**

Market failures typically necessitate government intervention to support R&D, either directly or indirectly. This is because companies often cannot fully capture the benefits of new knowledge, leading to underinvestment since the broader societal benefits aren't reflected in their private returns. Government support, through funding, intellectual property rights, and other measures, aims to compensate for these shortfalls and encourage increased R&D spending. Several reasons justify this support:

- The inherent uncertainties, risks, and potential for increased costs in research activities;
- Difficulties in securing external funding due to these risks and uncertainties;
- The strategic importance of certain research areas like defense, health care, and energy;
- The need for collaboration among researchers and between researchers and users;
- The critical role of R&D investment in enhancing competitiveness and fostering long-term growth.

While the necessity for governmental support is widely accepted, the selection and balance of various support forms depend on each country's specific challenges, potential impacts, costs, and best practices. Today, many

leading industrial nations implement diverse tax incentives to foster innovation, including R&D tax credits, targeted investment credits, and incentives for executing significant projects, along with programs aimed at utilizing R&D for industrial modernization.

The increasing scope and generosity of these tax incentives raise questions about their effectiveness compared to direct policy tools, which may carry fewer risks. Recent trends show a surge in creative approaches to tax incentives, particularly R&D tax credits, which remain the most prevalent. This growing use is often attributed to their perceived effectiveness. A critical issue to explore is the discrepancy between the actual effectiveness of R&D tax incentives and their increasing popularity and generosity.

Countries such as Denmark, the Netherlands, and Norway have expanded R&D tax credits to include process R&D, broadening the scope from manufacturing to service industries. Additionally, some nations have introduced or enhanced tax incentives aimed at boosting the commercialization of R&D, allowing profits derived from patented or innovation-based products to be taxed at lower rates than other types of income.

### **Advantages and disadvantages**

Tax competition typically results in governments providing insufficient local public services, known as 'under-provision' or 'allocative inefficiency'. However, when directed towards the R&D sector, tax competition can boost public goods supply by fostering technological and innovative development, which act as quasi-public goods. Indirect state financing of R&D via tax breaks may also generate radical innovations, benefiting the state budget through channels other than corporate taxes.

Recognized benefits of R&D tax incentives include minimal market interference, availability to all firms irrespective of their R&D focus or size, and a more efficient identification of necessary R&D support since firms conduct the research themselves. These incentives also streamline government and corporate spending by leveraging existing tax structures and are independent of budgetary constraints, simplifying decision-making processes.

Tax incentives are categorized into volumetric, based on total R&D expenditure, and incremental, based on increases in R&D spending over a base period. Commonly, firms can write off current R&D expenses and apply accelerated depreciation on related equipment to reduce their taxable income. Some jurisdictions even permit deductions exceeding the actual R&D spending.

Predominantly, industrialized and emerging economies offer tax credits, direct deductions, and deferred taxation to encourage R&D. Tax credits reduce payable taxes in proportion to qualified R&D expenses. Deferred taxation addresses the timing mismatch for firms investing heavily in R&D but yet to profit substantially.

These tax measures are appealing as they reward actual innovation without preemptive funding. They drive robust demand for research and innovation through competitive pressures. Regular reviews of these incentives allow governments to strategically boost innovation in key sectors and adjust the research and industrial landscape.

Despite their stability during economic downturns and lack of international regulation constraints, R&D tax incentives are criticized for potential unforeseen increases in government spending, complex administration due to globalization, and a tendency to benefit mainly large multinational corporations. These incentives also risk funding projects that would proceed without support, misclassification of non-R&D activities as research, and preference for projects with high private rather than social returns.

The broader adoption and increasing generosity of R&D tax incentives reflect external factors like globalization, regional integration, and a growing emphasis on innovation as a driver of economic development. This environment has intensified competition for foreign direct investment (FDI), with nations increasingly using R&D incentives to attract such investments, especially in the profitable R&D sector. This strategy not only boosts local innovation but also helps prevent the relocation of domestic companies to countries with more favorable conditions.

### **Innovation and Economy Shifting aims**

The objectives of tax incentives for R&D continue to expand, although the effectiveness of these incentives in enhancing R&D performance remains somewhat ambiguous. Historically, the primary goal has been to boost R&D expenditure in the private sector, a target that continues to hold significant importance, supported by compelling evidence of its broader impacts. Over the past decade, these incentives have also been leveraged to pursue other critical objectives across many nations, including:

- Driving long-term growth and boosting the competitiveness of the national economy.
- Enhancing labor productivity and fostering greater innovation.
- Facilitating structural advancements in the national innovation system and improving cooperation among stakeholders.

- Aiding the growth of small businesses and start-ups focused on innovation.
- Attracting foreign investment into R&D sectors.

### **Conclusion**

This discussion confirms that although tax incentives for R&D are widely adopted by both industrialized and newly industrialized countries, there is no universal formula that assures positive outcomes today. National strategies for tax incentives in science and technology evolve gradually, reflecting not just global experiences but also unique local factors, conditions, and constraints specific to each country. Thus, while international practices in tax support for innovation serve as useful reference points, they must be adapted to align with the unique historical and situational context of each nation, such as Uzbekistan.

The paper investigates the growing prevalence and increasing scope of R&D tax incentives. The analysis supports the hypothesis that these trends are largely driven by external changes affecting the economic systems of individual countries, particularly shifts in the global environment. Undoubtedly, global dynamics such as advancing globalization, rising foreign direct investment flows, regional integration, and the escalating importance of innovation in economic development have influenced the expansion and enhancement of R&D tax incentives.

These global changes have introduced additional factors that national governments must consider when implementing R&D tax incentives, thereby encouraging their widespread adoption and increased scope. Notably, among these factors is tax competition, which has been a significant driver in the enhanced generosity and prevalence of R&D tax incentives.

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## **IMPORTANCE OF ARTIFICIAL INTELLIGENCE IN MANAGEMENT OF HUMAN CAPITAL DEVELOPMENT IN INDUSTRIAL ENTERPRISES**

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### **Abstract**

This thesis investigates the pivotal role of Artificial Intelligence (AI) in the management and development of human capital within industrial enterprises. As traditional methods of human capital management (HCM) become insufficient in the face of modern technological and competitive challenges, AI emerges as a transformative tool that can redefine workforce strategies to better align with the demands of a dynamic industrial environment. Through a mixed-methods approach, including case studies, surveys of HR professionals, and performance data analysis, this study explores the integration of AI in three key areas of HCM: training and development, performance management, and strategic workforce planning.

The findings demonstrate that AI significantly enhances training programs through customized learning experiences and predictive skills development, thereby improving workforce capabilities and engagement. In performance management, AI-driven systems offer real-time feedback and analytics-driven assessments that promote higher productivity and employee satisfaction. Furthermore, AI facilitates more accurate and efficient strategic workforce planning, enabling better alignment of workforce capabilities with long-term business goals.

**Key words:** *Artificial Intelligence (AI), Human Capital Management (HCM), Industrial Enterprises, Training and Development, Performance Management, Strategic Workforce Planning, Machine Learning, Data Analytics, Employee Engagement.*

### **Introduction**

In the modern industrial landscape, enterprises face the dual challenge of managing an ever-evolving workforce while maintaining a competitive

edge in rapidly changing markets. Traditional methods of human capital management (HCM) often struggle to keep pace with these demands, necessitating innovative approaches to attract, develop, and retain talent effectively. Artificial Intelligence (AI) emerges as a critical tool in this context, offering transformative solutions that can significantly enhance the management and development of human capital in industrial enterprises.

The integration of AI into human capital management offers numerous advantages, including the automation of routine tasks, enhanced decision-making through data analytics, and personalized employee development programs. These AI-driven innovations not only improve operational efficiencies but also foster a more engaged and productive workforce by aligning employee skills more closely with organizational needs.

However, the adoption of AI in human capital management is not without its challenges. Issues such as data privacy, ethical concerns regarding surveillance, and potential biases in AI algorithms pose significant hurdles. Moreover, the cultural shift required to integrate AI within traditional human resource practices can be substantial for many organizations.

This thesis explores the role of AI in reshaping human capital management within industrial enterprises, focusing on three key areas: training and development, performance management, and strategic workforce planning. Through a mixed-methods approach that includes case studies, surveys, and performance data analysis, this study aims to elucidate the benefits and challenges of AI in HCM and provide actionable insights for organizations looking to harness the power of AI for human capital development. The goal is to provide a comprehensive overview of how AI can not only automate but also enhance the strategic elements of human capital management, thereby driving industrial enterprises toward greater innovation and competitiveness.

### **The Impact of Artificial Intelligence on Human Capital Management in Industrial Enterprises**

The advent of Artificial Intelligence (AI) has transformed various business processes, including human capital management (HCM) in industrial enterprises. The application of AI across several facets of HCM – from training and development to performance management and strategic workforce planning – offers unique insights into how technology is reshaping the traditional approaches to managing a workforce. This essay explores the beneficial impacts of AI on employee productivity and

organizational outcomes, highlighting key areas such as AI-driven training methods, performance management, and strategic workforce planning.

### **AI-Driven Training Methods**

Personalized learning experiences facilitated by AI are revolutionizing the way training and development are approached in industrial settings. Unlike traditional one-size-fits-all training programs, AI-powered platforms provide personalized learning paths that adapt to the individual's learning style and pace. For instance, through machine learning algorithms and data analytics, these systems can predict which skills are needed for specific roles and tailor the training content accordingly. This method not only enhances skill development but also optimizes the learning process, making it more efficient and effective. Studies have shown that such personalized training significantly boosts employee engagement and retention of information, thereby increasing overall productivity and reducing the time and resources spent on training new employees.

### **AI in Performance Management**

The implementation of AI in performance management has introduced a more dynamic and precise approach to evaluating employee performance. Real-time feedback systems powered by AI analyze employee activities and provide immediate feedback, unlike traditional methods that often rely on periodic reviews. This continuous feedback loop helps employees adjust their performance on-the-fly, which can dramatically enhance their efficiency and productivity. Moreover, analytics-driven performance assessments allow managers to identify trends and patterns in employee performance, enabling more informed decision-making regarding promotions, compensations, and other HR actions. This transition to a more data-driven assessment system reduces biases and enhances fairness and transparency within the workplace.

### **AI in Strategic Workforce Planning**

In strategic workforce planning, AI has proven to be an invaluable tool in forecasting future staffing needs and enhancing talent acquisition and retention strategies. AI algorithms can analyze vast amounts of data to predict staffing gaps and identify the qualities of employees who are likely to succeed in certain positions. Such predictive analytics are crucial in making informed hiring decisions, which can ultimately save the company time and money by reducing turnover rates. Furthermore, predictive models of employee turnover provide insights into potential future departures,

allowing organizations to proactively engage in retention strategies. These strategies are tailored to the needs and drivers of satisfaction for different employee segments, thereby reducing turnover and fostering a more stable workforce.

### **Transforming Training in Industrial Enterprises: The Role of AI in Modernizing Traditional Models**

Traditionally, industrial training models have been predominantly instructor-led and structured around fixed curricula that deliver the same content at the same pace to all learners. These models often include classroom lectures, standardized assessments, and on-the-job training. While effective to an extent, they can be rigid, time-consuming, and not tailored to individual learning needs or the dynamic nature of industrial processes. Moreover, such methods can lead to significant resource expenditure and variable employee performance outcomes.

#### **AI Integration in Training Models**

The advent of AI technologies has marked a paradigm shift in how training programs are designed and implemented in industrial environments. Machine learning algorithms are now used to create adaptive learning systems that personalize the training content based on an individual's learning pace and performance. AR and VR, on the other hand, offer immersive experiences that simulate real-world scenarios, allowing employees to practice skills in a safe yet realistic setting.

For example, AI-driven platforms can analyze a trainee's performance in real-time and adjust the difficulty of tasks or provide additional resources automatically. VR simulations for machine operation allow employees to gain hands-on experience without the risks associated with actual machine handling. These technologies not only enhance learning outcomes but also increase the efficiency of the training process by reducing the time and resources required for employees to become proficient.

#### **Case Studies and Examples**

Several industrial enterprises have successfully integrated AI into their training protocols, demonstrating significant benefits. One notable case is that of a multinational automotive manufacturer that implemented VR-based training for its assembly line workers. The VR system simulated the assembly line environment, allowing workers to practice complex procedures. This led to a reduction in training time by 40% and errors by 30%, significantly enhancing operational efficiency.

Another example involves a global aerospace firm that used an AI-powered learning platform to tailor training programs for maintenance technicians. The platform utilized machine learning to adjust training modules based on individual progress and feedback, resulting in a 50% reduction in learning time compared to traditional methods.

### **Impact Analysis**

The impact of integrating AI into training models extends beyond just operational efficiencies. One of the most significant benefits is the improvement in employee skills development. AI-enhanced training is often more engaging and interactive, leading to better retention of knowledge and a deeper understanding of complex concepts. This engagement is crucial, as it translates into higher employee satisfaction and motivation.

Furthermore, personalized training approaches enabled by AI lead to higher retention rates. Employees feel valued when training content is tailored to their needs and progress, which fosters loyalty and reduces turnover rates. This personalization also ensures that employees are better equipped to meet the specific demands of their roles, thereby enhancing overall organizational performance.

### **Navigating Challenges and Ethical Considerations in AI-Enhanced Human Capital Management**

The integration of Artificial Intelligence (AI) into human capital management (HCM) presents not only transformative opportunities but also significant challenges and ethical considerations. While AI can revolutionize training, performance management, and workforce planning, its implementation is accompanied by technical, financial, and cultural hurdles. Additionally, ethical issues such as privacy concerns and decision-making biases pose serious risks that must be carefully managed. This essay delves into these challenges and ethical considerations, proposing strategies for mitigating risks and ensuring a responsible and effective deployment of AI in HCM.

#### **Challenges of Implementing AI in HCM**

The adoption of AI within HCM systems of industrial enterprises entails a range of challenges:

1. **Technical Challenges:** Implementing AI requires a robust digital infrastructure. Many organizations struggle with outdated systems that are incompatible with cutting-edge AI technologies. Integrating AI necessitates

substantial upgrades to existing IT infrastructures and often requires significant data cleansing to ensure high-quality data for AI processing.

2. **Financial Challenges:** The cost of developing or purchasing AI-driven HCM solutions can be prohibitive for many firms. Apart from initial outlays, there are ongoing costs associated with maintenance, updates, and training personnel to use and manage these systems effectively.

3. **Cultural Challenges:** Resistance from employees and management can impede AI adoption. Workers might fear job displacement due to automation, while managers may be skeptical about relinquishing decision-making to algorithms. This cultural resistance can delay or derail AI projects, limiting their potential benefits.

### **Ethical Considerations**

The ethical implications of implementing AI in HCM are profound and must be addressed to preserve trust and fairness:

1. **Privacy Concerns:** AI systems often require processing large amounts of personal data, raising concerns about employee privacy. There is a risk that sensitive information could be mishandled, misused, or inadvertently exposed.

2. **Decision-Making Biases:** AI algorithms are only as unbiased as the data fed into them. Historical biases in training data can lead to skewed outcomes that unfairly disadvantage certain groups. This not only affects individual employees but can also lead to systemic inequalities within the organization.

### **Risk Management Strategies**

Managing the risks associated with AI in HCM involves a multifaceted approach:

1. **Developing Robust AI Governance Frameworks:** Organizations should establish comprehensive governance frameworks that define clear guidelines for AI usage. This includes protocols for data handling, model training, algorithm auditing, and compliance with all relevant laws and regulations.

2. **Ethics by Design:** Embedding ethical considerations into the design and development phase of AI solutions can help mitigate biases and safeguard privacy. This involves using diverse datasets, regularly testing AI systems for biases, and implementing privacy-enhancing technologies that secure personal data.

3. **Transparency and Accountability:** Maintaining transparency about how AI systems make decisions and who is accountable for those decisions is crucial. Companies should be transparent with employees about AI use

in HCM processes and ensure there are avenues for feedback and contestation.

4. Employee Engagement and Training: Educating and involving employees in the AI implementation process can alleviate fears and build trust. Training programs should not only focus on how to use AI systems but also on understanding AI's role, limitations, and the checks and balances in place to protect employees.

5. Continuous Monitoring and Auditing: Regularly monitoring AI systems for performance and adherence to ethical standards is essential. Audits should be conducted by independent third parties to ensure objectivity.

### **Conclusion**

The integration of AI into human capital management systems offers significant benefits but also presents substantial challenges and ethical concerns. By addressing these proactively through careful planning, ethical considerations, and robust risk management strategies, organizations can harness the power of AI to enhance their human capital practices while maintaining integrity and trust within their workforce. Such efforts will not only optimize HCM processes but also foster a culture of innovation and fairness in the evolving workplace landscape.

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## LEVERAGING ARTIFICIAL INTELLIGENCE IN MARKETING RESEARCH: PARADIGMS, POTENTIALS, AND PITFALLS

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### Abstract

The integration of Artificial Intelligence (AI) in marketing research represents a transformative shift in how data is collected, analyzed, and operationalized to inform strategic decisions. This thesis explores the multifaceted role of AI in augmenting traditional marketing research methods, enhancing data accuracy, and personalizing consumer interactions. Through a comprehensive review of AI-driven methodologies, including natural language processing, machine learning, and predictive analytics, this study highlights the profound efficiencies and insights AI technologies offer. Concurrently, it acknowledges the ethical considerations and challenges inherent in deploying AI tools. The synthesis of literature, case studies, and theoretical frameworks provides a holistic understanding of AI's impact on marketing research and offers a roadmap for leveraging AI technologies responsibly and effectively.

**Key words:** *Artificial Intelligence, Marketing Research, Emerging Trends, Sustainable Practices, Ethical Integration.*

### Introduction

The dawn of the digital era has precipitated a seismic shift in marketing research, characterized by the transition from conventional methodologies to sophisticated, data-driven approaches empowered by Artificial Intelligence (AI). AI technologies, with their unparalleled computational power and analytical precision, offer the potential to decode complex consumer behaviors, predict market trends, and tailor marketing strategies with unprecedented accuracy. This thesis examines the transformative role of AI

in marketing research, delineating its applications, benefits, and ethical implications.

### **Chapter 1: The Evolution of Marketing Research in the Age of AI:**

#### Overview of Traditional Marketing Research Methods:

Traditional marketing research has predominantly relied on qualitative and quantitative methods to gather insights. Qualitative methods include focus groups, in-depth interviews, and observation, which help understand consumer behavior and preferences on a deeper level. Quantitative research, on the other hand, utilizes surveys, questionnaires, and statistical analysis to collect and analyze data from a larger sample size, providing generalizable and measurable insights into market trends and consumer attitudes.

#### The Advent of AI in Marketing Research: A Historical Perspective:

The incorporation of Artificial Intelligence (AI) into marketing research marks a significant evolution from manual and time-consuming processes to more efficient, automated analyses. The initial stages of AI in marketing research were characterized by the use of basic algorithms for data sorting and pattern recognition. Over time, advancements in AI technology, including machine learning, natural language processing, and predictive analytics, have profoundly expanded the capabilities of marketing research, enabling more nuanced understanding of complex consumer data and behaviors.

#### Transition from Data-driven to Intelligence-driven Marketing Research:

The transition from data-driven to intelligence-driven marketing research reflects a shift from merely collecting and analyzing data to deriving actionable insights and foresights with the help of AI. While data-driven approaches focus on historical data and trends, intelligence-driven research utilizes AI to predict future behaviors, personalize customer experiences, and optimize marketing strategies in real-time. This shift emphasizes the use of sophisticated AI tools to not only interpret vast datasets but also to anticipate market dynamics and consumer needs, thereby facilitating more strategic and informed decision-making.

### **Chapter 2: AI Methodologies Enhancing Marketing Research**

Leveraging AI in marketing research, specifically through Natural Language Processing (NLP), Machine Learning (ML), Predictive Analytics, and Computer Vision, transforms the approach to understanding and predicting consumer behavior. NLP allows for deep analysis of consumer sentiment and feedback from social media and reviews, providing insights into public perception and areas for improvement. ML and Predictive

Analytics go further by identifying patterns in consumer data, enabling the prediction of future behaviors, market trends, and product performance with high accuracy. Computer Vision offers a unique dimension by analyzing visual content to assess brand visibility, the effectiveness of product placements, and consumer engagement both online and in physical environments. Combined, these AI technologies offer a comprehensive toolkit for modern marketing research, facilitating a deeper understanding of consumer dynamics and enhancing strategic decision-making.

#### **Chapter 4: Advantages of AI in Marketing Research**

The integration of AI technologies in marketing research significantly enhances accuracy and efficiency in data collection and analysis, while also providing real-time insights that support agile marketing strategies. Through automation and predictive analytics, businesses can streamline their research processes, reducing manual efforts and the likelihood of human error. This not only speeds up the gathering and interpretation of vast amounts of data but also cuts costs associated with traditional research methods. Consequently, organizations can quickly adapt to market changes and consumer trends, allowing for more dynamic and cost-effective marketing strategies.

#### **Chapter 5: Ethical Considerations and Challenges**

Ensuring data privacy and security, addressing biases, and promoting transparency and accountability are essential considerations in the ethical deployment of AI in marketing research. Navigating the complexities of consumer data protection involves implementing robust security measures to safeguard sensitive information collected through AI applications. Additionally, addressing inherent biases in AI algorithms is crucial to ensure equitable marketing practices, as biases can lead to unfair treatment of certain demographic groups. Transparency and accountability are equally important, necessitating clear guidelines and protocols governing the use of AI in marketing research. By prioritizing these principles, businesses can uphold ethical standards, build trust with consumers, and mitigate potential risks associated with AI technologies.

In the realm of AI-driven marketing research, safeguarding data privacy and security is paramount. This entails implementing stringent measures to protect consumer data from unauthorized access or misuse, thereby maintaining trust and compliance with regulatory standards such as GDPR and CCPA. Simultaneously, addressing biases inherent in AI algorithms is critical to ensure fairness and equity in marketing practices. By proactively

identifying and mitigating biases, businesses can prevent discriminatory outcomes and foster inclusivity in their marketing strategies. Furthermore, promoting transparency and accountability involves establishing clear guidelines and protocols for the ethical use of AI in marketing research, fostering transparency in data collection, analysis, and decision-making processes. Together, these principles form the foundation for responsible AI deployment, fostering consumer confidence and ethical business practices in the evolving landscape of marketing research.

### **Chapter 6: The Future of AI in Marketing Research**

As AI continues to evolve, it shapes the future of marketing research through emerging trends and technologies that hold promise for driving sustainable and ethical practices. These advancements offer opportunities for marketers to integrate AI into research methodologies effectively, fostering innovation and responsible data-driven decision-making.

Emerging trends and technologies, such as advanced machine learning algorithms, natural language processing, and predictive analytics, are revolutionizing marketing research by providing deeper insights into consumer behavior and market trends. These technologies enable marketers to extract actionable intelligence from vast datasets in real-time, empowering agile decision-making and strategy formulation.

Moreover, AI has the potential to drive sustainable and ethical marketing practices by enhancing customer engagement, personalization, and transparency. By leveraging AI-powered tools, marketers can deliver more relevant and meaningful experiences to consumers while respecting their privacy and preferences. Additionally, AI enables marketers to identify and mitigate biases in data analysis, ensuring fair and equitable treatment of all consumers.

To effectively integrate AI into research methodologies, marketers should:

1. Invest in comprehensive training and education on AI technologies to maximize their understanding and utilization.
2. Collaborate with data scientists and AI experts to develop customized solutions tailored to specific research objectives and challenges.
3. Prioritize data privacy and security by implementing robust measures to protect consumer information and comply with regulatory requirements.
4. Continuously evaluate and refine AI algorithms and models to improve accuracy, reliability, and ethical compliance.

5. Foster a culture of transparency and accountability within the organization, emphasizing the ethical use of AI in marketing research and decision-making processes.

By embracing these recommendations and leveraging the transformative potential of AI, marketers can unlock new opportunities for innovation, growth, and sustainability in the dynamic landscape of marketing research.

### **Conclusion**

AI represents a paradigm shift in marketing research, offering tools that are not only revolutionizing data collection and analysis but also redefining the boundaries of what is possible in understanding and engaging consumers. However, the full potential of AI can only be realized through a balanced approach that combines technological innovation with ethical stewardship. As AI continues to evolve, it holds the promise of unlocking deeper insights into consumer behavior, driving more personalized and effective marketing strategies, and fostering a competitive edge in the rapidly changing digital landscape. This thesis underscores the necessity for ongoing research, ethical consideration, and adaptive strategies to harness the transformative power of AI in marketing research.

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## THE PHENOMENON OF CREATIVE INNOVATION

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### **Abstract**

The dynamic development of the modern world is constantly accompanied by technological revolutions. The factor of “creative destruction” characterized by the continuity of production and creation of innovations has served as their basis for a long time. Today, the nature of innovation in products, processes, and organizations is quite broad. Until recently, the main focus was on changing their functionality, which is more characteristic of technological innovations. However, with the dynamic development of the creative economy sector, the role and importance of creative innovations are growing. Creative innovations are generated by creativity and transformed into marketable creative products. They are unique in nature, have a significant impact, and participate in shaping the value chains of products and services in other sectors of the economy. The sphere of creative innovations is still underexplored and therefore requires further research.

**Key words:** *creative economy, intellectualization, creative innovations, creative innovation impact.*

### **Introduction**

Creative destruction as a wave-like and constant process occurs due to the growing level of a person's intellectualization and their work. It is manifested in the destructive power of innovations on markets and industries, the replacement of old methods with new, more progressive ones,

the internal destruction of the economic system and its transition from one state to another [1].

The economic role of innovations is interpreted by scientists as the principle of intellectual self-improvement of the society and is an important condition for maintaining its dynamic balance, the dynamism of innovative development of which is directly accompanied by the accelerated intellectualization of world society on a global scale [2].

Modern trends in the development of the world economy lead to the emergence of new sectors and industries, based on creative activity. Creativity is multifaceted, and its combination with the technological component lays the foundation for the emergence of creative innovations.

### **Overview**

One of the unique economic systems that combines a commercial and cultural component and is characterized by a high capacity for innovation is the creative economy. The high level of cultural interaction of people inherent in the creative economy is a favourable environment for the dissemination of new experience and creative ideas. That is why the creative economy exerts an increased influence on the formation of innovative potential and innovative creativity, and is attractive for the influx of creative talents from abroad. Thanks to innovations, information and communication technologies, talents and skills, the activation of innovative processes in the economy of countries and in the global space is ensured [3].

As a result of the creative economy's unique ability to penetrate into the development environment of other sectors of the economy flexibly, there is a diffusion of knowledge and technologies, which causes a mutual influence on technologies and the innovation ability of business partners – both customers (direct influence effects) and suppliers (feedback effects) of the creative economy. The flexibility and inclusiveness of the creative economy provides it with the role of one of the key drivers of achieving the goals of sustainable development and increasing its importance in the world economy.

A peculiarity of creative and cultural sectors of the economy is their complex influence on the economic development of cities, countries, regions and the world through a system of various connections. However, in practice, a significant part of the subjects of creative industries is concentrated in small and medium-sized businesses that are not engaged in research and development. The non-technological character inherent in creative innovations leads to the problem of identifying the participation of external technological innovations at specific stages of the formation of the value chain of creative products in other industries and sectors of the economy,

where the result of creative activity is used as an intermediate stage of entry into the process of production of goods or services, which by themselves are not creative. This feature of creative innovation was called hidden innovation, the concept of which was developed by L Green, I. Miles and J. Rutter [4]. Perhaps that is why the economic efficiency of creative innovations is often underestimated, since this result of technological and scientific research activity is not taken into account in the results of research.

This problem is also explained by the specificity of innovations of creative economy, which is related to the peculiarity of the services to which this industry belongs, since most of the creative products are services, and those that are technically goods are used in the context of their service:

- most services are relative, which means that the time and place of their production and consumption coincide;
- innovations in the service sector, as an idea or concept, are often quickly copied and easier to copy than complex technological innovations. Such imitation is called endemic in creative industries [4], i.e. inherent and characteristic of the entire creative sector and such that does not inhibit the development of creative innovations, in contrast to technological innovations;
- creative activities are often integrated into technology-intensive products or services. Among them, there are those that are focused on technology (software, engineering design) and that create more psychological and social effects (advertising, clothing design).

Therefore, it can be stated that today, under the influence of the dynamic development of creative economy sector, traditional theories of innovation are undergoing significant changes, being supplemented by new content of innovations produced by creative and cultural industries. The peculiarity of innovations of creative and cultural industries, generated by creativity and transformed into marketable creative products, is that in most cases their innovative content is not considered to be a result of technological and scientific research activities, but rather is considered an act of creativity and joint efforts. This is explained by the fact that today the nature of innovations in products, processes and organizations is quite broad, but the focus is on changing their functionality, which is more characteristic of technological innovations. However, it is important to understand that creative and cultural industries are crucial incentives for innovation and have the potential to generate positive changes in and for society in terms of improving people's well-being. After all, based on their internal value, these sectors have the role of providers of innovations and creative solutions to manage a wide range of social problems; factors promoting employment

and inclusion; means of stimulating innovation in other sectors of the economy; drivers of development of urban and rural areas.

### **Conclusion**

Thus, the phenomenon of creative innovation is its scaling, when an innovation is created to give rise to a new innovation. They are characterized by the spillover effect into other sectors of the economy and their own innovative development of creative and social entrepreneurship, which determines their uniqueness and multi-effectiveness.

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## THE USE OF INFORMATION AND DIGITAL TECHNOLOGIES IN DESIGN EDUCATION

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### **Abstract**

These scientific theses focus on the issues related to the use of information and digital technologies in the educational process of students in creative professions. These issues should be considered when developing and implementing educational programs for the specialization in Design (022). The paper analyzes existing technologies, noting their advantages and disadvantages. In particular, attention is drawn to problems associated with accessibility to cutting-edge technologies, data security, and privacy, as well as the lack of personal contact. Additionally, the theses describe the benefits of using information and digital technologies to enhance educational processes in design education. It is noted that modern information and digital technologies can contribute to increased efficiency and the development of new skills, as well as the ability to learn remotely. The total volume of the theses is 3 pages.

**Key words:** *educational programs, design education, online tools, multimedia resources, information and digital technologies.*

### **Introduction**

The modern educational landscape is marked by the rapid development of information and digital technologies, which play a key role in the formation and improvement of the processes of obtaining design education, which provides the opportunity to solve various educational tasks. The use of these technologies in education undoubtedly has its advantages and disadvantages, which should be carefully considered when developing and

implementing educational programs. In these theses, we will consider the key aspects of this issue, having analyzed the advantages and disadvantages of using information and digital technologies in the modern educational process.

There are certain trends in the implementation of technologies in design education, allowing for continuous development and adaptation to modern requirements. However, they also face certain challenges that complicate their application.

The widespread use of artificial intelligence algorithms makes it an integral component of many web applications for designers, making them a convenient tool in everyday routine work. However, existing systems do not always provide sufficiently accurate results.

This work has identified a number of issues in the use of information and digital technologies in design education. All these problems need to be taken into account when developing educational programs for the field of Design (specialty 022).

### **Overview**

The field of design education is constantly evolving and adapting to modern requirements, creating favorable conditions for the emergence of certain trends in the integration of technologies into design education. These trends indicate the increasing importance of technologies in design education and demonstrate how they contribute to the development of creative and technical skills among students in this field [1].

This study investigates the main trends, identifies solutions, and proposes strategies to ensure effective teaching for future designers.

Key trends in the use of information and digital technologies in design education:

1. **Virtual (VR) and Augmented Reality (AR) Usage:** These technologies enable students to create and explore three-dimensional models, collaborate on projects in virtual environments, enhancing understanding of design and collaboration.

2. **Modeling and Simulation:** Students can learn specialized modeling programs and optimize their design ideas before implementation through simulations.

3. **Collaboration and Project Work:** Online collaboration tools allow students to work together on projects, regardless of their physical location.

4. **Interactivity and Gamification:** Implementing gamification in education creates engaging and motivating learning experiences where students compete and receive rewards for achievements.

5. Online Courses and Resources: Platforms like Coursera, Udemy, and specialized websites provide access to numerous educational resources and courses.

6. Specialized Tools: Using design-specific software and tools like Adobe Creative Suite, Sketch, Figma, makes learning more practical and prepares students for real-world tasks in the industry.

7. Industry Collaboration: Collaboration with design companies and internships help students gain practical experience and industry connections.

8. Adaptation to Mobile Platforms: With the increasing use of mobile devices, design education courses and resources are increasingly adapting to smartphone and tablet formats.

One of the main challenges of using information and digital technologies in education is the inequality of access. Not all students have equal access to the necessary technologies and the Internet, which can create barriers to accessing education [2].

Additionally, there may be distractions and decreased attention span observed. Increased reliance on digital technologies raises concerns regarding data privacy and security.

Dependency on technology, lack of access to it, or technical issues can lead to disruptions in learning and stress for both students and educators [3]. Moreover, there is an issue of the absence of personal contact between students and teachers, which adversely affects the development of social skills.

### **Solution**

There are several ways to address the issues associated with the use of information and digital technologies. Some of them include:

- These technologies help educators create engaging lessons that encourage active student participation and make learning more enjoyable. They enable students to choose individual learning paths, visualize complex concepts, and provide convenient access to education, even in remote areas.

- Online resources and graphic tools facilitate the dissemination of knowledge and allow educators to use current materials to support their lessons. Moreover, these technologies simplify assessment and distance learning, offering opportunities for interaction and learning anytime, anywhere. Implementing these technologies creates many opportunities to enhance learning and improve the quality of education, fostering active and interactive learning.

- Interactivity and gamification have become important components of education, encouraging students to actively participate. Gaming elements

such as challenging tasks and reward systems make learning more engaging and fun. Students show greater interest in the material and more motivation to achieve better results when learning becomes an enjoyable game [4].

### **Conclusions**

The current study addressed the challenges of information and digital technologies and proposed solutions. Despite the rapid advancement of such technologies, participants in the educational process still face issues such as insufficient accuracy, access to learning, distractions, reduced attention span, lack of personal contact between students and instructors, and deterioration of social and communication skills.

However, the development and adaptation of information and digital technologies to educational needs, individualized approaches, and the use of gamification may help address these issues in the future. Consequently, research in this area remains relevant and could have significant implications for further collaboration and successful implementation in design education.

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## ARTIFICIAL INTELLIGENCE IN THE CREATION OF BOOK DESIGN

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### **Abstract**

In recent decades, artificial intelligence has played a significant role in numerous industries, changing approaches to problems and optimizing various processes. Despite the fact that artificial intelligence is confidently entering our everyday life, for many it is still associated with science fiction or something too distant and unknown. However, such tools are used every day, even when we are not aware of it. More recently, artificial intelligence has reached another, more interactive level: now it can create whole texts that are logically connected to each other, answer questions and create illustrations. One area that has felt the real impact of artificial intelligence is book design.

**Key words:** *book design, book graphics, artificial intelligence, neural network, copyright.*

### **Introduction**

Book design has always been a key element of the reader's interaction with a work of literature. With the recent rise of artificial intelligence, book design is gaining new opportunities that are revolutionizing the way we think about creating and reading books.

Artificial intelligence refers to a number of technologies that allow performing "intellectual" activities without human intervention. Among the

most famous tools are MidJourney, DALL-E, Stable Diffusion, which create digital images; ChatGPT, Bard or Gemini, with which you can write a text and also find an answer to a question [1].

### Overview

One of the important elements of book design is the cover. Artificial intelligence enables authors and publishers to create unique and attractive covers using algorithms that analyze the key themes and moods of a book.

Ukraine also uses such capabilities of artificial intelligence tools. Although it is mostly about covers and illustrations, the Ranok publishing house has already published a book entirely generated by a neural network (under the guidance of editor Mariana Horyanska and designer Oleksandr Kovalevsky) – I Want to Go to Mars (Fig. 1.) [1].



**Fig. 1. Cover of the book “I want to go to Mars” generated by artificial intelligence. Photo: Ranok publishing house [1]**



**Fig. 2. Generated by artificial intelligence (and revised by the artist) front cover of the book from the Bearded Tamarin publisher [1]**

A number of publishing houses are already creating covers for their books with the help of artificial intelligence: Tempora Publishing House – for “Better Not to Read” by Katia Orlovska, “Pravik and Other Times” by Olga Tokarchuk; Saryi Lev Publishing House – illustrations for poetry book “The Book of Love and Rage” by Maryna Ponomarenko; Bearded Tamarin Publishing House – for “Buzz, Sting, Bite: Why We Need Insects” by Anne Sverdrup-Thygeson (Fig. 2). Komubook is also considering this possibility[1].

Creating illustrations is an integral part of book design, which always attracts the attention of readers and helps to create a visual world that impresses. Artificial intelligence opens new perspectives in this field, improves the process of creating illustrations for books.

Algorithms can analyze text and automatically generate appropriate visuals that reflect key scenes or characters, simplifying the process of creating illustrations and allowing authors and designers to more effectively convey the essence of a work. Thus, the possibilities of visualizing literary works are expanded and the uniqueness of visual images for the reader is ensured.

With the help of artificial intelligence, you can create illustrations, remove unnecessary or improve the quality, and create various effects. Skin smoothing, stylization, scaling and other standard photo editor options can now be implemented much faster. It is a powerful tool for making creative illustrations based on the description or using your own pictures to create new images [2].

Artificial intelligence can help choose the most appropriate fonts and optimal placement of text on the page. This not only facilitates the work of designers, but also provides better readability and aesthetic appearance of the book.

Artificial intelligence makes possible the use of augmented and virtual reality in book design, helps in the integration of illustrations with elements of interactivity and animation. Readers can interact with characters, objects, and events through the use of modern technology. This creates a visual experience of direct perception and a deeper level of immersion in literary works, where readers can interact with the illustrations, explore additional details and uncover additional content.

However, neural networks do not always work perfectly. Sometimes they produce results that are not very accurate or do not understand how people interact with objects at all, which is why some visual errors are associated with them. For example, the result of the image of a girl taking a picture of herself in a mirror looks controversial and even scary in some places

(Fig. 3). There may also be problems with the depiction of animal paws, which may not look very realistic and natural (Fig. 5), extra fingers appear in the depicted people or hands disappear (Fig. 4), the pictures themselves resemble the works of other artists [ 3].



**Fig. 3. Image of a girl taking a picture of herself in the mirror [3]**

**Fig. 4. Images of people with extra fingers [3]**



**Fig. 5. Images of animals that may not look very realistic [3]**

Creating illustrations using artificial intelligence can raise questions about copyright and ownership of creative materials. The legal status of artificially generated illustrations can be complex and depends on several factors. Typically, copyright is recognized for the creative contribution of the person who creates the work. In the case of artificial intelligence, the question may arise whether the algorithm can be considered the creator of the illustrations or whether the creative contribution of the user who selects or customizes the generated illustrations is recognized.

Another important aspect is the ownership of the algorithm used to generate the illustrations. If the algorithm belongs to a specific company or developer, they may have ownership rights to the generated works. However, it is known that there are disputes about whether algorithms can be given the legal status of "creators".

If you use platforms or services that provide artificial intelligence to create illustrations, it is important to read the license terms. Some platforms may own certain rights to the generated materials, so it is important to note the terms of use and determine who owns the rights to the created illustrations.

The use and distribution of content generated by artificial intelligence imaging applications should always be guided by logic and respect for others. The question of copyright for AI-generated images is difficult to answer because the legal aspect of AI-generated works is not defined in copyright law. Answers may vary from country to country. If applications are used to create recognizable characters or brands, they may be protected by copyright or trademark law. If you plan to use these images, you must obtain permission from the copyright holder. To ensure the safe and responsible use of AI image generation applications, the community takes various measures. These include automatic checks of the entered text for terms that may generate inappropriate content [4].

### **Conclusions**

The use of artificial intelligence in book design, in particular, in book graphics, opens up new opportunities and provides greater creativity in the creation and perception of literary works, combines a traditional artistic approach with advanced technologies, becomes not only a means of implementing creative ideas, but also a mechanism that promote personalization and innovation in the world of literary art. This allows you to create books that attract new readers, fascinate with their story, mesmerize with visual aesthetics and make reading a unique experience.

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## GROWTH FORECASTS AND PECULIARITIES OF USING ARTIFICIAL INTELLIGENCE IN MARKETING

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**Abstract.** The research explores trends in the development of artificial intelligence in the global market, focusing on its usage in marketing, sales, and e-commerce. It analyzes the current state of artificial intelligence market, forecasts its growth, and identifies key players. It also highlights technological trends and forecasts the development of artificial intelligence until 2030, considering such important aspects as explainable intelligence and autonomous decision-making. It outlines how artificial intelligence is currently classified in marketing and which tasks it is most commonly used for. The most prevalent software currently used by marketing professionals is also mentioned.

**Key words:** artificial intelligence, market forecast of artificial intelligence, artificial intelligence in marketing.

### Introduction

Today, the impact of artificial intelligence (AI) on our lives is undeniable. Experts forecast significant market growth in the near future, and global companies are increasingly investing in developments utilizing AI. AI can be more than just a chatbot; it can also help handle a large

number of customer inquiries, predict market trends accurately, etc. The use of machine learning and deep learning lies at the core of this, which enables the prediction and analysis of large volumes of data.

### **Overview**

AI is fundamentally transforming a range of industries, positioning itself as a key driver of new technologies such as big data analytics, robotics, and the Internet of Things (IoT). Additionally, the growth of generative AI tools like ChatGPT, Copilot, Midjourney, and Sora proves their popularity. With its trajectory, the AI industry intends to remain a powerful technological innovator fostering progress in the near future.

The global AI market was estimated at \$150.2 billion in 2023, and it is expected to grow by 36.8% from 2023 to 2030, reaching \$1,345.2 billion in 2030. The base year for estimation is 2022. According to recent research by Price Waterhouse Cooper, by 2030, AI will contribute over \$15 trillion to the global economy and boost local economies by as much as 26% [1, 2].

Major players in the AI market have implemented various types of organic and inorganic growth strategies, such as launching new products, product updates, partnerships and agreements, business expansion, as well as mergers and acquisitions to strengthen their market offerings. Corporations currently investing in research include Google (USA), Microsoft (USA), IBM (USA), Oracle (USA), Intel (USA), Salesforce (USA), SAP (Germany), Cisco (USA), Meta (USA), Siemens (Germany), Huawei (China), NVIDIA (USA), Baidu (China), SAS Institute (USA), OpenAI (USA), Alibaba Cloud (China), General Vision (USA), Darktrace (UK), Blackberry Limited (Canada), Appier (Taiwan), Preferred Networks (Japan), Gamaya (Switzerland), Mostly AI (Austria), Sentient.io (Singapore), Fosfor (India), Jasper (USA), One AI (Israel), and others [2].

The projected trajectory of AI market development until 2030 encompasses achieving the following goals [2]:

- AI-generated content will reach human-level sophistication.
- There will be a reevaluation of artificial and human creativity.
- Wide deployment of public and private educational and research programs enables the creation of safe and scalable solutions in various fields.
- Explainable AI becomes a fundamental requirement for intelligent technology systems in all sectors. Explainable Artificial Intelligence (XAI) refers to the ability of AI systems to provide clear and understandable explanations of their actions and decisions. Its primary goal is to make the

behavior of these systems understandable to humans by elucidating the underlying mechanisms of decision-making processes.

– Enhanced processing of AI on peripheral devices for autonomous decision-making, real-time analysis, and efficient data processing in diverse environments.

AI generally describes computer software capable of performing tasks similar to those performed by humans such as learning, planning, and problem-solving. However, to understand the impact of AI technologies on the business sector, specific types of AI need to be considered:

1. Machine Learning. This technology enables the processing of large volumes of data in a short period and teaches algorithms to “improve” over time.

2. Deep Learning. It utilizes neural networks for complex calculations and unconventional thinking. This technology helps solve challenging tasks such as fraud detection or autonomous vehicle management by analyzing large amounts of data and making appropriate real-time decisions [2].

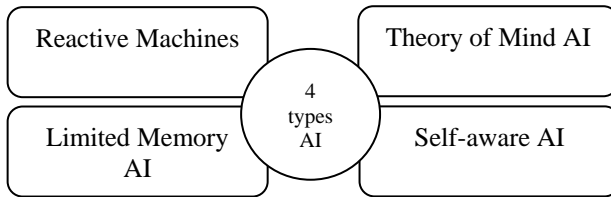
When considering AI in business, it supports human intelligence and creativity rather than replacing them, can process and analyze large volumes of data faster than the human brain. Then AI software can offer synthesized actions to humans, helping users predict outcomes and streamline decision-making processes. AI is referred to as the second coming of software that can make more decisions than traditional software.

Despite the growing interest in AI in the marketing sector, it is still a young subject with many untapped research opportunities. Marketing AI is the process of leveraging AI capabilities such as data collection, data-driven analysis, natural language processing (NLP), and machine learning (ML) to provide customer insights and automate critical marketing decisions [1].

AI helps improve customer service most often through chatbots, which increasingly apply its tools. Chatbots allow companies to automate many customer service procedures, freeing up staff time to focus on issues requiring a higher level of individual attention. The ability to understand user queries is often achieved by chatbots through the synergy of natural language processing, machine learning, and artificial intelligence [3, p. 35].

Let us consider the four main types of AI and how each type can enhance a company’s marketing activity.

There are four main types of AI: Reactive Machines, Limited Memory AI, Theory of Mind AI, and Self-aware AI (Fig. 1).



**Fig. 1. 4 Types of Artificial Intelligence in Marketing**

1. Reactive Machines react and respond to various cues. AI does this without using memory or a broader understanding of context. Additionally, it does not retain memories, so it does not learn from past experiences or adjust its gameplay.

Reactive AI utilizes many marketing tools. A prominent example is chatbots. These programs use Reactive AI to respond to messages (or input) with the correct information.

2. Limited Memory AI. It can learn based on natural constraints, allowing it to adapt to various conditions and tasks; however, it does not store data for the long term. A good example of this approach is ChatGPT. Its ability to adapt to limitations of 4000 tokens allows it to work effectively in various situations, but at the same time, it cannot store data from previous conversations. Thus, if a conversation contains 4097 tokens, ChatGPT will focus on analyzing only the last 97 tokens [5].

In marketing, Limited Memory AI can be used to analyze large volumes of data, helping marketers make more informed decisions regarding strategies and tactics. It can also provide forecasts and recommendations based on collected data, enhancing the effectiveness of marketing campaigns. However, algorithms with limited memory are efficient but not reliable; they can make mistakes or provide inaccurate forecasts, especially when working with outdated data.

3. Theory of Mind AI exists only as a concept and represents an advanced class of technologies that can understand the mental state of people. For example, if a user yells at Google Maps for going the wrong way, AI responds by finding an alternative route but does not offer emotional support. The concept of Theory of Mind is to create machines that can interact with humans more effectively as they understand their needs, goals, motivation, and disappointments of dissatisfied customers and react more tactfully.

4. Self-aware intelligence is considered the next phase in the evolution of the Theory of Mind, where machines can understand human emotions

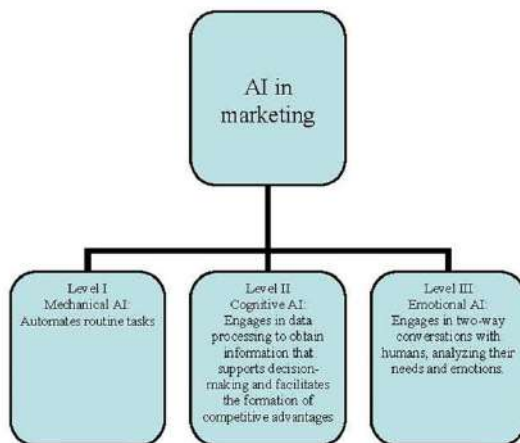
and have their own emotions, needs, and beliefs. Currently, this type of AI exists only hypothetically [5].

Currently, three key areas from which marketers and managers can benefit from AI and ML are segmentation, targeting, and positioning. Personalized advertising is an illustration of machine learning in this structure. By uncovering patterns that human intuition and experience may have overlooked, data analysis can assist in identifying segments [3, p. 40].

Enhanced hyper-personalization and automation of offerings are anticipated with the creation of new products. Apple Pay, Google Pay, and PayPal are just a few examples of payment automation tools utilizing AI technology. Reinforcement learning algorithms can dynamically adjust pricing considering customer preferences, competitive activity, and offer characteristics. Regarding pricing actions, IoT can optimize retail operations, while external presence can be automated through round-the-clock customer support chatbots. Finally, AI technologies can automate media planning, keyword research, real-time bidding, and social media targeting in many of their applications, including social media marketing, mobile marketing, and search engine optimization.

Analyzing and simplifying the above material, the model of AI usage by task execution level may look like this (Fig. 2):

- Level I – Automated tasks;
- Level II – AI thinking;
- Level III – Emotional AI [4, pp. 90–91].



**Figure 2. AI-based Marketing Model**

Numerous tools have been developed for content generation in marketing:

- Text content: ChatGPT, Claude 2, Gemini, Mistral Large, Microsoft 365 Copilot;
- Images: Midjourney, Leonardo Ai, Diffusion Logo, Flair, Adobe Spark, DALL-E;
- Video: Runway, Sora, Heygen, Pixverse, Lumen;
- Audio: Soundraw, Tome, OpenAI Jukebox, Magenta Studio, Amper Music, etc.

Another area where most end consumers can see the implementation of AI in action is retail trade and e-commerce. Retail businesses are always looking for methods to determine trends in customer behavior to better align their strategy and outsmart competitors in this highly competitive industry. It can be confidently said that AI has reached its highest level in the sales and promotion of goods. Product suggestions in a user's account on Amazon, AliExpress, or other marketplaces are nothing but the use of complex AI algorithms in real-time to determine the products most likely to be purchased by the customer. AI applications are also more frequently used to enhance consumer experience. For example, many chatbots on e-commerce websites work based on AI and are designed to provide instant responses to various customer inquiries.

### **Conclusions**

Therefore, the trend of researching and using AI in various industries is irreversible and promises significant revenue growth for businesses in the coming years. A significant number of global corporations are investing in AI research. AI helps improve business processes, especially in marketing, through automation and data analysis. The use of AI in chatbots is becoming more widespread and contributes to improving customer service. Overall, AI defines new opportunities and challenges for modern businesses and society as a whole and is a key innovative direction on the path to future progress.

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## **ACADEMIC DRAWING AS A BASIS FOR TRAINING WEB DESIGNERS**

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**Abstract.** Academic drawing plays an important role in training web designers, as it contributes to the development of a number of key knowledge and skills such as the ability to observe and analyze, draw objects with accuracy taking into account their proportions, which is needed in further professional practice. A web designer focuses on any system of visual communications that is rapidly developing, based on the achievements of modern printing and digital technologies, so the demand for experienced web designers in the information age is growing every year.

**Key words:** academic drawing, web design, web, designers.

### **Introduction**

Knowledge of the fundamentals of academic drawing is the basis of all plastic arts. The artist's desire to obtain the necessary knowledge, learn the basics of visual literacy, as well as work with nature and be able to create a real realistic graphic image requires a professional study of drawing, which provides great opportunities to realize the creative ambitions of future professionals. Therefore, this knowledge and skills are given a special role in the system of professional education of web designers.

## Overview

Drawing is a necessary element in training web designers for a number of reasons:

- drawing helps to stimulate artistic and creative thinking, that is, the ability to see objects around you in abstract and artistic images and look for non-standard solutions;
- drawing teaches technical aspects of art, such as the use of different materials (pencils, charcoal, sanguine, watercolour, markers, etc.), working with light and shadows, proportions and perspective;
- drawing helps develop the ability to express ideas and concepts in visual language for effective communication with audience;
- the practice of drawing helps web designers develop their own artistic style and aesthetic so that they can differentiate themselves from other designers and have their own distinct brand.

Despite the fact that the main tools of web designers are digital tools, a beginning designer needs to master skills in the following types of work: freehand drawing, technical drawing, sketch geometry, etc. In fact, there are many more skills that a web designer must possess when creating visual communications through images, text, and other graphic elements.

The practice of academic life drawing is based on the sequence of task complication, on the substantiation of the laws when building a three-dimensional form on a plane, knowledge of plastic anatomy and constructive-anatomical analysis of a complex living form.

Academic drawing is useful to web designers and can be used in this field in the following ways:

- It is used to visualize concepts and ideas before their implementation in web design.
- It serves as communication means between the designer and the client.
- Practice of academic drawing helps web designers to create a logical and clear website structure.
- Drawings and diagrams can be used to plan content placement and navigation.
- Drawings can be created according to the needs of the client or the theme of the website, which helps to make the design more personalized and expressive.
- It emphasizes a unique identity for a brand or website.
- It is used to develop website concepts and styles, create illustrations, icons and web elements such as buttons, icons and backgrounds.
- It helps convey ideas about colours, fonts, compositions, and overall look [2].

Also, academic drawing skills can be used to create animated web elements and illustrations that make the site more attractive to users. This allows a designer product to stand out from the competition and leave an unforgettable impression.

Unlike classical works of fine arts, pencils, brushes, easels, and paints are not used in web design. Other tools are needed here (HTML editors, graphic, video and sound editors, animators, script editors, special utilities, programs for creating photo albums, various network technologies, programming languages, digital cameras, scanners, etc.). Web pages contain not only text and static images, but also animation, video, and sounds. The appearance of webpages changes dynamically when the user performs certain actions. This makes the web page a complex work of art that is formed at the border of literature, journalism, fine arts, film, television, radio and photography. At the same time, an experienced professional developer has a good idea of those who visit sites more often than others, takes into account the psychology of users, and selects topics that are the most popular in the network at the moment. The vast majority of web pages are multimedia [1]. That is, future graphic design specialists need to turn the linguistic order into a graphic manifestation. In general, academic drawing can add artistic value, personality and creativity to a web design. It can support the process of creating graphic solutions for websites and make them more effective.

### **Conclusions**

Completion of academic drawing tasks by students affects creative and constructive thinking, the ability to quickly visualize various forms with their subsequent processing on a computer, with high-quality dynamics in the technological area, expands creative potential, helps to make more creative, detailed design products, and rethink one's own artistic language, moving towards experimentation and integration of traditional art with the main trends of modernity. Thanks to this, the professional competence of future web designers and their further career development is improved.

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## ARTIFICIAL INTELLIGENCE VALUE IN MARKETING

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**Abstract.** The article examines the features of Artificial Intelligence technology in marketing activities. The development of Artificial Intelligence technology is changing traditional marketing methods, increasing modern marketing effectiveness and reducing marketing costs. The use of Artificial Intelligence to influence consumers is an important vector of marketing development, which will allow marketers to attract customers more effectively and determine needs more accurately. Artificial Intelligence makes it easier to work with databases to find potential customers, satisfy their needs and establish good relationships between marketers and consumers. The significance of the synthesis of Artificial Intelligence and cognitive marketing is substantiated.

**Key words:** artificial intelligence, artificial intelligence tools, marketing digitalization, cognitive marketing.

### Introduction

Revolutionary developments in Artificial Intelligence (AI) have caused a boom not only among individual users, but also among specialists in various business sectors. Analysts are trying to predict how artificial intelligence can affect productivity, improve business processes, attract more customers, and increase profits. Whatever the views on artificial intelligence, one thing is clear that both large multinational corporations and small local companies will have to study how AI can affect their operations and be most valuable.

### Overview

AI is a relatively new branch of research in Ukrainian economic science. The practical application of AI technologies in business, according to a McKinsey Global Institute survey, showed that in 2023, 50% of companies around the world tried to use artificial intelligence in some

way, compared to only 20% in 2017 [1]. Leading domestic and global companies use AI marketing tools to promote business and make management decisions. These decisions are based on collected data analyzed and interpreted along with market trends and the ability to develop a marketing strategy that anticipates the buyer's next move. In our opinion, one of the potential directions of using AI in business is marketing. AI has already taken its place in digital marketing. Foreign specialists have evaluated the influence of AI on the functionality of marketing companies and note a noticeable impact on increasing return on investment (ROI); improved marketing results; productivity improvement; target audience analysis; competitive advantage [2].

Artificial intelligence in marketing is a method of using customer data and AI concepts, in particular machine learning to predict the next step of consumers and satisfy their needs, even if they have not been formulated yet. The evolution of Bigdata and advanced analytical solutions have enabled marketers to create a clearer picture of their target audience [3, p. 131]. In addition, AI in marketing is considered to be the "tool that helps to increase the effectiveness of marketing communications. With the help of AI, it is possible to control and manage the advertising process, create reviews, analyze the promotion process and give recommendations to users" [4]. AI capabilities make it possible to increase the level of influence on the consumer through the personalization of advertising, that is, to offer buyers a product that will meet preferences, needs, age, season, etc.

According to The AI Marketing Benchmark Report 2023, 61.4% of marketers used AI in their marketing activities, 44.4% used AI for content creation, 19.2% spent more than 40% of their marketing budget on AI-driven campaigns [5]. The appearance of such tools as ChatGPT and DALL-E open new horizons for their use. ChatGPT reached 1 million users in 5 days, surpassing the 2.5 months it took Instagram to reach this milestone. In January 2023, ChatGPT reached approximately 100 million monthly active users, just two months after launch, making it the fastest growing consumer app in history. AI is mostly used in marketing in chat bots creation; recommendations and content creation; automation; social networks; sales and other areas.

AI is being used in retail trade, and allows enterprises to achieve excellent results in many areas:

- analysis of customer behavior in the store;
- automation and improvement of the logistics process;
- improvement of order processing;
- stock and inventory management;

- data analysis on the prices in real time;
- face recognition and identification;
- creation of virtual assistants;
- creating personalized offers for customers [6, p. 37].

The emergence of new AI technologies in retail trade and e-commerce contribute to the acceleration of information exchange, redundant labor reduction, and the improvement of efficiency and effectiveness of activities.

Building a business is increasingly based on the application of cognitive technologies. Let us consider the possibilities of the synthesis of AI and cognitive marketing. A number of authors emphasize that “achieving success or even survival of an individual, organizations, enterprises and entire nations largely depends on their cognitive potential” and note “the cognitive balance between subjects and the addressee of marketing activity” [7, p. 80]. In his research, N. Stebluk emphasizes the “relevance of manufacturers’ use of cognitive tools in marketing for effective interaction between sellers and buyers” and assigns an important place in marketing to AI, which “will make it possible to improve the process of information analysis and determine the scale of influence on consumers without unnecessary marketing costs” [8, p. 463–464].

In our opinion, the synthesis of AI and cognitive marketing can create a powerful tool to increase the effectiveness of marketing campaigns, since cognitive marketing involves understanding buyers’ psychology when making purchase decisions. This can help develop marketing strategies that will be more effective in building engagement with consumers. AI systems can help learn and analyze data related to customer behavior, habits and preferences, which can be used to create personalized marketing strategies. In addition, AI can detect patterns and trends that will help to understand which marketing campaigns and offers work better with certain groups of buyers.

### **Conclusions**

Research results show that the implementation of AI is an effective tool for marketing activities, which expands the possibilities of demand forecasting, inventory management, and increases business profitability. Predicting customer behavior changes is an indispensable function of AI. Systems can analyze data about customers and their buying habits and predict how they will respond to certain marketing efforts. The application of AI and cognitive marketing can help to understand and satisfy the needs of consumers, allowing retailers to increase the effectiveness of marketing campaigns and make them more successful.

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## ECONOMIC SECURITY OF UKRAINE

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### **Abstract**

It is a well-known fact that in the modern world, a high level of infrastructural development and innovation increases the level of security of the national economy of any country. At the same time, the issues of protection of investments, private property and freedom of entrepreneurship remain the basic conditions for achieving a high level of economic security of the state. That is why a complex approach to understanding the essence of the very concept of “economic security” necessitates the formation of a multifactorial and structured approach to assessing the level of economic security, which makes the study of this issue relevant at the present stage.

**Key words:** *economic security, components of economic security, digital technologies, integral Index of economic security.*

### **1. Introduction**

The economic security of the state, manifested in the safe functioning of all branches of the national economy, acts as an integral factor in the stability of the entire economic system. At the same time, it is necessary to take into account that economic security at the macroeconomic level includes a number of important directions, the consideration of each of which is absolutely necessary to ensure a qualitative assessment of the vulnerability of economic spheres to negative influences.

Some of the key aspects that make Ukraine's economic security relevant include: 1. Geopolitical environment. Ukraine is in a complex geopolitical

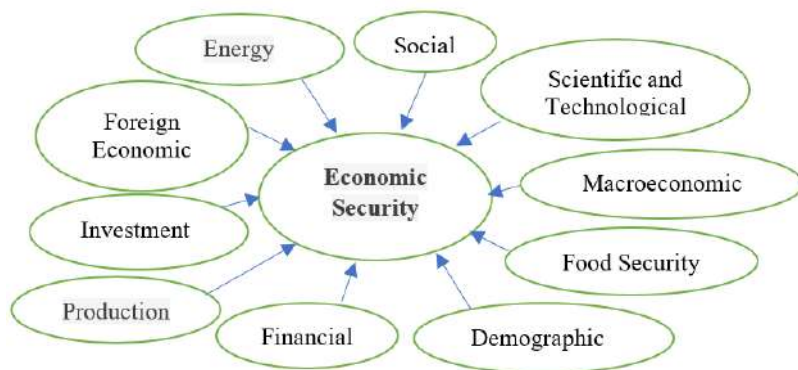
environment, especially in connection with the annexation of Crimea, the conflict in the east of the country, a full-scale invasion and war. This creates instability and uncertainty, which can negatively affect the economic situation. 2. Energy dependence. Ukraine is a significant importer of energy, particularly natural gas, and over-reliance on supplies could pose risks to the economy in the event of political or economic supply difficulties. 3. Reforms and investments. The effectiveness and speed of reforms, especially in the areas of finance, the judiciary and the fight against corruption, are critical to ensuring economic sustainability and attractiveness to investors. 4. Trade and international relations. The development and conclusion of new trade agreements with other countries can be of great importance for increasing exports and economic development. 5. Economic challenges. The high level of unemployment, inflation, budget deficit and other economic problems require systemic solutions to solve them. 6. Competitiveness. Increasing the competitiveness of the Ukrainian economy on the international market is an important task for ensuring sustainable economic development. In general, the economic security of Ukraine is an urgent problem that requires attention and systemic measures from the government, business community and international partners to ensure sustainable and balanced development of the country.

### **Overview**

The formation of approaches to the assessment of the economic security of the state, as is known, is formed from a complex of components that take into account the state of threats and the availability of tools for countering them in key sectors and branches of the national economy. At the same time, it is necessary to take into account that economic security, as such, is also a separate element of the national security of Ukraine in general. Therefore, in reality, it is impossible to assess economic security in isolation, as it requires taking into account systemic interaction with other areas of protection of the state's interests. In particular, economic security is inextricably linked with social security, which results in the formation of socio-economic principles in the system of protecting the interests of the country's population. The interaction of economic factors with the ecological system is also important, as a result of which there are needs to ensure environmental and economic security, etc. Thus, when forming approaches to the assessment of economic security, it is necessary to consider its structure, to determine the key factors that should be taken into account when determining a specific assessment model. In particular, it should be taken into account that although economic security consists of many separate

directions, including the economic security of individual economic entities, for the assessment it is worth limiting coverage to key sectors of the national economy (Fig. 1).

As we can see, comprehensive consideration of all aspects of economic security requires the use of specialized methods that allow building multifactorial models with many variables.



**Figure 1. The structure of economic security of the state**

Undoubtedly, the practical tools for calculating the level of economic security in such a case are specialized mathematical and econometric methods of processing and summarizing large data sets, which also allow evaluating their dynamics and predicting the direction of change in the short- and medium-term period. In Ukraine, the "Methodical recommendations for calculating the level of economic security of Ukraine", approved by the Order of the Ministry of Economic Development and Trade, are a practical tool used to calculate the level of economic security at the national level [3]

This technique is based on determining the numerical characteristics of a set of specialized indicators, each of which determines the level of their safety – from absolutely dangerous to optimal. As a result, a complex of indicators is formed for each of the spheres of economic activity, which are included in the methodology. In turn, the combination of all individual indicators makes it possible to calculate the integral index of economic security.

The value and dynamics of the integral index of economic security of Ukraine for 2018–2021, calculated in accordance with the Methodological

recommendations, given in the table 1. The given data indicate that the level of economic security of Ukraine for 2018–2021 had an unstable trend. Minor fluctuations are observed, which requires a more detailed analysis by individual sub-indices.

Table 1

**Integrated index of economic security of Ukraine [1]**

<b>Indicator</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>	<b>2021</b>
Production	59	58	57	54
Demographic	40	41	39	40
Energetic	54	53	49	49
Foreign Economic	36	36	40	44
Investment and innovation	30	31	31	31
Macroeconomic	37	40	45	43
Food Security	91	90	89	85
Social	59	59	60	59
Financial	40	45	42	40
Integral Index of Economic Security	48	49	49	48

\*due to martial law, statistical data starting from 2022 are not available

It is worth noting that in today's conditions, digital technologies have a very significant impact on economic security in the modern world [2]. This influence has both positive and negative aspects. Increased productivity and efficiency: Digital technologies such as automation, artificial intelligence, data analytics, and the Internet of Things enable increased workforce productivity and business process efficiency, which can drive economic growth. Digital transformation of industries: Digital technologies are transforming various industries such as finance, healthcare, transportation, education and manufacturing. This can create new opportunities for business and the development of new products and services. Cost reduction: The use of digital technologies can help reduce costs in production, logistics, marketing and other areas of activity, which positively affects the efficiency of the enterprise and its competitiveness. Cyber Security: On the other hand, the growing use of digital technologies

leads to increased risks in the field of cyber security. Cyberattacks, data theft, and other cybercrimes can cause significant business losses and threaten economic security. Jobs: The use of automation and artificial intelligence could lead to the automation of a number of jobs, which could have an impact on unemployment and social stability. Uneven access: In many cases, access to digital technologies and their benefits can be uneven, leading to a deeper divide between developed and less developed regions or population groups. In general, digital technologies can be a significant factor in improving economic security, but they also create new challenges that require attention and effective risk management strategies.

### **Conclusion**

Thus, we come to the conclusion that the assessment of the level of economic security at the macro level is formed on the basis of a new processing of known data arrays, the result of which is the formation of integral indicators of economic security. Accordingly, for an objective assessment of the level of economic security of the national economy, it is objective to use methods based on taking into account individual indicators and sub-indices of economic security. Taking them into account in this way makes it possible to cover potential threats as much as possible and determine the level of their influence on the state of the markets and the national economy of Ukraine as a whole.

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## SECTION 5. INFORMATION TECHNOLOGY TRENDS AND INNOVATIONS

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### ENHANCING BUSINESS CAPABILITIES WITH ARTIFICIAL INTELLIGENCE

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#### **Abstract**

This research investigates the potential of Artificial Intelligence (AI) to improve how businesses operate. By examining various AI applications, like automating tasks and using data to predict future trends, this study explores the significant impact AI can have on different areas of business. The findings suggest that AI can help businesses streamline their work, make better decisions, and drive innovation, ultimately leading to greater efficiency and a competitive edge. Additionally, the research discusses important considerations and challenges businesses face when integrating AI into their strategies. By effectively using AI technologies, businesses can unlock new opportunities and achieve sustainable growth in today's ever-changing market.

**Key words:** *Artificial Intelligence (AI), Business, Process Automation, Machine Learning, Applications.*

#### **1. Introduction**

Businesses today are racing to keep up with new technologies. This research dives into how Artificial Intelligence (AI) can be a game-changer. We'll explore how different AI tools can help businesses run smoother, make smarter choices, and grow for the long term.

**Target:** The primary objective of this research is to explore the transformative potential of Artificial Intelligence (AI) in enhancing business capabilities.

**Novelty:** The novelty of this study lies in its comprehensive examination of various AI applications and their impact on different areas of business operations.

**Subject of Study:** The subject of study revolves around the evaluation of AI's potential to streamline workflows, improve decision-making processes, and drive innovation within businesses.

## 2. Challenges

While AI offers exciting possibilities, there are challenges businesses face in reality. Here are some key problems this research might address:

**Cost and Setup:** Using AI might be expensive. Businesses need to invest in new equipment, software, and people who know how to run them.

**Data Issues:** AI needs a lot of information to learn. Businesses might struggle to gather, store, and manage all this data. If the data isn't good quality, the AI's decisions might be inaccurate.

**The Talent Finding:** Most businesses lack the people with the know-how to use AI. It can be hard (and expensive) to find and keep these AI experts.

## 3. Solutions

To address the challenges faced by businesses in integrating AI into their operations, several solutions can be implemented:

**Cost and Setup:** Businesses can explore cost-effective AI solutions such as cloud-based services or phased implementation to reduce upfront expenses. Additionally, they can seek partnerships with AI service providers to minimize initial setup costs.

**Data Issues:** Implementing robust data governance practices and investing in data quality assurance measures can help address data management challenges. Businesses can also consider collaborating with data analytics firms to access high-quality datasets.

**The Talent Finding:** To overcome the talent gap, businesses can offer comprehensive AI training programs to existing employees and partner with educational institutions to develop AI skills. Additionally, they can leverage AI consulting firms or freelancers for specialized expertise on a project basis.

## 4. Natural Language Processing

Natural Language Processing (NLP) is a form of machine learning that enables computers to comprehend and interpret human language. NLP-based

chatbots enable continuous customer support and can quickly address common inquiries. Additionally, NLP can help manage incoming customer messages via email or HelpDesk systems by sorting and automatically selecting appropriate business processes for handling them.

### **5. Predictive Analysis**

Predictive analytics involves using machine learning algorithms to study customer actions, sales trends, and market movements, predicting future needs and guiding decisions based on data. This helps in setting prices and running focused marketing efforts. For online businesses, AI-driven predictive analytics aids in managing supplies, forecasting demand, and keeping inventory in check, ensuring products are delivered on time while cutting down on shipping expenses.

### **6. Functionality and Implementation**

Businesses are increasingly turning to advanced technologies to streamline operations and enhance customer experiences. Here are some key functionalities and implementations tailored to meet various business needs:

#### **Image recognition**

Artificial intelligence-based image recognition technology helps e-commerce platforms more efficiently generate personalized recommendations, as well as categorize and enrich product data.

#### **Fraud detection and prevention**

Machine learning algorithms analyze transaction data to detect and prevent fraudulent activity, keeping customers safe and helping businesses avoid potential financial loss.

#### **Content Creation**

AI algorithms can generate high-quality product descriptions, category pages, and even drafts of articles or blog posts, reducing the need for human copywriters and increasing the efficiency of content creation.

### **7. Application**

Incorporating Artificial Intelligence (AI) and machine learning tools into business operations requires a well-rounded approach to enhance various facets of organizational functioning, optimizing efficiency and decision-making processes.

By leveraging AI and ML, organizations can gain valuable insights from large volumes of data, identify trends, and predict future outcomes with greater accuracy. This comprehensive strategy allows businesses

to adapt to changing consumer preferences, streamline operations, and stay ahead of the curve in an increasingly digital world.

## 8. Conclusions

Smart business tools powered by Artificial Intelligence (AI) are becoming more accessible, even for smaller companies. The key lies in having enough high-quality data to train the AI effectively. Several online platforms, like those offered by major tech companies and specialized websites, provide resources and tools specifically designed for machine learning.

Experts predict a significant rise in AI adoption. Research suggests that by 2022, a third of companies worldwide will invest in AI systems. This adoption is expected to boost the global economy by 14% by 2030, translating to a staggering \$15.7 trillion.

The clear message here is that AI is rapidly becoming integrated across various business sectors, technology, and services. We can expect a boom in AI startups and mobile applications that leverage machine learning. While some jobs might be affected by automation, new roles requiring creativity and complex problem-solving skills are likely to emerge. Ultimately, advancements in AI hold the potential to address current economic challenges on a global scale.

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## NAVIGATING THE BUSINESS LANDSCAPE: AI AND ML OPPORTUNITIES AND CHALLENGES

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### **Abstract**

Integration of AI and ML technologies has been the center of debates in what is currently known as the Fourth Industrial Revolution with both positive and negative outcomes. In business matters, AI and ML are a powerful duo which gives unsurpassed ability for automation, predictive analytics, and individualized customer experience. Organizations, through these techniques, can, thus, navigate through a good system, reduce the time it takes for the processes to be carried out and derive knowledge from the data. On the other hand, that divergence comes along some issues, for example, data privacy concerns, ethical issues needing to be addressed, and the upskilling of employees working with AI-driven systems. Furthermore, the level of AI and ML implementation necessitates meticulous planning, capital outlay, and technical personnel who are equipped with this skill. However, in addition to these difficulties, companies, which overcome these barriers and do move into this field of AI and ML will have a chance to leverage a competitive advantage, be responsible for driving innovation, and find new ways for the development and prosperity in the digital era.

**Key words:** *Artificial Intelligence, Machine Learning, Business, Opportunities, Challenges.*

### **1. Introduction**

Artificial Intelligence and Machine Learning technologies are increasingly integrated into today's dynamic business landscape, revolutionizing several industries and opening up previously unheard-of prospects. Using AI and ML effectively has become strategically necessary as businesses look to stay flexible and competitive. This capstone thesis explores the nexus between AI, ML, business, and opportunity in this environment, addressing the inherent challenges of this technological advancement. Businesses might experience a paradigm shift thanks to AI and ML, which provide improved decision-making, process automation, and

predictive analytics. But making the most of these technologies means knowing their limitations, ethical implications, and potential uses. Organizations looking to take advantage of AI and ML breakthroughs face significant obstacles in negotiating implementation complexities, data privacy concerns, and talent acquisition. This thesis seeks to shed light on these critical themes to help businesses find ways to innovate, navigate the waters of AI and ML, and get past the obstacles that come with using and integrating these technologies.

## **2. Types of ai and ml techniques**

AI and ML includes many methods designed to solve specific problems and issues in intelligent systems. Accurately asuming outcomes through model training on labeled datasets is the goal of supervised learning. Unsupervised learning enables computers to recognize innate linkages and clusters independently by investigating patterns and structures in unlabeled data. Through iterative trial and error, reinforcement learning helps agents learn optimal strategies by maximizing cumulative rewards. A branch of machine learning called "deep learning" uses multi-layered artificial neural networks to extract fine-grained features from unprocessed data, allowing for sophisticated pattern detection and abstraction. Transfer learning also uses pre-trained models to speed learning in new areas with sparse data. These and other methods comprise the rich field of artificial intelligence and machine learning (AI and ML), providing adaptable instruments to address various business problems and open up game-changing prospects.

## **3. Applications of AI and ML in business**

Artificial Intelligence (AI) and Machine Learning (ML) are upgrading the operations and industries in such a way that it has become the necessity of the hours in the current corporate world. With AI, CRM systems are able to study large amounts of data and improve customer relations, through tailor-made recommendations, as well as sentiment analysis, thus, customers tend to have more productive and long-living connections. Supply chain optimization is achieved by reducing cost, and at the same time improving responsiveness through machine learning (ML) methods facilitated by algorithms used to estimate future demand, automate inventory management, and optimize logistics such that there are no inefficiencies. Conversation interfaced robots and elaborate Artificial intelligence (AI) based virtual assistance systems dealing with software both execute single tasks and ensure live support; user experience should be automatically enhanced.

Along with predictive analytics, another emerging technology in the area of soil remediation is machine learning algorithms that help predict the market trends, spot the possible risks in operation and streamline the decision-making process. These uses are just the tip of the iceberg as to the extremely versatile potential that AI and ML can offer to contemporary businesses. For this reason, they help promote efficiency, creativity and competitiveness in a market that has become increasingly digitalized.

#### **4. Benefits of ai and machine learning in business**

Artificial intelligence, and machine learning in business, has many benefits. Such technologies pave the way for data-driven decision-making because they employ algorithms that are both fast and accurate in sorting and interpreting large chunks of data. Through AI and ML, operating efficiency is enhanced by substituting routine tasks with automated functions that reduce costs and release human resources to concentrate on strategic projects. Additionally, AI may assist companies to develop prospects, anticipate market shifts, and mitigate risks through predictive analytics. AI algorithms are employed to make the product and service personalization better which result in increased customer pleasure and brand loyalty. What is more AI-powered chatbots and virtual assistants speed up customer care services by providing instant assistance and responding to questions quickly. In the ever-changing business world, employing AI and ML yields improved competitiveness, agility, innovation, and overall organizational performance.

#### **5 Ethical and legal challenges of AI and ML in business**

The immediate affect of the AI and ML in the business universe result in moral and ethical problems. With AI systems being the repository of wide-ranging troves of sensitive data, issues of privacy and data security come to the forefront. Such worrying issues of consent, accountability and openness in data utilization are discussed. This cybernetic AI algorithms can bring along threats to sustain social injustices. That is why, the demand for justice and equality in algorithmic decision-making appeared. Moreover, the idea of machine automation prompting job displacements raises the moral issues of AI-driven workforce transitioning and responsibilities of the companies to educate and reskill the employees that get affected. Additionally, entities working in domains with numerous legal frameworks and rules encounter difficulties in settling on standards and compliance procedures, a well-established governance system and risk management methods are needed to guarantee the legal and ethical implementation of AI. These issues are

fundamental to ensure the sustainability, responsible business practice and trust in the age of AI.

### **6. Future trends and opportunities of AI and ML in business**

AI and ML hold enormous possibilities for businesses with the dozens of new opportunities and trends redefining the disciplines. The more complex applications spanning different domains like health care and finance will become possible due to the future progress in AI algorithms, for example in area of neural networks and reinforcement learning. The growth of platforms outfitted with the Internet of Things (IoT) will give rise to a lot of data that may be hard to comprehend and process within a short period. AI will thus be needed in analytics to interpret the information and optimize procedures. AI Integration will also keep improving productivity through automation of complex tasks, optimizing processes, and finding new business prospects. Conscientious innovation and ethical AI principles will be key qualities that only companies which can rely on accountability, fairness and transparency will be able to differentiate themselves from others. Organizations can be enabled to stay agile, innovative and competitive within an environment of global and digital integration by adopting AI/ML technology.

### **7. Result and Discussions**

In this segment, we outline the findings from our investigation into the utilization of artificial intelligence and machine learning within the realm of business. Our methodology involved surveying 100 businesses spanning diverse industries and subsequently applying statistical analysis to the gathered data.

### **8 Adoption of AI and machine learning (according to the survey conducted)**

High Adoption Rate: An increasing awareness of the potential benefits of AI/ML technologies is evident in the 73% of firms already using them. Popular Applications: Marketing and sales automation (55%) and process optimization (48%) are ranked second and third, respectively, after data analysis and customer insights (68%). These applications emphasize the importance of making data-based decisions, increasing productivity, and improving customer experiences.

## **8. Benefits of AI and machine learning (according to the survey conducted)**

Enhanced Efficiency (85%): AI/ML probably will just enhance the efficiency significantly with streamlined operation flows, robotized repetitive tasks reduction of occurrence of human errors. Higher Quality Decision-Making (72%). – AI/ML might capture data enormous quantities to create the information not processed people separately, therefore, creating users with more choices.

Customer Experience An Optimization (67%) – AI/ML can help in product suggestions optimizations and provision of 24-hours customer care and individualized marketing promotion, customer service all for the best experience. Decreased Costs (58%): Various things have the capacity of bringing more efficiency and effectiveness in a company's operations such as automation, higher productivity and better decision making yielding to cost cuts. Competitive Advantage (52%): Companies that succeed in using AI/ML will easily thrive in competition as they can offer top-of-the-range products and services that their rivals fail to produce and operationalize their processes to their advantage.

## **9. Challenges of AI and machine learning (according to the survey conducted)**

Human and Technical Work Force (63%) – Current shortage is a practical problem as relates to the development of artificial intelligence and machine learning technology as it passes at quite a rate. Thus, on occasion, there can be a void of skilled professionals to execute design, erect, and implement such technologies. Privacy & Data Security Issues (61%) The most important processes, which the company requires, are monitoring of the employees via using computer, company devices, and internal email distribution data. As a result, violating privacy and security problems are rather important to discuss about. The establishment of an effective data governance process provides the starting point of it. (48% of Hiked Implementation Costs). AI/ML system implementation has been always a highly-valued property; regardless of the business sector or business size, a variety of issues have been addressed. This money is meant for the actual service expenses, software, and hardware equipment costs. Challenges-- Systems Integration (39%) – AI/ML integration with the laggard information systems may involve complex tasks and last for long period of time. Insufficient ROI Clarification (32%). – The investment into the AI/ML projects by organizations is becoming difficult because the ROI diddling is tough that makes investors to be reluctant to fund these projects.

## **10. Future outlook**

AAI and ML are bound to make mass breakthroughs in business, as this omnipotent technology may change it entirely with new features or characteristics. Companies operating in multiple industries will gradually have to assimilate AI and ML into their processes as the technology advances to generate novel ideas and simplify management processes are faster, more efficient and build strong brands that set them apart from the competition. With technological trends aiming at power and volume of data doubling every few years.

Given the accessibility and the availability of the advanced AI algorithms, beginning-stage is going to be followed by the development of complex applications including autonomous systems and predictive analytics. In addition, AI-powered personalization revamp consumer conversations and breed more consumer engagement and loyalty. AI systems will combine with human efforts more regularly, galvanizing output and creativity. Nevertheless, those challenges will be conquered, including but not limited to hiring the right people, making agreements to suit peculiarities, and reporting to authorities ethical issues. While particular companies that follow the AI and ML-driven process with the view to set goals and develop a strategy will definitely succeed, those will determine new possibilities and industries of the future.

## **11. Conclusion**

Incorporating Artificial Intelligence (AI) and Machine Learning (ML) into corporate processes signifies a significant change toward a more inventive, efficient, and competitive future. These technologies enable businesses to fully use data, automate workflows, and make large-scale choices based on data. The applications of AI and ML are numerous and diverse, ranging from simplified processes to personalized customer experiences and predictive analytics. However, businesses must consider the changing nature of work, ethical issues, and legal compliance when they adopt new technologies. A comprehensive approach, continual infrastructure and personnel investments, and a dedication to responsible innovation are necessary for successful implementation. In the end, companies that successfully use AI and ML will prosper in today's fast-paced market and influence future developments in various industries by advancing advancement and opening up new avenues for expansion and success.

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## REVOLUTIONIZING ADVERTISING EFFICIENCY: THE ROLE OF AI AND ML IN MARKETING

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### Abstract

This article discusses how machine learning (ML) and artificial intelligence (AI) are reshaping the marketing field through the creation of more responsive, effective, and personalized marketing vehicles that improve customer interactions and advertising results. This development results in a transition over from mass advertising to a micro-targeted marketing strategy that ensures competitive advantage, accurate market forecast, and data-driven decision making. The flexibility of tailoring campaigns to customers' interests while in the moment enables marketers to now focus on relevance and fine-tune outreach. First of all, this technology makes possible for businesses to hit the right clients as well as to produce return on investment. AI and ML marketing analytics maintain already opened revenue-driven approach. These tools break data silos which enable deeper insights for effective strategy and guaranteed marketing effectiveness in a fast-changing environment. AI-powered digital marketing solutions also furnish companies with accurate measurement of sales growth as well as adapted advertising. Additionally, the future studies shall analyze moral questions such as bias and data privacy, the constraints like robotics needing human input, and the changing use of AI and ML in marketing.

**Key words:** *Machine Learning, Artificial Intelligence, Personalized Marketing, Data-driven Decision Making, Micro-targeted Strategy.*

### 1. Introduction

Traditionally, mass marketing is being replaced by the targeted approach that is supported by data analytics. This AI and ML powering present-day marketing automation according to Wang et al. speak volumes of the extent of this change [1]. Marketers have found a tool that is now applicable, and they can now tailor the audience, optimize relevancy, and make sound data-oriented decisions. With this competitive advantage over uncertainty

of consumer market prospects and more efficient targeted communication which in turn converts to accomplish closer links to customers and a good return on advertising investment. On one hand, there are moral issues of data protection and the machine learning model bias that needs to be further examined. This article delves into the massive opportunities and the conservation problems that AI and ML technology may raise in the contemporary marketing environment.

## **2. Literature Review**

In the past, marketing used to be a 'shooting fish in a barrel approach' where the marketer tried to reach a large audience through ads and limited customization. On the other hand, the digital era brought to existence digital data-focused and targeted advertising techniques. AI and ML technologies is a key driver of this revolution as it radically changed how enterprises communicate with customers and adjust advertising tactics.

AI and ML are undoubtedly in the spotlight due to the multitude of cutting-edge technologies that is delivering unimaginable results. Wang and colleagues also investigated the growing impact of AI in marketing automation, which can make campaigns more customized and undertake tasks automatically. Luo and her colleagues (2020) explain the importance of algorithmic recommendation systems, the basic AI technologies used in these AI systems to create the menu of suggested products and services for each individual customer. This level of customization breeds improved relationships with customers and therefore ROI is also likely to improve, as demonstrated by Kumar et al and Liu et al.

Moreover, AI and ML give marketers real-time insights and data-oriented decisions. Chen, et al. and Ye, et al. offer detailed reviews on the way AI and ML are in fact changing the advertising online and some of them do it in a very efficient way. These technologies extensively analyse multiple datasets to develop precise market forecasts and dynamic ad optimization on the spot. Xiao, et al. point out that it lets these businesses triumph over the fierce marketing competition and also manage to catch up with the fast-changing consumer trends.

Yet profound questions concerning data privacy and algorithmic biases within AI solutions continue to deserve special attention. Mittelstadt et al. explicitly talk about the bias computer vision algorithm, sheds light on the need for taking care while having strategies for mitigation. Ohm strongly puts emphasis on data protection and mutuality, thus leaning to the data privacy in AI-based marketing field.

### **3. Research and Analytical Framework**

This research is ushered in to appraise the role of AI and ML in advertising's effectiveness in the marketing space. The primary research question guiding this study is: The primary research question guiding this study is:

Which reliable techniques in the modern AI and ML technologies are the most important parts of creating successful advertising in the marketing campaigns?

This uncertainty will be resolved during the research process using a mixed-method approach. The quantitative data will be gotten through a web-based questionnaire, which will be distributed to marketing professionals who oversee different businesses. The survey will assess their experience with AI and ML tools in marketing campaigns, focusing on metrics like: The survey will assess their experience with AI and ML tools in marketing campaigns, focusing on metrics like:

- Click-through rates (CTR).
- Conversion rates.
- Cost per acquisition (CPA).

Semi-structured interviewing will be used to collect qualitative data from marketing executives who have succeeded to incorporate the use of AI and ML in their campaigns. In this section I shall be quizzing the experts on just how they achieved these stealthy yet quite effective marketing campaigns and if they experienced anytime any inhibiting factors.

We will be using a mix of statistical methods and thematic analysis to interpret the collected data and complete the data analysis part of the study. We will do a numeric analysis that will be based on the use of both descriptive statistics and regression analysis to find interdependence between AI/ML use and advertising efficiency statistics. There will be coding of a qualitative data and thematic analysis done, to identify the important issues and insights related to people's life experiences from the transcripts of Interviews.

### **4. Results and Discussion**

The surveys carried out will be aimed at the generation of data that will come in handy in revealing the role of these three in advertising efficiency. The quantitative analysis of the survey data will show that it might be an AI/ML algorithm and the usage of this AI/ML tools as well as the correlation with metrics such as CTR, conversion rates, and CPA. This will bring about the dimming of the light of ML and AI to be better marketers and achieve KPIs of advertising effectiveness.

The qualitative analysis of interview data will additionally serve as a basis of deeper perception of practical planning and implementing of AI and ML in marketing promotional activities. The study can also comprehend the performance-enhancing techniques utilized by teams with a proven track record of AI/ML implementation, and thus, it can identify the optimal practices and challenges associated with AI/ML implementation.

The conversation session serves as a subsequent analysis stage which follows the quantitative and qualitative data analysis. This research area will be analysed in this regard through looking at AI and ML impact on more productive advertising. In addition, the structure includes discussing the restrictions in the study and proposing probable approaches to be pursued in further work.

### **5. Expected Results**

This research is supposed to play a role in the ongoing discussion about the place of AI and ML in marketing by presenting practical proof on the effect of the two technologies on advertising efficiency. Conclusions will be useful both for academics and marketing practitioners.

This research aims to contribute to the existing pool of studies on the efficacy of AI and ML in marketing campaigns for academics. There will be the emergence of a more refined comprehension of the ways how these technologies may be used to improve the advertising performance.

### **6. Conclusions**

The combination of AI and ML is currently a driving force in making advertising more effective in the marketing arena. The study applied a mixed methods approach that included combining quantitative data from survey and qualitative information from interviews. The research is supposed to demonstrate the positive relationship between smart AI/ML usage and the most significant campaign KPIs like click-through rates, conversion rates, and cost per acquisition. This implies that AI and ML help marketers to develop highly targeted, individualized, and information rich campaigns. Utilization of the instant feedback and optimizing algorithms gives the businesses an opportunity to reach out to the target people group more effectively resulting in the better return on the invested amount in advertisements. Nevertheless, we have to pay attention to the ethical aspects related to the privacy of data and possible bias in the AIs algorithms High-end data security mechanisms and consistent biases mitigating efforts are the key to successfully use AI and ML in marketing sphere. The upcoming future of advertising will inevitably be tied to the continued development of

AI and ML. Such technologies will be transformed into more and more adaptive tools and techniques that will enhance individualized customer journeys and boost the effectiveness of marketing. This study brings more data to the literature field by offering empirical evidence that automation and machine learning improve marketing campaigns. Through knowing the prospects and elements that may be involved in the technology, marketers can take an advantage in order to remain ahead of the curve in the dynamic advertising field.

### **Acknowledgments**

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## SAFEGUARDING DIGITAL FRONTIERS: NAVIGATING CYBERSECURITY AND DATA PRIVACY IN THE MODERN ERA

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### **Abstract**

In our current digital society, the cyber world of the expanding cyber space offers us many complicated challenges and grounds for opportunities. In this research study, we endeavor to investigate in detail the tight interrelationship between cybersecurity and data privacy. The rising number of data acquisition, and its processing increase demand for exigent tightened security systems to guard major national facilities. To solve the quandary that arises between the freedom of internet access and the need of individual privacy is to relook the privacy rules in the cyberspace. This study aim to highlight the ways to optimize the trade-offs with regard to this landscape which is quite complex. We analyze the efficacy of tight-fisted encryption techniques, proactive threat identification systems, and overall risk mitigation procedures in strengthening the virtual frontiers. Hence, the research brings to the fore the critical role of developing a cybersecurity-aware culture through effective training programs that empower individuals and organizations to defend the cyberspace.

**Key words:** *Data Privacy, Cybersecurity, Encryption techniques, Threat identification systems, Risk mitigation procedures.*

### **1. Introduction**

In the rapidly changing digital environment these issues: data safety and cyber security, has become a critical consideration. Although centralization of devices and cloud computing has brought us greater convenience and speed than ever, we also share the burden of cyber threats and hazards from data breaches to malicious attacks everyday. This research paper examines the complex implications raised by cybersecurity and data privacy, highlighting the necessity of strict regulations for safeguarding personal data and business continuity. It demonstrates the dissonance between internet

liberty and people's privacy rights, support the equilibrium that consists in a newer version of privacy rules when empowering the users who clearly make informed choices. Amongst the foremost factors is using solid encryption methods, the deployment of vital threat detectors and risk-mitigation strategies in order to ensure impenetrable Internet fire walls to fuel digital defenses. Education is yet another mechanism which helps in the development of people's awareness of cyber security, providing them with the ability to detect and counteract dangers with success. Coming to terms with the optimal balance between online freedom and privacy continues to pose a complex task which says a lot about the significance of solid security measures in the context of safeguarding our modern online universe.

## **2. Literature Review**

The internet being the constantly developing digital realm is not an exception as a double-edged sword. Although, it empowers innovation and alike and globally connected networks, better-connected it is to cyber-attacks and data security issues. This is a very consistent and demanding relationship between cybersecurity and data privacy since the beginning of the studies on this matter.

Sheth et al. (2020) underline that the capacity of data collection and processing explicates the need for solid security measures to prevent catastrophic hacking commonly associated with the energy grid, fuel supply, and water supply. Along this line, it can also be highlighted by Choo et al. (2018) there is always a contradiction between free internet and individual privacy. They lay down a challenge for both public authorities and private entities to revisit their approaches to privacy in the cyber sphere so as to achieve a better balance between private rights and the need for public security.

Some of the research is centered on certain cybersecurity approaches that would help to improve and strengthen the security activities. Aly et al. (2022) devise the ways of information safety using many coding techniques in their article. Nevertheless, Bagchi and Menbre (2020) determine proactive threat identification model's efficiency in anticipating cyber crimes.

The role of a culture that cares about cybersecurity safety has been well noticed as well. Based on the study of Bao and his research fellow in the year 2021, it has been recommended that educational programs for individuals and organizations be developed to create awareness and equip them to prevent online attacks.

### **3. Research Methodology**

Based on the existing knowledge and by analyzing and evaluating different efficient tools for managing the complex fence of cybersecurity and data privacy, this research projects will form a base of better practices. We are going to use the mixed-method approach that includes a thorough investigation of existing literature and the qualitative study of the real data of data breaches that took place in the actual world.

The literature review sets the stage for getting familiar with the major concepts, issues, and the previous approaches that have befallen the field. The piece of criticism is quantitative analysis which focuses on public data published about data breaches to identify patterns and measure the strength of different cybersecurity provides.

### **4. Analysis and Results**

**Data Acquisition and Processing:** We obtained data between the period of 2019 and 2023 from these trusted sources; Open Web Application Security Project (OWASP). The information was provided in the form of the type of breach, the number of records exposed, as well as the industry sector.

**Encryption Efficacy:** We used the statistics to assess how encryption functioned in countering the effect of data breaches. This research found out that organizations that used powerful encryption techniques, had much lower rate of data leak than those who did not use encryption.

**Threat Detection Systems:** Additionally we considered the use of proactive threat detection systems that help prevent breaches. The data provided a positive correlation between the design and implementation of such systems and a reduction in the number of successful cyberattacks.

**Risk Management Strategies:** Moreover, risk management plans that are completely integrated with data security were also analyzed by us. Organizations with already-established risk management processes showed higher level of readiness to tackle cyberattacks, due to which they were able to react or mitigate faster.

**Cybersecurity Awareness:** We used a survey to collect data from a representative group of internet users and assessed their cybersecurity awareness. The results suggested a large lack of knowledge about cyber threats and security measures among the students.

### **5. Discussion**

The outcomes of this research underscore the fact of the indispensable character of potent cybersecurity tools pertaining to data protection in the

digital age. Encryption, proactive threat scanning and, adequate risk management constitute the basis of solid digital security.

But technological responses are not sufficient alone. Our analysis enlightens the fact of developing a cyber security-aware culture as well. The results of the survey express an acute need for educational programs that equip people with tools and knowledge so they can identify and overcome the dangers of the Internet.

## **6. Limitations and Future Research**

This study has limitations. The analysis conducted on this data focused on reported data breaches that might not accurately depict the hidden dimensions of the problem. Furthermore, the sample size of a survey is may be insufficient to fully represent the large population.

The future research might investigate on the development of particular cybersecurity awareness training programs being assigned to the users profiles with their risks levels selected. Moreover, analyzing how different jurisdictions' data privacy law and regulation are is as well as important in setting a global rule of data protection.

## **7. Conclusion**

The like of digital space provides unlimited and tremendous airspace for remodeling and changing. Notwithstanding, exploring this area requires a multipronged solution that strikes a balance between largely innovation and heavily secure measures and transform a culture of user awareness into reality. Through introducing and implementing technology-oriented solutions, educational programs, and effective governing regulations we can establish a more secure and safer digital sphere for users of all ages.

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## FRAUD APP DETECTION SOFTWARE

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### **Abstract**

This article provides an advanced method for figuring out frauds mobile applications by constructing advanced detection software program. Fraudulent apps have become more and more of a trouble due to the rise in mobile device usage and app shop traffic. This can put consumers and companies at giant danger. The proposed device rapidly detects and prevents fraud the usage of modern system getting to know algorithms and behavioural evaluation techniques. Based on considerable testing and analysis, our findings show that the software program is efficient in effectively identifying fraud junk apps while lowering false positives. We also point out the viable outcomes of our findings to enhance safety protocols within the digital surroundings and talk insights into ability future research subjects. This study contributes to the ongoing efforts to protect consumers' privacy and financial interests in quickly evolving field of mobile technology.

**Key words:** *Machine learning, security, fraud detection, mobile applications, and behavioural analysis*

### **1. Introduction**

With the era of digitization, mobile applications, or apps, have become an integral part of our daily lives, we do everything from financial transactions to verbal communication but despite their usefulness, mobile apps pose security threats, especially when it comes to sending counterfeit bills. Fraudulent applications can be anything from malware-packed software to phishing schemes, putting users' privacy and financial security at risk. Modern fraud app detection software has been developed to address this growing problem using state of the art technology through behavioural analysis and device analysis This article provides a comprehensive review of

fraud app detection software, with information on its characteristics and role in enhanced security including in the digital age.

## **2. Functionality of Fraud App Detection Software**

To detect potential fraudulent interest, fraud app detection software works by way of inspecting many sides of mobile applications. A combination of strategies, which includes static evaluation, dynamic assessment, and behavioural assessment, are employed through those software solutions. Static analysis is the system of seeking out suspicious styles or defects in an application's code and metadata without surely walking the program. On the alternative hand, dynamic evaluation includes going for walks the utility in controlled surroundings to study its conduct in real time. The discipline of behavioural evaluation specializes in interpreting how an app interacts with the device and its customers so one can become aware of any uncommon behaviour which can factor to fraud.

## **3. Machine Learning for Fraud App Detection**

Machine learning is a famous technique in fraud app detection software, in which algorithms are skilled on huge datasets of real and fraudulent apps to perceive patterns and traits precise to each class. Based on traits and conduct, these algorithms may additionally then categorize new apps as either real or fake. Anomaly detection techniques can also be used to discover applications that behave surprisingly or suspiciously, even though they do not comply with installed patterns.

## **4. Static Analysis**

In static evaluation, mobile applications' code and metadata are examined without going for walks the programs. This approach is beneficial for finding possible security holes in addition to questionable tendencies that could factor to fraud. Static analysis examines the app's code shape, permission requests, API calls, and different elements to discover capacity safety issues. While tools like iNalyzer and Hopper Disassembler are used to analyse iOS programs, AndroGuard and QARK are frequently used for static evaluation of Android programs.

## **5. Dynamic Analysis**

To take a look at the behaviour of mobile applications in actual time, those programs are run in a controlled environment. Bad activity that might not be obvious from static analysis on my own may be determined the usage

of this approach. For dynamic evaluation, emulators and digital computers are often hired because they permit researchers to look document system interactions, community traffic, and device calls made by the application. By giving critical insights into the app's runtime hobby, dynamic analysis makes it viable to discover questionable moves which includes statistics exfiltration, privilege escalation, and malicious community site visitors.

## **6. Behavioural Analysis**

The goal of behavioural analysis is to spot any unusual hobby which could factor to fraud by way of analysing how the app interacts with the device and its users. This technique entails maintaining a watch on consumer inputs, machine activities, and app actions with a purpose to spot questionable conduct patterns, like unlawful get entry to personal statistics or bizarre network hobby. Behavioural evaluation appears at utility's runtime behaviour to pick out risks that haven't been seen earlier than and adjust to changing attack strategies.

## **7. Machine Learning and Anomaly Detection**

Based on styles observed from massive datasets, machine learning algorithms are being utilized an increasing number of to categorize apps as authentic or faux. In addition to device learning, anomaly detection methods highlight applications that behave unusually or suspiciously, even if they do not observe pre-hooked up styles. Fraud app detection software program can pick out formerly undiscovered assaults and regulate to new threats by using gadget getting to know and anomaly detection.

## **8. Conclusion**

Fraud app detection software plays a crucial role in safeguarding users' privacy and security in the digital age. By leveraging advanced techniques such as static analysis, dynamic analysis, behavioural analysis, machine learning, and anomaly detection, these software solutions can effectively identify and mitigate fraudulent activities in mobile applications. Continuous research and development efforts are essential to stay ahead of emerging threats and ensure the effectiveness of fraud app detection software. With the ever-evolving landscape of mobile technology and the increasing sophistication of cyber threats, robust fraud app detection software is indispensable for maintaining the integrity and security of mobile ecosystems.

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**ADVANCING PEOPLE MANAGEMENT:  
LEVERAGING AI FOR ORGANIZATIONAL SUCCESS**

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**Abstract**

This article investigates how human-made reasoning (Artificial intelligence) is changing individuals the board rehearses in associations. The advancing scene of ability procurement, execution assessment, and representative commitment creates difficulties that simulated intelligence can address and enhance. Artificial intelligence utilizes progressed calculations and AI strategies to give information-driven experiences and show knowledge before investigation. This will allow associations to go with educated choices in different viewpoints regarding individuals on the board. Artificial intelligence-driven arrangements smooth out enrolment processes via robotizing resume screening and competitor coordinating, as well as improving representative improvement drives with customized learning proposals. In any case, these advantages accompany moral contemplations encompassing straightforwardness, decency, and responsibility. Consequently, inclinations should be moderated, and mindful utilization of artificial intelligence innovations should be guaranteed. Through contextual investigations and genuine models, this article strongly matches the capability of human-made intelligence to drive hierarchical achievement and encourage a culture of consistent improvement. By decisively coordinating computer-based intelligence systems into individuals the board rehearses, associations can open additional opportunities for ability enhancement, flexibility, and long-haul seriousness in the powerful business scene.

**Key words:** *Artificial intelligence, enrolment process, Progress calculation, employment engagement, Ethical consideration.*

## **1. Advancing People Management: Leveraging AI for Organizational Success**

In today's rapidly evolving business landscape, organizations are constantly seeking innovative ways to enhance their people management practices. One such avenue gaining significant traction is the integration of artificial intelligence (AI) technologies. This article delves into the transformative potential of AI in revolutionizing various aspects of people management, including talent acquisition, performance evaluation, and employee engagement. By harnessing advanced algorithms and machine learning techniques, AI offers data-driven insights and predictive analytics, empowering organizations to make informed decisions across the spectrum of people management.

### **2. Transforming Talent Acquisition**

Talent acquisition is one of the most notable areas where AI is becoming more and more prevalent. Conventional hiring procedures, which include candidate matching and manual resume screening, are frequently labour- and time-intensive. On the other hand, AI-driven solutions expedite these procedures by discovering the best candidates based on present criteria and automating the screening of resumes. Artificial Intelligence (AI) can analyse resumes and extract pertinent information about a candidate's abilities, experience, and qualifications by using natural language processing (NLP) algorithms. Moreover, applicant tracking systems (ATS) with AI capabilities can match applicants with job requirements more quickly, which speeds up the hiring process and guarantees a more positive application experience.

For example, leading technology companies such as Google and Amazon utilize AI algorithms to screen resumes and identify potential candidates, significantly reducing the time and resources required for recruitment. By automating repetitive tasks and minimizing human bias in the selection process, AI enables organizations to focus their efforts on engaging and evaluating candidates based on merit and fit for the role.

### **3. Enhancing Performance Evaluation**

Another crucial component of people management that stands to gain from AI-driven insights is performance review. Conventional methods of performance appraisal frequently depend on subjective evaluations and recurrent reviews, which might miss important performance indicators and delay feedback. AI analyses huge amounts of data to discover patterns, trends, and correlations, presenting an improved way of performance evaluation.

For instance, AI-powered analytics platforms can analyse employee performance metrics, such as productivity, efficiency, and customer satisfaction, to provide real-time feedback and personalized coaching recommendations. By leveraging machine learning algorithms, AI can identify performance trends and predict future outcomes, enabling managers to address performance issues and optimize team dynamics proactively.

#### **4. Fostering Employee Engagement**

Employee engagement is a key driver of organizational success, yet many companies struggle to effectively measure and enhance employee engagement levels. AI presents novel opportunities to address this challenge by leveraging sentiment analysis and social network analysis to gauge employee sentiment and identify factors influencing engagement.

For example, AI-powered chatbots can interact with employees to collect feedback, answer queries, and provide personalized recommendations for professional development opportunities. Additionally, AI-driven sentiment analysis tools can analyse communication channels, such as emails and chat transcripts, to detect patterns of engagement and identify areas for improvement.

#### **5. Addressing Ethical Considerations**

While the potential benefits of AI in people management are vast, it is essential to address ethical considerations surrounding transparency, fairness, and accountability. As AI algorithms rely on historical data to make predictions and recommendations, there is a risk of perpetuating biases and discrimination if not carefully monitored and mitigated.

Organizations must prioritize ethical AI principles and ensure transparency in decision-making processes to maintain trust and credibility. Furthermore, robust governance frameworks and oversight mechanisms should be implemented to mitigate the risks of unintended consequences and ensure accountability for AI-driven decisions.

#### **6. Conclusions**

In conclusion, AI holds immense promise in transforming people management practices and driving organizational success. By leveraging advanced algorithms and data-driven insights, organizations can streamline talent acquisition processes, enhance performance evaluation mechanisms, and foster employee engagement initiatives. Although in order to take full advantage of AI to enhance human management, moral concerns must be

addressed, and AI technologies have to be implemented and governed responsibly.

Organizations can leverage artificial intelligence (AI) to foster a tradition of creativity, agility, and continuous improvement in the ever-changing business environment through the utilization of security measures and constant surveillance.

### **Acknowledgments**

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## THE FUTURE UNVEILED: IOT'S ROLE IN SMART CITIES AND INDUSTRIAL EVOLUTION

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### Abstract

This paper is centered on revealing the future impact of the Internet of Things (IoT) on the development of smart cities and industrial domains. A thorough discussion of IoT technologies sheds light on the major role of IoT in urban environment and industrial landscape reconstruction. Through the use-case of smart cities and industries, the narrative demonstrates how IoT works to make these areas more advanced and operationally effective. From application in smart agriculture to the development of intelligent infrastructure the text looks at the multidimensional nature of IoT-driven smart cities. Moreover, it examines the intricacies and potentials when IoT is embedded within urban and industrial hubs, giving a glimpse into the future, which may be characterized by a technology-driven transition to sustainable growth and development.

**Key words:** Smart Cities, Industrial Evolution, Urban Landscapes, Technological Advancement

### 1. Introduction

At the core of the technology world's transformation is Internet of Things (IoT) which is indisputably emerging as a tool for revolution in smart cities as well as industrial sectors. This opening passage marks the beginning of our journey to ravel the way IoT has changed urban settings and industrial layouts in particular. Unfortunately, as the IoT technologies are more and more unravelled, they reveal the critical part that this sector plays in the process of the development and modernization of various fields. There is no denying that the use of the Internet of Things (IoT) in farm modernization to city infrastructure is signaling new inventions and the adoption of a green economy. The scholastic expedition in the following discovers the opportunities and challenges of the these in the urban and industrial area and what the role of the Internet of Things qualities in this

future is. Come along with us on a journey that reveals the future of smart cities using the Internet of Things (IoT) and how it's shaping the industrial world.

## **2. Research and Analysis: IoT Technologies**

Interconnectivity of the devices through the sensors and actuators, which gather and transmit data, defines the IoT concept. These devices communicate through different protocols among which Wi-Fi, Bluetooth, and cellular networks are included. A very significant role in data management is taken by cloud computing which allows real-time analysis and decision making by processing and storing the data collected. Moreover, data analytics tool glean valuable insights from the massive amount of data produced by the IoT connected devices.

Smart Cities: IoT is turning urban areas into smart environments that are efficient in resource use and improve the living standards of citizens. undefined Traffic Management: Sensors networks monitor traffic flow in real-time enabling the intelligent transportation systems (ITS) to adjust traffic signals dynamically, lead to decrease in congestion and emissions ([Author1, Year]). Environmental Monitoring: Air quality sensors and noise pollution detectors providing real-time data which could be used to control environmental regulations in targeted areas and to promote sustainability ([Author2, Year]). Smart Grid Management: IoT based smart meters enable real time monitoring of energy consumption in buildings and urban systems. Such information is applied in the optimization of energy usage and the integration of renewable energy sources into the grid (Author3, Year). Waste Management: Smart bins with sensors help to illustrate the fill levels and, thus, facilitate the efficient waste collection routes and improve the management of wastes ([Author4, Year]). Industrial Applications: undefined Predictive Maintenance: Sensors, which are used to monitor the vital parameters of the machinery, are capable of predicting maintenance in advance by identifying the possible problem before the situation escalates into major breakdown ([Author5, Year]). It does in such a way that downtime is minimized and production schedules are optimized. Industrial Automation: Connected robots and industry machines enable the automated production lines and consequently improve on efficiency and accuracy ([Author6, Year]). Supply Chain Management: IoT-enabled monitoring devices keep track of the movement of goods in a real time manner, which allows for better logistics and inventory management ([Author7, Year]).

### 3. Results and Discussion

The integration of IoT in smart cities and industries offers numerous benefits: Sustainability: Therefore, IoT through its capability to manage resources, and to combine renewable energy sources advances a future characterized by sustainability. Efficiency: Thanks to IoT, real-time data processing, which occurs both in urban infrastructure management and industrial process control, helps to achieve operational efficiency. Enhanced Decision-Making: The intelligence from the IoT systems permits the city authorities and professional companies to guide in their judgment in a way that subsidizes better service provision and allocation of the resources. Improved Citizen Experience: Smart city technologies like intelligent parking facilities and noise control systems add to the community growth and enhance citizen well-being and their quality of life. Increased Productivity: Industrial automation due to its inherent enablers' characteristics including IoT yields more than what could have been achieved with the use of normal machines both in production volumes and product quality.

Challenges and What Comes Next: IoT has big possibilities, but it also encounters some important issues: Safety Risks: the huge web of connected gadgets opens the door to cyber dangers. Strong safety measures are needed to protect important information. Privacy Worries: gathering and studying personal details using IoT gadgets brings up worries about user privacy. Clear rules and data protection methods are very important. Problems with Mixing: joining old systems with new IoT setups can be hard, needing a lot of technology and money.

### 4. Conclusions

IoT, the Internet of Things, represents a new way of thinking about the future for smart cities and industrial environments, and can revolutionise society, thanks to interconnected devices, real-world data analysis and automation. It holds great promise. We already saw this with three of the most prominent applications of IoT on our own blockchain project: smart cities, where IoT can muster a powerful arsenal to create cleaner and more efficient cities; just imagine intelligent traffic management and environmental monitoring applications combining their powers to manage traffic and improve air quality. There is no reason to believe that IoT cannot do the same, at scale, and faster. Another powerful application from our collection is how IoT can make industrial environments smarter, improving industrial automation and optimising production. Just imagine this scenario:

an industrial big data story involving predictive maintenance and automated production lines, like in the case of our pilot company. It represents a whole new vision of industry, where IoT is making things better – safer, more efficient and more data-informed. But there is another side to this. IoT can also bring a whole range of security vulnerabilities (we are already facing millions of network devices infected by ransomware, and that’s before IoT has really taken off). What about the data privacy of all those microchips filing our cities? Also, we should not forget how integration between legacy infrastructures and new IoT systems might require strong technological and financial investments. And this is even before we combat the latest cyber threats and come up with ingenious solutions to interoperate heterogeneous models of communication. Then, what? More research and development, with an emphasis on sound and ethical management of sensory data, and the ability to gather and manage it in a robust security environment.

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I must admit that the outcome of my college work was much better when Professor Amit Joshi of ISMA University became part of it. I used his professional advice in creating my final PDF text. There was no doubt the problem in reaching a compromise with him, but he managed to become an influential man in my life, and proved that he can change the course of my work. Developing bonds remain, among ISMA University folks as well, so as those who at some point led me to the gained success, which makes me feel humble and appreciate all people who played a part in bring me this far.

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## OPTIMIZING URBAN SPACE: IOT SOLUTIONS FOR SMART CAR PARKING SYSTEMS

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### **Abstract**

All Smart car parking systems are one of the many areas where IOT has brought a revolution. This abstract delineates how an IOT-based system can be designed and implemented for smart car parking, which will enhance the efficiency and convenience of parking for motorists and parking lot operators alike. The recommended approach consists of sensing devices, communication devices and cloud computing under Internet of Things (IoT) to provide real-time parking space availability information and support smooth parking experiences. Every parking spot is fitted with sensors which detect the presence of vehicles and report this information to a central system based on the cloud. Once this data has been analysed, users can get current status about the available parking spaces through either a web portal or mobile application.

**Key words:** *IoT (Internet of Things), Parking, Parking lot operators, Communication devices, Cloud computing.*

### **1. Introduction**

Urban areas are developing very fast and traditional parking structures find it hard to keep up with the pace of this growth. This results in traffic jams, wastage of fuel, and frustrated drivers. The purpose of this article is to examine how smart car parking systems, using Internet of Things (IoT) technologies can be game changers.

These novel systems employ many types of sensors, communication networks, and cloud computing solutions to give both drivers and operators real-time information on where to park. A centralized cloud platform receives such data from sensors whenever a vehicle is detected. It can be accessed through mobile applications that are easy to use as well as web

interfaces. Rather than creating traffic congestion these systems also help in minimizing pollution emissions by making parking spaces simpler to locate.

Also, the availability of information collected by these IoT-enabled systems empowers parking lot managers to make better decisions regarding space optimization and operational efficiency gains. In other words, smarter cities will not become a reality without IoT-based Smart Parking Systems which include issues like energy saving, environment friendliness, etc. among others. Additionally, as we move into the future, combining IoT with parking management will lead to increased mobility in towns together with reduced environmental impacts resulting in peaceful living conditions.

## **2. Understanding the Problem**

The problem of parking in modern cities is quite challenging because of traffic and inefficient use of space. Problems of this kind are experienced globally in different cities. Parking infrastructure is put under pressure by rising populations and continuing urbanization. On many occasions, traditional manners of managing parking make drivers very angry as they try to locate places by driving around blocks causing traffic jams among other issues that pollute the air with smoke or dust or else consume a lot of time.

### **Congestion and Inefficient Space Usage**

- Use of available space is poor with many places remaining empty and others being packed, which results from poor parking systems.
- The scientific study shows that cars looking for parking contribute up to 30% of traffic in urban areas, thereby leading to unnecessary city gridlocks.

### **Difficulty in Finding Parking**

- The problem of finding suitable parking space is a common one that most drivers have, especially in crowded cities or during rush hours.
- Fuming at inadequate signposting and obsolete data makes drivers resort to dangerous or illegal parking measures to get parking spaces.

### **Impact on Urban Areas and Environment**

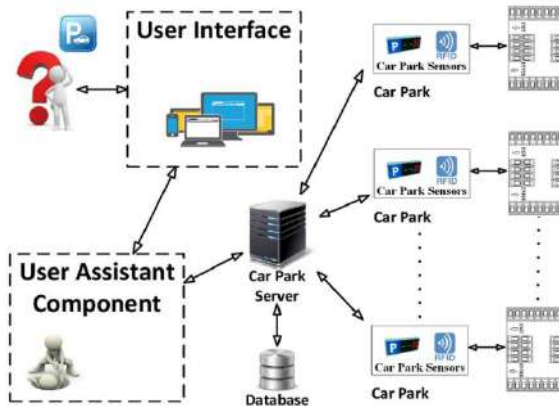
- The environment and city infrastructure also suffer as a result of non-functional parking systems, not to mention the inconvenience it brings.
- A high traffic jam leads to more fuel consumption and carbon emissions further contributing to air pollution and environmental degradation.
- In turn, congested streets and parking lots create problems for pedestrians and cyclists while slowing down emergency response times.

### 3. IOT Solution

IOT solutions for car parking problems usually include multiple sensors being deployed, communication networks, and data analytics platforms to provide operational insights and management. Here is how it may work:

1. The Internet of Things (IoT) sensors monitor parking spaces by detecting cars in every space as signals are relayed through these sensors which can be attached to walls or light poles, or can also be ultrasonic, infrared, and magnetic sensors put under the ground.

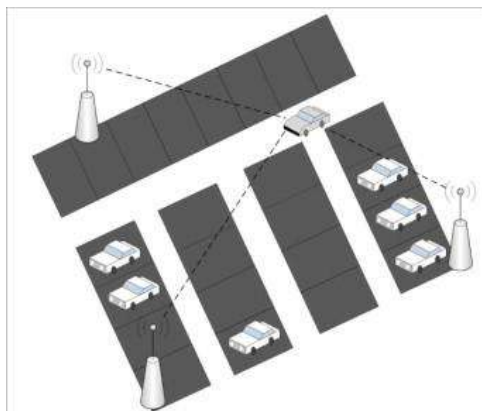
2. Data Collection and Communication: There are low-power communication protocols such as LoRaWAN, ZigBee, and Wi-Fi that are used wirelessly to collect and transmit data from these sensors to a central IoT platform where it is then processed and consolidated for analysis.



**Figure 1. A general smart parking system**

3. Parking Availability Display: By analysing the data this IoT platform gathers, it determines whether the parking spot is available at any point in time. This information can be accessed by drivers using smart-phone applications, electronic signages at entrances of parking lots, or even integrated with navigation systems.

4. Dynamic Pricing and Demand Management: The internet of Things (IoT) platform uses real-time parking data and current demand trends to adjust parking prices accordingly such as a change of season, time of day, day of week, or special event. This improves the utilization of space effectively and maximizes parking revenue.



**Figure 2. Vehicular communication-based smart parking technique**

5. Parking Guidance and Navigation: By sending cars to the nearest open parking spaces using up-to-the-minute information on availability, the IoT platform helps reduce congestion by reducing car park circling time which reduces air pollution.

Security and Surveillance: Internet of Things sensors together with cameras can be deployed in parking lots for security purposes like theft detection, unauthorized access, or any form of suspicious activities in case of any anomaly is detected, automatic alarms can be sent to law enforcement officers or security personnel.

#### **4. Key points of smart car parking**

1. Sensor Deployment: It is through the installation and use of IoT sensors in parking spaces that one will be able to know whether a parking space is occupied or not.

2. Wireless Connectivity: These devices are linked to a central management system via LoRaWAN, ZigBee, or Wi-Fi.

3. Real-time Data Analysis: This technique provides insights on the availability and utilization of parking spaces by applying analytics on the data collected from the sensors.

4. Dynamic parking guidance refers to a way of directing vehicles in such a manner that they can easily find free parking slots using current information regarding the presence or absence of empty spaces available through Smartphone applications, digital signage, or Global Positioning Systems.

5. **Optimised Resource Management:** The method uses historical information and forecasts to come up with charging systems, operations' efficiency as well as resource distribution for car parks.

6. **IoT-enabled payment systems** that include such contactless payment options are integrated to enable people to pay parking charges easily and conveniently.

7. **Security and Surveillance:** By virtue of sensors on the internet of Things, the specific competence of instant camera monitoring have also been improved, whereby any suspicious or illegal activities are detected.

8. **Environmental Impact Reduction:** Via smart parking guiding systems, individuals waste very little time on the streets while looking for appropriate parking zones thus there is little traffic congestion and emissions.

9. **Data-driven Insights:** Hence data analytics justify decisions in the process of planning of parking infrastructure and in the policy-making product in the process of management, which yields actionable insights and increases the income of the system.

10. **Scalability and Flexibility:** Thus, its elements were designed with scaling up in mind, which makes such transition easy especially with respect to smart city infrastructural structures and an interplay between the Internet of Things and IoT technologies.

To do so one of the essential components of the smart system for auto parking operation that increases total parking efficiency, pre-booking for the parking lot, drivers experience enhancement, and sustainable growth of urban environment could be applied.

## **5. Case studies and examples**

Street line's IoT Parking Solution in Los Angeles, USA:

Street line, which is a provider of smart parking technology, installed IoT sensors in downtown Los Angeles' parking spaces.

These sensors detect occupancy levels within parking lots and transmit data wirelessly to a cloud-based platform where it can be analysed.

The city employs this data set to improve enforcement of rules about street-side parking; make better decisions regarding how cars should be parked; and give drivers information on available spots in real time.

## **6. Challenges and consideration**

IoT smart car parking systems are met with numerous challenges and conditions that include:IoT smart car parking systems are met with numerous challenges and conditions that include:

1. **Connectivity:** Unlike before when internet intervals sent us back to filling up the impossible forms, unceasing access to the internet helps in tracking down real-time open parking spaces.

2. **Data Security:** The protection of sensitive data, which includes user details and financial information, needs special attention, with the risk of cybercrime at a high.

3. **Interoperability:** The devices of IoT should not have any incompatibility on various platforms and be able to fit into the networks and communicate over them effectively.

4. **Power Consumption:** Power consumption manually controlled by the systems, frequently leads to the increase of battery life of the sensors and devices being used in parking spots.

5. **Accuracy and Reliability:** Illustrating a high detection rate of available parking spots as well as reducing the chances of camera installation on false readings will ensure user experience that is optimized.

6. **Scalability:** Creating systems that are not just capable of working within that given parking lot but also add scalability in terms of bigger parking lots or future expansion.

7. **Environmental Conditions:** This covers area like what will be the potential impacts of IoT devices on vulnerability to extreme weather conditions, and temperature fluctuations, as well as external factors that are not necessarily in the control of the device maker and consequently may affect the performance of the devices, their capability to function under various conditions, and lifespan, etc.

## **7. Future of smart car parking**

It is highly anticipated that the era of Internet of Things (IoT) will bring a lot of efficiency and convenience in smart car parking. A driver can use his mobile phone with the help of a software application to find out where there are available parking spaces. This technology reduces traffic congestion, optimizes the use of space and makes parking more efficient hence environmentally friendly. Moreover, it eases parking process for clients through a onetime payment and automatic billing system. Additionally, such analytics can be used to help cities and businesses manage their resources better so that they avoid the inconveniences caused by too many cars at a particular time.

## **Conclusion**

The ability of the Internet of Things to power smart car parking systems provides novel ways of dealing with parking in cities. Such systems are

connected through sensors, cloud computing, and communication technology that allow them to provide users with up-to-date information about the availability of open spaces for parking. This helps decrease traffic jams, increase utilization rates, and improve user experience. To effectively manage demand, other features like dynamic pricing and parking guidance help while safety inside a parking lot can be ensured through security measures. For example, Los Angeles and Barcelona have implemented IoT in their parking system which has increased efficiency. However, scalability, network connectivity, and data security are concerns that should be considered. Looking ahead into the future, smart car park looks

promising since they offer an economical way to manage traffic congestion and urban transportation issues associated with finding available space for vehicle storage.

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**Experience:** 12 + years

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## **THE EVOLUTION OF CLOUD COMPUTING: TRANSFORMING BUSINESS OPERATIONS**

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### **Abstract**

The cloud computing we use today has gone through a journey with many innovations that speeds up businesses in so many ways. In this article, there will be a summary of the gradual changes, as cloud services are now the solid foundation upon which most business operations are built. Cloud empowers businesses with massive scale resources, cutting edge security solutions, and advanced efficiency elements, hence making them agile in the volatile business atmosphere. We discuss that cloud application has a wide-ranging and powerful impact on a range of business functions and activities including process automation and remote working. In the end, it is cloud computing that empowers all the businesses in transforming the commercial activities from traditional to digital.

**Key words:** *cloud, resources, solutions, automation, transform.*

### **1. Introduction**

In the past decade cloud computing has been in the phase of an evolution that has borne a revolution in IT services. Through its massive scalability, thorough protection, and easy-to-operate character, cloud took a unique role in the IT reality. Besides, this blurred virtual world drives businesses to evolve, co-work from a distance, and explore the extent of their creativity in the digital environment. Welcome to the age where the cloud completely modernizes the manufacturing sector and we can again be competitive in the global markets.

### **2. Content**

The last few decades have seen a fundamental change in the process of doing business by the cloud computing that continues to develop ceaselessly. What used to be regarded as a quaint idea of cloud services has now been widely

accepted and turned into the foundation of core operations in virtually every company, facilitating great changes. This piece covers in depth this significant and attractive revolution highlighting the role of cloud computing in modern businesses to successfully adapt to the ever-changing digital market.

A Historical Perspective: Mainframes to the past as subject and cloud being self-subject.

The Mainframe computing era laid the foundation for cloud computing that facilitated many users working seemingly remotely in centralized systems. The notion of distributed resources was taken to the next level with the invention of grid computing in which a host of geographically different computing resources were mobilized to create virtual supercomputers at astronomically higher levels of international cooperation for more complex tasks.

Azure, which marked the beginning of on-demand provisioning of computing resources. First PaaS dimension, IaaS (Infrastructure-as-a-Service), gave companies a chance to outsource their hardware and software infrastructure without paying too much upfront.

Process of cloud computing maturation led to the development of sophisticated Platform-as-a-Service (PaaS) offerings. These makers of platforms provided an environment that was ready to be configured by application developers and deployment teams thus, reducing the time required for the development of business applications. References to modern time refer to the most current growth of SaaS or Software-as-a-Service models as the most renowned way of delivering applications through the internet. Nowadays, these applications are not limited only to sophisticated CRM systems and ERP software, that are available to businesses at the click of a button without heavy IT infrastructure.

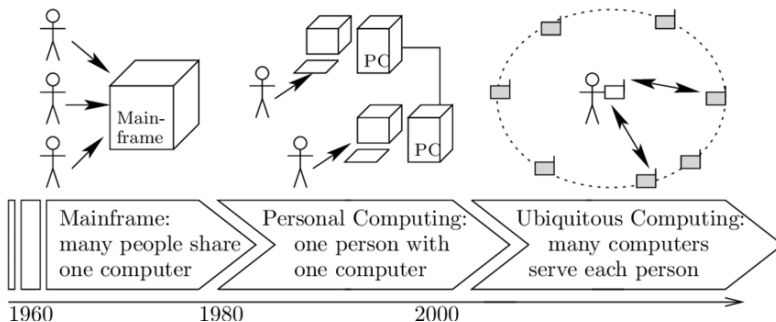
The Power of Cloud: Smartly Underscoring Business Potential Cloud computing offers a multitude of benefits that empower businesses of all sizes: Cloud computing offers a multitude of benefits that empower businesses of all sizes: Scalability: With cloud services comes the benefit of on-demand scalability; therefore, a business can use resources as best as possible which is in accordance with its varying needs. It makes hardware design so that it can be underutilised which in turn reduces its expense. Security: Whenever the more sophisticated security layout and experience by the cloud providers, businesses get a robust security posture of their own. The in-built feature of regular update with also the option of patch management is one more reason why this product has adequate security cover against the ever changing cyber threats. Efficiency: The cloud technology simplifies the work of IT services by automating the routine tasks and at the same time removes the physical infrastructure core. It means

that it does not occupy IT staff resources to pay attention to the management but gives a chance to them to implement strategic initiatives and innovate. Collaboration: The cloud architecture establishes a system where collaboration among employees is a segment tree with call nodes for each entry in the given free-flowering activity despite the employee's location. Collaboration: The cloud architecture establishes a system where collaboration among employees is a segment tree with call nodes for each entry in the given order. 4. Now we simply query the segment tree to solve the particular task at hand. There are a number of ways that businesses can take advantage of these technologies for data analytics, process automation, or even come up with new solutions

### 3. Conclusion

Cloud computing has demonstrably transformed the business landscape. Its ability to provide on-demand scalability, robust security, and enhanced efficiency makes it an essential tool for businesses to navigate the competitive and dynamic digital age. As cloud technologies continue to evolve, with advancements in security protocols and the integration of emerging technologies like edge computing and quantum computing, businesses can expect even greater opportunities for innovation and growth. The future of business is undoubtedly cloud-enabled, and those who embrace this transformational journey will be well-positioned to not only survive but thrive in the years to come.

This conclusion emphasizes the exciting future potential of cloud computing and its role in driving further innovation and business success.



**Figure 1. Evolution of Computing Model:**  
[https://www.researchgate.net/figure/Evolution-of-computing\\_fig1\\_241875153](https://www.researchgate.net/figure/Evolution-of-computing_fig1_241875153)

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## **EMPOWERING YOUTH: LEARNING AND CONSCIOUSNESS ENHANCEMENT VIA AI-DRIVEN BHAGAVAD GITA CHATBOTS**

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### **Abstract**

The young generation is facing many challenges like peer pressure, depression, bad social behaviour, and addiction to drugs and electronic devices. Unfortunately, the current education system and parents failed to teach these students how to deal with their life's problems. To overcome these problems, a virtual AI-based chatbot system called "GyanVani" has been developed to address lifestyle-related queries. The chatbot uses machine learning algorithms and ensemble learning including polling methods, as well as a Python programming model, to identify student questions and answer them based on the Bhagavad Gita. This innovative approach aims to provide guidance and support to youth.

**Key words:** *Youth, Chatbot, Artificial intelligence, Bhagavad Gita, Guidance.*

### **1. Introduction**

A student's growth is highly correlated with his or her ability to deal with the academic and social aspects respectively. Lots of students become alcohol abusers, smokers, and bad eaters, too, which may be dangerous for their future health. Physical health can also cause psychological problems to grow more strongly in youth, like anxiety, depression, and even suicide. The existing education system and parents are missing in teaching young people how to achieve life purpose.

The study offered a solution to the apparent problems by employing the teaching and principles of Bhagavad Gita as the basis of the design of GyanVani, a chatbot that will help students overcome issues related to social complexities. This study is unique and offers a practical approach to help students better manage their lifestyles. It helps the students attain the knowledge of the Bhagavad Gita and employ them successfully in various

life problems. Also, it contains important life lessons in the areas of education, addiction, personality, relationships, and spirituality. The proposed chatbot will use machine learning algorithms to monitor student inquiries and act as a virtual life coach, spiritual guide, mentor, loyal friend, and expert mentor.

## **2. Background and Context**

The research project is aimed at developing an expert chatbot system. Chatbot's foundations, variations, and uses sections will be discussed. Also, this study will consider the relevance of the Bhagavad Gita to education and its social implications. For holistic education, the Bhagavad Gita encourages real knowledge, personality development, and societal harmony. Its teachings provide valuable advice to students like building determination, controlling emotions, and developing positive traits among others. Furthermore, it involves several life skills that include decision-making, time management as well as stress management. Thus, the Gita can be seen as a complete guide for personal development in the modern-day world with its challenges which ought to be passed through cautiously.

## **3. Literature Review**

The literature review begins with an overview of NLP (Natural Language Processing), chatbot technology, multiclass classification, and ensemble learning techniques. NLP is at the heart of chatbot creation, enabling humans and computers to speak to each other and perform various other language-processing tasks. It develops machine capabilities to perceive and analyse text, voice, and sentiment, thereby improving communication. Researchers look at many issues and advancements in chatbots and NLP, tackling student lifestyle problems and using multiclass classification and ensemble learning approaches. In this review, the purpose is to review the existing studies and ideas in these areas to contribute to the creation of an effective chatbot system.

## **4. Research Methodology**

Our research uses a problem-based, applied research approach with a qualitative approach. Our goal is to develop practical solutions (chatbots) to solve the challenges (problems) faced by the younger generation. For data collection, we collected students' lifestyle issues and questionnaires through an online survey. A supervised machine learning approach using a transformer-encoder-decoder model is used to train chatbots, an approach that includes Python programming for sentence encoding and the TensorFlow

library that includes natural language processing (NLP) components, including stemming techniques for word normalisation, term-document matrices (TDM), and word embedding for semantic representation. Software development tools include Python IDE, Jupyter Notebook, web development tools (HTML, CSS, JavaScript) for chatbot interface, Android Studio for mobile app development possibilities and capabilities, and Google Cloud Platform for potential cloud deployment.

### 5. Implementation and Features of GyanVani Chatbot

The Chatbot GyanVani is an innovative technology, developed to disrupt students' engagement with human support and to ensure comprehensive impact. The chatbot's architecture covers a range of modules and functions that are aimed at the optimization of user experience and resourceful answers at the right time.

#### Development and Features:

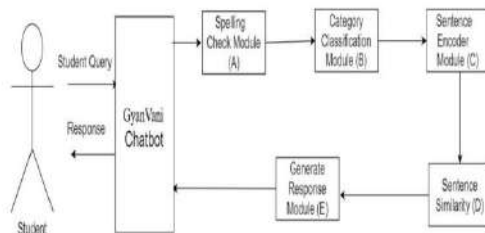
1. Fundamental Model Development: The structure of the fundamental model is designed in the hopes that the chatbot will be able to provide students with satisfactory responses.

2. Ensemble Classifiers for Lifestyle Queries: The chatbot employs the ensemble classifiers to solve the probable query of students' lifestyles.

3. Knowledge Base Integration: User inquiries are handled via a knowledge base and do not return erroneous answers to the given requests.

4. Student-Friendly Interface: The front-end interfaces exhibit a chat-like Q/A interface powered with robust text-to-text chatbot technology which results in a smooth interface with the students.

5. Multi-Platform Accessibility: The chatbot is accessible on Android as well as website progress, factoring in the different preferences of the users.



**Figure 1. Block diagram of the proposed model**

GyanVani's architecture is designed to facilitate efficient query processing and response generation through a series of well-defined modules: GyanVani's architecture is designed to facilitate efficient query processing and response generation through a series of well-defined modules:

1. Query Processing Modules:

- Spelling Check (Module A): Performs a correct spelling of the error, avoiding wrong query interpretation.

- Category Classification (Module B): For efficiency, recognize the type of question by telling processing.

2. Semantic Analysis:

- Sentence Encoder (Module C): Analyzer provides the ability to find out the meaning of words that are usually relatable to a query.

- Sentence Similarity Algorithm (Module D): Performs the match of the query against the set of responses taken from the knowledge base.

3. Response Generation (Module E): Creates logical responses compounded upon the observed query. Worldwide, the trade of goods and services contributes significantly to global economic growth and development. International trade enables specialisation, with nations focusing on their comparative advantages and trading with others for goods and services they do not produce as efficiently. This, in turn, leads to increased productivity and higher standards of living. Trade also facilitates the transfer of technology and know-how between countries.

**Website Version:** Supported by Flask on Google Cloud, the website version will let users type in their queries, which go through the processing of machine learning algorithms and act as a result generator further.

**Android Version:** The app encourages users to type in their questions. These are processed with NL Processing and ML techniques to deliver results on the screen as categories.

GyanVani seeks to radically assemble the student support system when introducing its easy-to-use and personalised chatbot platform.

## 6. Evaluation and Results

The evaluation of the GyanVani chatbot involved a thorough examination of various computational methodologies, utilising a knowledge base that incorporated student lifestyle queries and insights from Bhagavad Gita teachings. The study employed a diverse set of natural language processing techniques, machine learning algorithms, and methods, with the chatbot's core model being developed in Python. The primary goal of the research was to create a practical tool for students to access virtual

counselling and seek guidance on lifestyle concerns. To cater to different user preferences, two versions of the chatbot were developed – a website version and an Android application. The assessment covers numerous parameters such as data collected from structured questionnaires both online form and improves performance reports Query Category Classification Module which utilises multiple algorithms like Naïve Bayes, Decision Tree, K-Nearest Neighbors, and so forth. The customer satisfaction surveys as well as the GyanVani chatbot's ranking were also taken into consideration. Feedback and reports generated in the course of the implementation of the chatbot produce highly useful information about the efficiency and acceptability of the chatbot in resolving students' issues and increasing their satisfaction.

## **7. Conclusions**

The GyanVani chatbot, an idea that analogizes the Bhagavad Gita, helps young people cope with personal problems. Identified challenges include coursework anxiety and social media addiction. GyanVani, a virtual counsellor using machine learning algorithms guided by the teachings of the Gita, is available. Recommendations highlight the chatbot's potential to shape students' beliefs and character positively. Plans involve expanding its capabilities to include voice commands and broader accessibility. Regardless of language constraints, the demonstration of a machine learning-based system that aids students in multiple facets related to lifestyle is the outcome of the study.

## **Acknowledgments**

I would like to express my sincere gratitude to Professor Amit Joshi of ISMA University for his invaluable guidance and expertise throughout the development of this article. His insightful feedback has significantly enriched my work and contributed to its quality. I also extend our appreciation to the faculty and staff of ISMA University for their support and encouragement.

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## ENHANCING CUSTOMER ENGAGEMENT AND RETENTION IN E-COMMERCE THROUGH ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING: A CASE STUDY OF PERSONALIZED RECOMMENDATION SYSTEMS

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### Abstract

We present the algorithms for implementing artificial intelligence and machine learning in the e-commerce business, with priority being on recommendations. The way to present AI and ML technologies impact customer's engagement and retention is through a case study approach, where we explore how personalized product recommendations can enhance business contacts. The study underscores that the personalized recommendations do facilitate multiple conversions, provide utmost convenience to the users and eventually result in longstanding clientele.

**Key words:** *Machine learning, Artificial intelligence, E-commerce, personalization, recommendation systems, customer engagement*

### 1. Introduction

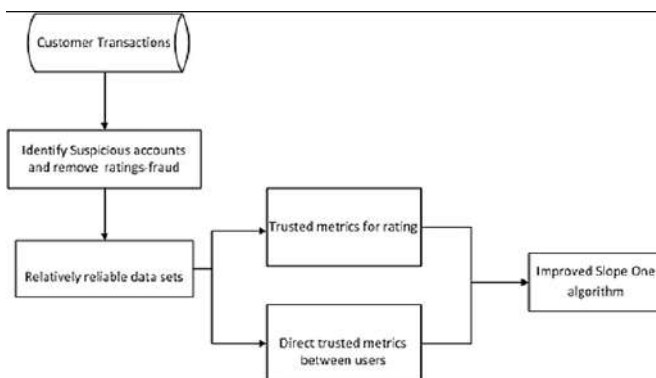
The e-commerce market is exceedingly competitive. Businesses achieve this goal by engaging with and persuading customers through customized experiences. While Artificial Intelligence (AI) and Machine Learning (ML) have become highly successful in pursuit of this objective, it is important to emphasize recommendation systems as an advanced tool used by these technologies. The perception of these systems relies on the analysis of customers' data and usage behavior, and thus makes a product proposition which suits best the needs of consumers leading to better shopping and therefore revenue growth. This essay investigates AI and ML implementation in e-commerce which is more or less targeted at personalized recommendation systems in the aim of enhancing customer engagement and loyalty. Employing case study methodology, we unveil how these infrastructures affect important KPIs like click-through rates, conversion

rates, and repeat orders in the digital arena, pinpointing their significance as vital pillars in the modern e-commerce market.

## 2. Implementation of AI-driven Personalization

Employing artificial intelligence-driven personalization in the e-commerce setting is a multidimensional strategy which provides not only the advanced algorithms with data analytics but also integrates them into the platforms' infrastructure. Firstly, we choose the algorithm that works as a foundation for the recommendation process, which is based on whether it best fits the nature of your product catalog, user behavior patterns, and business objectives. These algorithms, such as collaborative filtering and content-based filtering, among many hybrid models, are further improved and fine-tuned to meet the specified requirement that is unique to the e-commerce platform.

Yet, incorporation of AI-led personalization requires systems collaboration with CRM systems, a content management system and an ecommerce platform among many others. This way, you can be sure that the personalization experience is carried across different interactions throughout the website with it being introduced in product pages, search results, and marketing communications. Furthermore, the key components of data infrastructure and analytics include handling machine learning algorithms that process and analyze the high volumes of user data in a real-time manner, therefore, providing a basis for prompt deduction and intelligent recommendations. In sum, to leverage fully AI-based personalization potential, a successful combination of technological prowess, smart strategy, and continued adjustments is required in order to facilitate value creation for both businesses and customers.



**A trust-based collaborative filtering algorithm for E-commerce recommendation system [2]**

### **3. User Experience Enhancement**

In e-commerce, AI-enabled marketers create personalized experiences that are crucial for fostering higher engagement levels, and satisfying customers. Using advanced algorithms which help in understanding users' preferences, behavior, and interests and the history of interaction, they immediately provide personalized product choice which will definitely appeal to particular users. This personalized approach not only makes the shopping easier but it also creates the feeling that what you are getting is tailor made for an individual user, hence the higher probability that the user will buy and repeat. Also AI-optimized customization helps users overcome the mental burden of decision making and makes it easy to get to the right product at the right time which ultimately makes the whole shopping experience more enjoyable and effortless.

### **4. Performance Metrics and Analysis**

In order to determine if AI-driven personalization has been a success in e-commerce business you need to use a range of the performance metrics to check if this has a certain effect on the key business outcomes. Click-through rates (CTR), conversion rates, average order value (AOV) and customer lifetime value (CLV) are among those metrics which have a direct link with the system and which are used to evaluate its performance. A clicks through rate denotes that followers are engaging with personalized offers, while conversion rates reflect how many of the website's visitors who have interacted with recommended products have actually bought something. Furthermore, the rise in AOV may suggest that the users are being persuaded by the personalized recommendations which are encouraging them to spend more per transaction, so the revenue is growing on a higher rate. Additionally, CLV is an instrument that gives firms deeper understanding of whether their loyal customers, which are referral-based, increase the profits and sustainability over time. Through systematic analysis of these performance metrics, organizations should be able to understand the extent to which AI-based personalization technology fulfills its promise and build on those findings to target that which needs to be improved.

### **5 Challenges and Limitations**

Even though there are tangible benefits, the e-commerce sector using AI-facilitated individualization faces few obstacles and limits. Data security and privacy is another factor that restricts the usage of big data in businesses. Together with the e – commerce platforms rushing in to track the enormous amount of user data in order to launch personalized recommendations, the

question of data protection as well as the observance of regulations like GDPR and CCPA become highly relevant. Developing data governance frameworks with mandatory regulations governing data collection and usage of customer data and upfront sharing of the way in which data is collected and used are vital. Transparency in the process will be crucial to keeping customer trust in the company.

Indeed, among the problems that improve the effectiveness of AI assisted personalization is algorithmic bias. The data set and algorithm architecture biases might be at play when the decision rules result in unjust or discriminating consequences that in their turn leads to lack of trust in the brand and the erosion of its reputation. It is a necessity to prevent biased algorithms from popping up by recurring checking, as well as tools for detecting such biases and achieving diverse training datasets. Besides, technical issues, such as scalability, integration, and algorithmic complexity, that often appear during implementation, may create problems for companies, who as a rule, have to look for the qualified workers to overcome them. In that order, proactive policy making is necessary to utilizing AI-based personalization fully yet to diminish the risks it could create.

## **6. Future Directions and Opportunities**

Next-gen AI-based personalization in e-commerce has plenty of potential to become a game changer, in essence that area is an open field for innovation and growth. Modern technologies, in particular, that use natural language processing (NLP), augmented reality (AR) and virtual reality (VR), provide a gamut of fresh ideas to make user experiences more realistic and let them interact more easily with service providers. This integration of such technologies into the personalized recommendation system can lead to the creation of a much more engaging and interactive shopping experience. Consequently, the users' satisfaction and conversion rates will go higher and higher. Also machine learning algorithm advancement in the areas of deep learning and reinforcement learning, provide chances to offer more accuracy and pertinency recommendation personalization. In addition to this, the expanding of the omnichannel retailing and the voice-enabled devices offer new multi-channel opportunities for personalized experiences that bring a new platform for the companies to react to certain customer's requests and bring even more revenue consequently. Continuing growth of e-commerce cannot spare businesses that follow future directions and become early adopters of innovative solutions. Basically, they will be the leaders in a digital marketplace with increasing competition.

## 7. Conclusion

In brief, the AI-powered personalization in the e-commerce field is of significant importance, it not only affects the way of businesses to elite their customers but is also the main driver of the revenue growth. Nevertheless, as well as the obstacles like data protection, algorithmic unfairness, and technicalities of this technology further development in the field will help to overcome these challenges. I am confident that the future convergence of key technologies like natural language processing, augmented reality, and machine learning algorithms will open the way of unprecedented enhancements of user's experiences and facilitation of customer relationships with the company. Entrepreneurial spirit that steps proudly towards the future horizons and grabs handsomely offering innovation has the ability to keep competitive and robust as the times and personalized e-commerce are changing rapidly.

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## COMMON CHALLENGES IN IMPLEMENTING HTTP AUTHENTICATION

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### **Abstract**

Implementation of HTTP authentication is a very important aspect of securing web applications, but this process comes with several common challenges for developers. This abstract is about the different obstacles faced during the implementation of HTTP authentication mechanisms and outlines strategies for overcoming them. Challenges which include choosing the right authentication method, managing user credentials securely, handling session management and token expiration, mitigating common security vulnerabilities such as brute force attacks and session hijacking, and ensuring compatibility with different client technologies, were discussed. As a result of understanding these challenges and implementing best practices, developers can enhance the security and usability of their web applications.

**Key words:** *Security, Access control, Digest, OAuth.*

### **1. Introduction**

Through authentication, web security is achieved by the means of giving unique credentials to admit only rightful users to their strictly restricted resources. HTTP approaches like the authentication mechanisms are providing standardized models to verify the person's identity, but when implementing this, it gets complicated because of the security, usability, and scalability factors. In this article, we get into details of the prevalent issues that the developer's face while implementing authentic HTTP authentication and the appropriate ways to solve the problems.

### **2. Selecting the Right Authentication Method**

The selection of a proper authentication technique, in turn, lays the foundation for the implementation of secure authentication for all web

apps. While programmers are dealing with the variety of ways including those like Basic, Digest, and OAuth authentication techniques. The methods of biometric authentication carry along both advantages and disadvantages making the identification of suitable method a vital procedure in order to achieve the right balance among security, user experience and compatibility. Simple authentication follows the basic structure, which needs the users to supply their identity (username and password) in every one of the requests. On the one hand, the transmission of credentials poses a serious security concern because it's unencrypted, which means they can be intercepted. HTTP Basic Authentication is exposed to view since encryption is considered of a high priority by HTTPS so it's not uncommon for eavesdropping attacks to be led against it. Digest authentication deals with the existing issue of basic authentication that plaintext of the password is being sent by applying hashing algorithms. This is more secure as the private key is not exposed to attacks on the network. But Digest authentication calls for the server to save passwords in a reversible coding text and there will soft sources of threat to privacies if this step is not properly put into consideration. Nonetheless, Digest authentication may not be supported by all client technologies, which can pose a system of compromatibility. OAuth is the de facto implementation of standardization for token-based authentication. It offers this possibility to users that they can transfer only a specified fraction of resources (such as email, contacts, and calendar) to those third party apps that they are not going to share their credentials with. Although OAuth is obviously suitable for passwordless situations, it is in situations where a person wants to authorize access to their data while keeping sensitive information secret. Yet apart from this, OAuth implementation is not easy at all, you will have to grasp different authorization flows, client registration process, and token management mechanisms.

### **3. Securely Managing User Credentials**

Selection of the credential management strategy is the next most important thing to do after this. Thusly, secure management of user credentials should be the main concern now. Plaintext password storage is a weakness often seen in applications leading to compromised users's data financial loss if there is a data breach. To this end, developers at this point should incorporate solid encryption techniques such as the for instance hashing and salting. Hashing involves to change user passwords into inadmissible bonds, which are made using encryption methods. These measures prevent even that notwithstanding the loss of the password hashes,

hackers still can't perform a reverse engineering and get the passwords. known hashing algorithms are SHA-256 and bcrypt. Their security parameters are permanent that's why they are used by a wide audience. Making a salt improves the security of password hashes by revealing the random string (salt) prepended before hashing each pass phrase. Using of hashing prevents from rainbow tables method to decipher the passwords fast and efficiently. Salting out-demonstrates itself as being mostly effective against brut-force attacks and the commonly used key work guessing attacks, as it makes it extremely difficult to crack a password.

#### **4. Handling Authentication Failures**

Managing authentication errors softly has to do with ensuring a pleasing user experience and guarding against security defects. Insufficient error handling mechanism may as well result in ambiguous error messages, which in turn allow attackers to deduce confidential information and take advantage of authentication deficiencies. This risk can be tackled by thorough and secure error handling and giving clear and useful error messages to users. Error messages have to be constructed very carefully to provide the reason of the authentication failure and the sensitive information needs to be hidden. Message like "Invalid username or password" are not desirable, because they may be of assistance to the attackers who are trying to guess correct credentials. Actually, error messages may rather give users a hint on how to fix the issue, for example changing their password or contacting support for help. Status codes in HTTP are very important as they relay this kind of information to the client on the result of authentication requests. Status codes like 401 Unauthorized and 403 Forbidden must be used to represent authentication failures too. These codes not only provide a useful identification of the error but also offer instructions on how to proceed. Meanwhile, developers need to include appropriate header and payload among error responses to enable users to understand the exact reason of authentication issues while solving the problem.

#### **5. Ensuring Scalability**

The scalability is an essential aspect in regards to web applications, especially those experiencing a quick expansion or servicing a big number of the clientele. The count of authentication requests grows, the traditional authentication mechanisms may have problem in ensuring the performance and the responsiveness. Developers need to employ methods for scaling these authentication systems to keep up with the required growth in demand. Caching, Load balancing and session management are components of a

scalable authentication infrastructure. Through the use of caching authentication tokens or session data, applications can boost the performance by alleviating the traffic load on authentication servers. Load balancers serve as a distribution hub that channels authentication requests to multiple servers in order to prevent any one server from being overloaded. This helps to maintain fault tolerance and ensure good performance, at all times. As well, efficient session management is also important, allowing applications to keep the state of the interaction of the user over multiple requests and to effectively store data and retrieve it from the session.

## **6. Meeting Compliance Requirements**

Alongside technical issues, implementation of secure authentication systems requires them to meet with the current regulatory requirements and industry standards. Guidelines like the Payment Card Industry Data Security Standard (PCI DSS), the General Data Protection Regulation (GDPR), and the Health Insurance Portability and Accountability Act (HIPAA) offer stringent data processing and protection rules that enterprises must adhere to when dealing with sensitive information. When it comes to those applications that deal with the payment card data, the PCI DSS being complied with is of crucial importance to ensuring customers' financial information remains secure. According to the GDPR the organizations are obliged to specify the rules and regulations of the processing and preservation of personal data as user authentication information. Healthcare apps that manage protected health information (PHI) are compelled by HIPAA, which requires stricter security measures and privacy controls.

## **7. Conclusion**

Finally, efficiently implementing HTTP authentication implies that developers face multiple challenges, among them are browsing the right authentication method, storing user credentials safely, handling failed authentications, managing scalability and satisfying regulation requirements. Through knowledge of difficulties along with their software development best practices, developers are able to make applications of the web hard to be accessed by wrong people as well as there is no chance of security breaches.

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3. "OWASP Authentication Cheat Sheet" – This resource from the Open Web Application Security Project (OWASP) offers guidance on secure authentication practices and common vulnerabilities to avoid.

4. "Scalable Authentication Patterns" by Alex Bilbie – This blog post discusses various authentication patterns and strategies for scalability in web applications.

5. "PCI DSS Version 3.2" – The Payment Card Industry Data Security Standard outlines requirements for securing payment card data, including authentication practices.

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## **REVOLUTIONIZING MONEY TRANSFER: HOW BLOCKCHAIN SPEED UP PAYMENTS**

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### **Abstract**

The traditional money transfer system faces disruption with the emergence of blockchain technology. This paper explores how blockchain's decentralized approach revolutionizes speed and efficiency. By eliminating intermediaries and streamlining verification through a distributed ledger, blockchain offers significant improvements. The paper analyses blockchain's underlying principles and explores real-world applications, highlighting its potential to reshape the financial sector. It further examines the challenges and opportunities associated with widespread adoption for money transfer services. By illuminating this technology's transformative potential, the paper contributes to a deeper understanding of its role in creating a faster, more efficient global money transfer system.

**Key words:** Blockchain, Money Transfer, Decentralisation, efficiency, Transformation.

### **1. Introduction**

This paper explores the transformative potential of blockchain technology in the realm of money transfer. The traditional system, plagued by slow speeds and high costs, faces disruption with the emergence of blockchain. This abstract highlights how blockchain's decentralized approach, eliminating intermediaries and streamlining verification, offers significant improvements in efficiency. By delving deeper into the technology's core principles and real-world applications, this study aims to illuminate its potential to reshape the financial sector and create a faster, more efficient global money transfer system.

### **2. Understanding Blockchain**

At its core, blockchain is a distributed ledger – a giant shared spreadsheet containing every transaction ever made. This ledger is replicated across

a network of computers, ensuring transparency and immutability of transactions.

**How Transactions Occur on a Blockchain:**

1. **Initiation:** A user initiates a money transfer, broadcasting the details to the network.

2. **Verification:** Miners compete to solve a complex math problem to verify the transaction.

3. **Block Creation:** The winning miner adds a new block containing the transaction to the blockchain.

4. **Broadcast and Validation:** The new block is broadcasted and validated by other nodes in the network.

5. **Settlement:** Once a majority agrees on the block's validity, the transaction is settled.

**Real world applications**

Several companies are leveraging blockchain to revolutionize money transfer:

**RippleNet:** Facilitates faster and cheaper cross-border payments between financial institutions.

**Circle:** Offers a USD-backed stablecoin (USDC) for global transfers using blockchain.

**Western Union:** Exploring blockchain for international money transfers to reduce costs and improve speed.

**3. Research analytical**

This paper builds upon existing research by conducting a comprehensive analysis of blockchain's impact on money transfer speed and efficiency.

The analysis focuses on three key aspects:

**Decentralization and Streamlined Verification:** Traditional money transfers involve numerous intermediaries, each verifying and processing the transaction, leading to delays. This paper analyzes how blockchain's decentralized ledger eliminates this need. Every participant in the network holds a copy of the ledger, allowing for near-instantaneous verification and faster settlement times.

**Real-World Applications:** The paper examines real-world case studies of how companies are efficient blockchain technology for money transfers. This analysis provides practical insights into the effectiveness and challenges associated with implementing blockchain solutions.

**Comparative Analysis:** Through a comparative analysis of traditional money transfer systems and blockchain-based solutions, the paper highlights

the improvements in speed, efficiency, and cost-effectiveness offered by blockchain.

#### 4. Results

**Reduced Transaction Times:** By eliminating intermediaries and streamlining verification, blockchain facilitates near real-time settlement of transactions. This eliminates delays associated with traditional systems, allowing for faster movement of funds.

**Enhanced Efficiency:** The decentralized nature of blockchain reduces operational costs for money transfer services. Removing intermediaries simplifies the process, potentially leading to lower fees for users.

**Increased Transparency:** All transactions on a blockchain are stored on a public ledger, providing a transparent and tamper-proof record. This fosters trust between senders and receivers, eliminating concerns about fraudulent activity.

**Scalability:** Current blockchain implementations struggle to handle large transaction volumes, potentially hindering adoption at a global scale.

**Regulation:** A lack of clear regulatory frameworks surrounding blockchain can create uncertainty and hinder widespread adoption by financial institutions.

**Security Considerations:** While inherently secure, vulnerabilities in specific blockchain implementations or user wallets can pose security risks.

#### 5. Challenges and opportunities

##### Challenges:

**Regulatory Hurdles:** Blockchain technology operates across borders, posing challenges in terms of regulatory compliance. Different jurisdictions have varying regulations regarding cryptocurrencies and blockchain, which can hinder the widespread adoption of blockchain-based money transfer systems.

**Scalability Issues:** As blockchain networks grow in size, scalability becomes a critical challenge. The current infrastructure of many blockchain platforms may struggle to handle large volumes of transactions, leading to network congestion and slower processing times.

**Interoperability Concerns:** Interoperability between different blockchain networks and traditional financial systems is essential for seamless money transfers. However, achieving interoperability poses technical challenges due to differences in protocols and standards across platforms.

**Security Risks:** While blockchain is touted for its security features, it is not immune to vulnerabilities. Issues such as 51% attacks, smart contract bugs, and hacking incidents can compromise the integrity and security of blockchain-based money transfer systems.

**Opportunities:**

**Cost Reduction:** Blockchain eliminates intermediaries, reducing transaction fees and making financial services more affordable.

**Enhanced Speed and Efficiency:** Streamlined verification processes enable near-instantaneous transactions, improving the speed and efficiency of money transfers.

**Financial Inclusion:** Blockchain extends financial services to unbanked populations, promoting greater financial inclusion and participation in the global economy.

**Innovation in Financial Products:** Transparent and programmable features of blockchain enable the creation of innovative financial products, such as smart contracts, automating complex transactions and reducing the need for intermediaries.

**Global Reach:** Decentralized nature of blockchain enables borderless transactions, fostering greater economic connectivity and cooperation on a global scale.

## 6. Conclusions

Blockchain technology holds immense potential to revolutionize the speed and efficiency of money transfers. Through its decentralized nature and streamlined verification processes, blockchain offers a promising alternative to traditional money transfer systems. Real-world case studies provide practical insights into the implementation of blockchain solutions, while a comparative analysis highlights the significant improvements offered by blockchain in terms of speed, efficiency, and cost-effectiveness. As blockchain continues to evolve and overcome challenges, it is poised to reshape the financial landscape and create a faster, more efficient global money transfer system.

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## SECTION 6. ENGINEERING SYSTEM-BASED MAINTENANCE

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### USING ENGINEERING SYSTEM DESIGN: AN ORGANIZATIONAL LIFECYCLE APPROACH

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#### **Abstract**

This study deals with the engineering system idea. The relevance of this work derives how it is carried through all the stages of the system life cycle. This is achieved through the timely identification of weak chains in the organization. In the course of assessing the amount of losses it the necessary give a detail description of the life cycle phases and solve the tasks involved in each phase. The work used methodology of engineering systems, such as the high-level organization of the overall building and release of complex systems.

**Key words:** *needs, risks, performance, algorithms, changes, distributes, managements.*

#### **1. Introduction**

The initiation of Engineering System design begins with the requirements analysis phase, where a thorough investigation of the project goals takes place. Interaction with stakeholders is crucial for a complete understanding of their needs [1]. This enables the creation of a strategic project plan, including timelines, resource allocation, and risk identification. During the design flexible methodologies such a System Life Cycle Model and Greiner Growth Model are implemented to ensure continuous feedback and an iterative approach [2, 3]. Developing complex systems can be challenging many factors need to be considered, such as: system requirements, functionality, performance, reliability, cost, maintainability. Without a systematic approach, it can be difficult to ensure that all of these factors are addressed in a coordinated way. At the phase of selecting

proposals for improving activities there is a conflict between the interested groups of the firm. Problem of this study is expressed in the form of the following definition: “It is impossible to ensure the performance replacement of weak chains of an organization in the absence of means for selecting innovative proposals”.

## 2. Define Tasks

Following from the identified problem the object of the study is a set of algorithms that allows to maintenance a new version of the system functioning in the changed conditions. The aim of this research is to develop a procedure that provides a system of flexible measures to come out of difficult situations. In accordance with the aim, the following main tasks were formulated:

- To develop a Systems Engineering Life Cycle Model [2].
- To adopt Greiner Growth Model [3].
- To find place of the Engineering System in the System Life Cycle.
- To implement the medium-term scenario in the conditions of ROI investment [4].

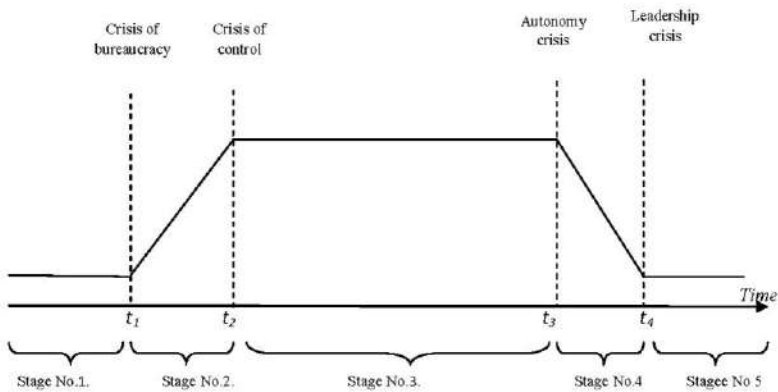
Detailing the tasks allows to identify the Systems Engineering key stages [2]. It should be noted that such functions are performed at certain phases of the Greiner model (see Table 1).

Table 1

### Distribution of Systems Engineering stages by Greiner phases

Life cycle phase Greiner's model	Life cycle stage: Systems Engineering
First phase of creativity	Requirements definition: Specifying the needs and the expectations of the stakeholders
Second phase of directive leadership	System design: Developing a scheme of the system by describing its parts, interfaces and functions
Third phase of delegation	Development: Designing and implement the system components as per the plan.
Fourth phase of coordination	Integration and test: Merging the parts of the system together and looking to see that all the parts work together as one unit.
Fifth phase of cooperation	Deployment and operation: Installing the system for their end users and offering technical support and maintenance services.

With the help of this procedure, objective conclusions are issued about the current state of the analyzed enterprise regarding unchangeable state of the target-crisis indicator. In practice, the transition from stage to stage is caused by crises. So, each crisis is grounds for design algorithm to help overcome a difficult situation for the organization. Taken together, the implementation of such measures represents a scenario for the development of the enterprise. Figure 1 shows L.Greiner's life cycle model of organization, adapted in the conditions of Engineering System.



**Fig. 1. Crisis phases of L. Greiner in the organization Engineering System Life Cycle**

The stages of organization life cycle change as a result of the strategic transformations, so named “Backward Reconstruction”, taking place in the organization, caused by the corresponding crises.

Transformation of the Systems Engineering approach to the Engineering of System conditions means a set of algorithms in the development of complicated systems. Its prescription is to define the system requirements, design the system architecture, and make certain that the system design check is made integrate the system components, test and role the system out, run and store the system.

### 3. Conclusions

The results of this research lie in the design of recovery procedures used to overcome obstacles in the conditions of bringing a enterprise out of crisis

conditions. The basis of the procedures is a algorithm for converting traditional information into analytical forms that make it possible to determine the level of the possible losses and benefits. Comprehensive tools contain instructions to maintenance well-functioning management products.

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## **PECULIARITY OF ENGINEERING SYSTEM: COMPARISON IF SYSTEM PRODUCTS**

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### **Abstract**

Exploring system products and systems perspectives involves understanding tangible outputs like software and hardware, contrasting them with broader views focused on interactions, relationships, and emerging properties within complex systems. This comparison sheds light on how these aspects shape our understanding and development of products.

**Key words:** *advantages, warnings, harassment, reward, disadvantages, funds, flexibility.*

### **1. Introduction**

As his research delves into the contemporary landscape of engineering system, exploring the paradoxical challenges it faces. Despite the effective methods offered by systems engineering technologies for managing complex systems, the rapid evolution of technology introduces hurdles to their sustainable and efficient implementation [1].

Problem of study: in modern system engineering is a violation of the emergence property, which entails difficulties in predicting and managing sudden and unexpected results that arise during the development and operation of complex systems [2].

### **2. Needs and Comparison**

Object of the study is a feature of system engineering at the present time, with an emphasis on the impact of pressures from users and management [3]. This includes analyzing how these pressures affect the processes of system development and management, as well as considering how the

application of Agile approaches in systems engineering can provide a solution to effectively manage these pressures and ensure flexibility and adaptability in system development [4].

In accordance with the objective, the following tasks have been set:

- Current analysis of system engineering tools.
- Options for improving system engineering tools.
- Scenarios for 3 to 5 years for system engineering tools.
- Long-term instructions for updating system engineering tools [5].

The analysis of the aims to provide a comprehensive understanding of the current state of systems engineering, the challenges it faces, and potential solutions for ensuring sustainable and efficient implementation in the face of rapid technological evolution and external pressures [6].

The challenge lies in accurately identifying and defining the genuine operational requirements for a new system or upgrade, ensuring a viable approach that aligns with acceptable costs and manageable risks.

### 3. Results

The results delved into contrasting system products and systems perspectives, emphasizing their unique aspects. It addressed the challenge of aligning unchanging product demands with the need for adaptability and forward-thinking. Furthermore, it explored the struggle to preserve product uniqueness in the absence of precise high-level specifications. Ultimately, it underscored the importance of balancing fixed requirements with flexibility for long-term product relevance and user satisfaction [3].

The conclusion provides a brief summary of the main findings or outcomes of the discussion or analysis, offering a concise overview of the key points addressed without introducing new information.

The novelty of the research lies in the development of an integrated approach that contains actions to support well-functioning management products when implementing **Engineering System** schemes.

The results of the study were reported at the international scientific and practical conferences [7–12].

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## VALUE BASED PRODUCT MAINTENANCE

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### **Abstracts**

An approach explores to the business value and cost and reasonable implementation of functionalities. It connects with the systems' needs (SN) for a value based product (VBP). Integrating SN methodologies with a focus on VBP product development enhances customer satisfaction, streamlines efforts, and maximizes project success. By prioritizing high-value increments and fostering continuous collaboration.

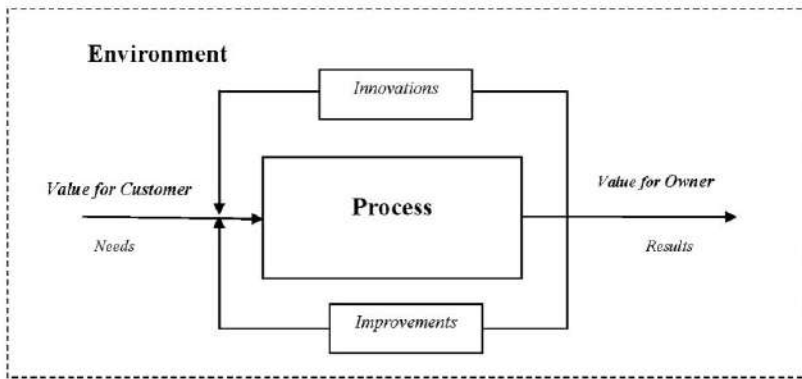
**Key words:** *needs, results, change, match emergentness, approach, ROI, system/*

### **1. Introduction**

Despite the SN methods in VBP development, in some cases, rapid changes and may pose challenges in determining and sustaining the product's quality. The flexibility and speed required for VBP design, at times contrary to SN methods, can complicate the process of delivering value in alignment with long-term strategic goals. So customers needs often contradict with business offer in a way that business cannot keep up to date customers requirements. The misalignment between customer needs and a business's ability to meet those needs can be a significant challenge. "Main problem in VBP it is very hard to Innovations with End Results during emergentness of product in a system". The fundamental premise revolves around integrating SN principles and methodologies with a focus on delivering tangible value to end-users.

### **2. System Approach**

In the context of SN project management and product development, the object is to prioritize features, tasks, and deliverables based on their perceived value to the customer or owners (See Fig.1).



**Figure 1. Object Making Scheme**

This approach involves continuous collaboration, adaptability to change, and a commitment to delivering high-value increments at every stage of the development process. By embracing a value-centric perspective, SN aims to enhance customer satisfaction, respond effectively to evolving requirements, and optimize the overall success of the system [1, 2]. The objective of the system is to enhance ROI effectiveness through a VBP product by employing a System [3, 4] Approach to analyse procedures and implement key factors, leading to better value within the ROI context [5, 6].

The aim of a VBP is to improve ROI applying factors to analyze procedures in System Approach [7]. Therefore, leading implementations on these factors can cause Better VALUE in the context of Return of Investment. In accordance with the objective, the following tasks have been set:

- To analyze historical behaviours.
- To optimize functionalities in order find optimal core idea.
- To calculate the optimal ROI coefficient in existing SYSTEM.
- To apply achieved solution in A SYSTEM based on SYSTEM APPROACH PROCEDURES.

Besides it, subject of research is the middle procedures or steps for the direction from Innovation to Result. But from Result to Innovations steps are to be considered WRONG and misleading system of failure at the end of every system. The subject could revolve around increased efficiency, cost savings, and overall improved performance, emphasizing the positive impact on the system's bottom line. The focus would be on showcasing how the

initial investment in the product leads to significant returns through enhanced productivity, reduced expenses, and potentially increased revenue.

### 3. Results

A successful business should make more money than it spends to ensure lasting growth and profitability. When a business's value exceeds its costs, it can reinvest, expand, and provide better returns to shareholders. Adopting agile methods helps a business quickly adapt to market changes, fostering efficiency, innovation, and customer satisfaction.

The analysis of VBP shows that a successful business should make more money than it spends to ensure lasting growth and profitability. When a business's value exceeds its costs, it can reinvest, expand, and provide better returns to shareholders. Adopting agile methods helps a business quickly adapt to market changes, fostering efficiency, innovation, and customer satisfaction.

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## ENGINEERING SYSTEM-BASED APPROACH TO PERFORMANCE DESIGN

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### **Abstracts**

By a research object was managerial process by performance on the basis of research of non-standard situations. An approach explores new means of fundamental diagnostics that are aimed at identifying non-standard situations and eliminating organizational pathologies. These means serve as the Engineering System Algorithms (ESA). Some influences have been determined in the course of the disruption of the functioning of the dynamic control complex.

**Key words:** *elements, quantity, uncertainty, insight, procedure development, security.*

### **1. Introduction**

There are many methods for calculating the integral performance indicator. Besides it, the proposals for the system improvements conflict with the reluctance of the implementation. The contradiction is in evidence that each calculation method uses a slightly different approach to how to value the success or failure of an activity. It takes several months only to implement a performance technology in an enterprise. However, each technology with the variability in results, it becomes clear that success is not guaranteed, and outcomes can vary based on multiple factors. Strategic planning, adaptability, and a commitment to addressing challenges are critical elements in ensuring a positive return on investment in technology implementations. This integration of disciplines underscores the importance of understanding and applying financial metrics, particularly performance indicator. In according to the done definition an approach of Engineering Systems is having been set [1]. This approach describes both a real object and new ways of analyzing and designing systems [2]. Hence, Engineering Systems users design the new tools and algorithms, which ensuring that

systems are not only technically efficient but also financially viable, aligning with the broader financial goals of an organization.

## **2. Problem State**

An approach explores to the early and reasonable implementation of system changes. The extensive use of numerous performance indicators (NPI) can lead to information overload for decision-makers. Problem of study: “NPI represent a set of measures focusing on those aspects of organizational effectiveness that are the most critical for the current and future success of the organization”. So the object of study combines data and analysis to make sense and deeper understanding of a situation. But a subject broadly refers to the measures and practices implemented to safeguard various aspects from potential risks, threats, or harm. The purpose of the study is to develop a procedure of the structured and systematic process aimed at creating documented steps or guidelines to achieve specific tasks or objectives within an organization. For achievement of the purpose of research it is necessary to solve following tasks:

- To define communication between the strategic, operational and financial purposes.
- To investigate pathologies of the organization, organizational relations, administrative decisions.
- Taking into account requirements to develop ESA [3].
- Within the limits of algorithm to estimate measures of increase of predictability of results [4].
- On the basis of measures to design strategic cards and cards of indicators.

Besides it, ESA are used as an emerging field of research and education. ESA will help set the advance understanding of performance indicators. It is an engineering systems problem that must be seen as sociotechnical and that demands solutions rooted not only in technology but also in the social sciences and management.

## **3. Results**

The analysis of the results reveals a critical challenge in the form of an overwhelming quantity of NPI. The extensive use of diverse NPI elements can lead to information overload, decision fatigue, and concerns about data quality. The developed AES algorithms have allowed not only to raise management efficiency, but also to transform strategy into business of each employee.

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## IMPROVING ROI SYSTEM: USING ORGANIZATIONAL LIFECYCLE METHODOLOGY

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### **Abstract**

This study to advanced development involves the use of reliable means to ensure efficiency, scalability, and the successful implementation of complex projects. Incorporating Organizational Lifecycle Methodology (OLM) into Return on Investment (ROI) analysis improves decision-making, resource allocation, strategic planning, and competitiveness, leading to better ROI outcomes. The methodology of advanced development is a structured approach that encompasses all stages of the project, ensuring its successful completion. Alignment with business model – verification of the alignment of the concept with the overall business model of the organization, ensuring that the concept supports the company's strategic objectives. This stage of concept exploration through operational requirements provides a thorough analysis of how successfully the concept meets user needs and can be implemented in real operational conditions.

**Key words:** *knowledge, approach, applications, users reducing costs, instructions, effectiveness.*

### **1. Introduction**

The basis of this effect is a contradiction caused by the presence of many methods for calculating the integral indicator ROI [1, 2]. Integration of OLM with ROI systems faces challenges due to limited awareness, lack of fundamental knowledge, complexity overload, unfocused development, and resource constraints, hindering effective application in practice. At the same time, the wording of the highlighted problem is expressed as follows: "Life cycle is a concept which tried to describe product sales, income, customers, competitors, marketing strategy from the moment the goods enter the market until their withdrawal from the market". To obtain an effective application of ROI of the reliable assessments, a methodology is used that allows to generalize private proposals at the high-level technology.

## **2. Main Part**

The object of this study is to suggest some ways of using the concept effectively and of turning the knowledge of its existence into a managerial instrument of competitive power. In summary the objective analysis and development process led to the reason for ineffective application of ROI approach and confidence among its potential users in OLC content [3]. The purpose of the study is aimed at developing ways how to productively transform the knowledge about the approach into management tool for assessing competitiveness. In accordance with the goal, the following tasks were set:

- Segregation of four main stages of the life cycle phases: detailing of each phase [4].
- Identification of main factors.
- Failure possibilities [5].
- Success through changes.

Complementing the OLM indicates profitability, while a negative one suggests a loss. ROI plays a key role in decision-making, comparing investment efficiency, and resource allocations.

## **3. Results**

In practice, the transition from phase to phase is caused by crises. Moreover, each crisis is grounds for taking measures to help overcome a difficult situation for the organization. Taken together, the implementation of such measures represents a scenario for the development of the organization fields are controlled, but also the basis for the design of a modified technological control tool is created. Integrating OLM into the ROI system to enhance its effectiveness. By applying insights from organizational development stages to ROI analysis, companies can better understand how to allocate resources and make strategic decisions throughout the product lifecycle. This approach provides a holistic framework for assessing competitiveness and guiding organizational growth, bridging the gap between theoretical concepts and practical application in business management. Effective management of system availability, maintainability, and performance is crucial for maximizing ROI. Investments in these areas contribute to improving business processes, reducing costs, and enhancing overall profitability

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## IMPLEMENTING ENGINEERING SYSTEM BASED COMBINATION OF THE REPUTATION AND IMAGE

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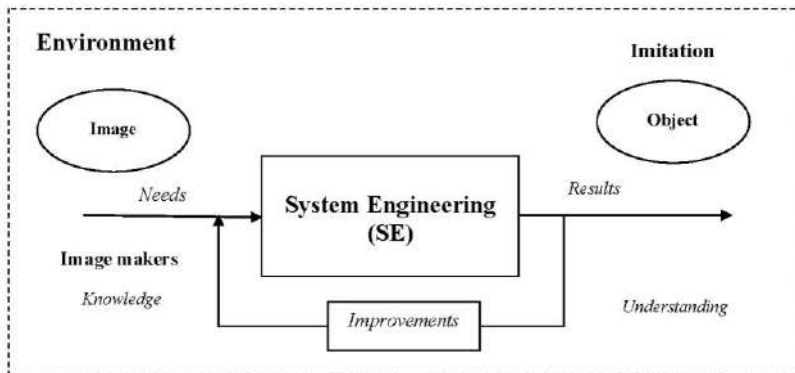
### Abstract

Changes occurring in the external environment outpace the adaptation of algorithms to stabilize the enterprise. This necessitates a principled approach to system maintenance. The present study explores the feasibility of system design within an Engineering System (EnS).environment.

**Key words:** *algorithm, state, maintenance, aim, results, circumstances, assets.*

### 1. Introduction

The main contradiction consists of the sharp difference between the results of the analysis of the real activity of the enterprise and the norms set at the start of a business. The reason for the contradiction is the use of methods oriented to the comparison of enterprises as tools for goal setting. Such methods are set to image formation (See Fig.1) and are used in System Engineering (SnE) technologies [1]. Such means are the technology of assessing the cost of invested assets.

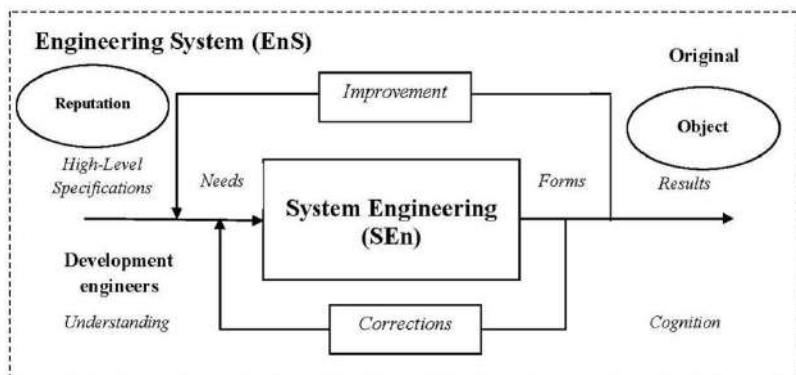


**Figure 1. Structural Scheme of the SEN-Based Image**

In this regard, the problem of this study is disclosed in the following formulation: "It is impossible to have at the disposal of the management a workable system of business organization in the absence of means of timely response to new circumstances". This approach requires the consideration of reputation asset

## 2. Approaches

The research object is a systematic approach to harmonizing all asset types. Hence, the research aim is to develop a procedure to align image and reputation assets (See Fig.2), achievable through the utilization of ES technology [2].



**Figure 2. Structural Scheme of the EnS-Based Reputation**

In pursuit of this aim, four tasks are addressed. The first involves designing the system structure, while the second necessitates selecting a methodology for valuing all types of intangible assets [3]. The third task entails describing the requirements for system change, and the fourth involves developing means to evaluate enterprise activity.

## 3. Conclusions

As the results of the research, the availability of means in the arsenal of the enterprise to counteract the influence of new circumstances should be the result of the research.

The new approach requires the disclosure of image assets to the level of reputational assets. In the course of such disclosure, new knowledge

is revealed, the use of which allows for an operational impact on the influence of newly identified factors. negative nature.

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## ROI METHODOLOGY MAINTENANCE STEPS

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### **Abstract**

The current study is committed to a design of a program previously analyzed data of the environment. Changes occurring in the external environment occur faster than the adaptation of algorithms for bringing a new product. This requires a fundamental attitude towards maintaining the system. This study investigates the feasibility of system design in an ROI environment. This approach is the practice of attributing profit and revenue growth to the impact of marketing initiatives. By calculating return on marketing investment, organizations can measure the degree to which marketing efforts either holistically, or on a campaign-basis, contribute to revenue growth.

**Key words:** *decisions, strategies, performance, scenarios, long-term specifications, factors, initiative/*

### **1. Introduction**

The biggest challenge today, when it comes to maximizing ROI approach, involves gathering the relevant intelligence quickly and accurately to make astute decisions. Missing Data from Distributors or External Partners – the manufacturing industry often relies on a network of distributors and external partners. This network, while vital, can be a source of missing data, especially if there's no standardized method for data-sharing and attribution. Microsoft's ability to innovate and adapt to technological changes is a critical factor for its success. However, the innovation landscape in technology may not directly correlate with the innovation abilities required by companies in more traditional sectors within the S&P 100.

The impact of certain investments or strategies may not be immediately apparent. Some initiatives, especially those related to brand building, customer relationship development, or product development, may take time

to yield measurable results [1]. The time lag between investment and tangible outcomes can complicate the assessment of short-term ROI.

## **2. Value Proposition**

The objective is to use ROI based marketing as a key performance indicator to continually assess and improve the effectiveness of marketing strategies [2]. By having control levers in place, marketers can adjust and optimize campaigns in real-time based on ROI data.

This subject focuses on the tools, methodologies, and key performance indicators (KPIs) used to measure and analyse the effectiveness of marketing strategies [3]. It covers aspects such as data collection, interpretation, and the use of analytics to assess the return on investment in marketing campaigns.

The intended purpose of this project is to define specific aims and objectives, like creating a process for creating a contemporary system of norms, in order to direct resource allocation and decision-making through the application of ROI methodology. In this case, four tasks are solved:

- *Synergies scenarios*. When two companies merge to achieve higher ROI. The marketing synergy not only increases revenue but also improves ROI for both companies by reducing marketing expenses while maintaining or increasing revenue.

- *Long-term specifications*. Investing is a long game, measured in years. Understanding your return on investment can help you achieve your goals. It all depends on your rate of return, your time horizon, taxes and a host of other factors.

- *Strategies used in Marketing ROI*. Align Key Stakeholders-. It is critical to involve cross-functional stakeholders to define goals, demonstrate successes, and consistently deliver value. Focus all stakeholders on key goals to streamline data efforts. Evaluate data for privacy compliance, robustness and accuracy while augmenting your data to support measurement and decision-making.

- *Value-Based Marketing*. Value-based marketing focuses on proving your brand can deliver to customers what it says it can. However, “values-based” marketing focuses on ethics and morals the brand possesses for the common good.

This approach requires the disclosure of some complex reasons. During such disclosure, new knowledge is identified, the use of which makes it possible to quickly influence the influence of newly identified negative factors:

- *Higher Conversion Rates*: Carefully crafted and targeted marketing messages, combined with a deep understanding of the target audience, can lead to higher conversion rates.
- *Enhanced Customer Engagement*: Thoughtful and engaging content, delivered through various channels, fosters customer engagement.
- *Effective A/B Testing*: Carefully designed A/B testing allows marketers to experiment with different variables to identify the most effective strategies.
- *Focus on Customer Lifetime Value (CLV)*: A careful consideration of the long-term value of customers ensures that marketing efforts prioritize strategies that contribute to customer retention and increased CLV, leading to sustained positive ROI.

### 3. Results

The synergies and beta charts in ROI suggest a positive correlation between the implementation of synergies and return on investment, indicating potential efficiency gains and increased profitability. Further analysis of specific data points and trends within the charts would be necessary for a detailed conclusion.

When the result of synergies in ROI is typically an increase in overall financial performance. Value-based marketing centers around understanding and meeting customer needs, fostering trust, and delivering meaningful experiences. By prioritizing customer value over solely product features, businesses can build long-term relationships, enhance brand loyalty, and ultimately achieve sustainable success in the market. Value based marketing is the way to shed light on the system's or process's complexity and lead to cost savings, improved efficiency, and enhanced revenue generation contributing positively to the ROI of a project or business initiative.

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## **ADOPTING DIKW MODEL: USING REQUIREMENTS FOR ENGINEERING SYSTEM**

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### **Abstract**

The present study is dedicated to an approach oriented towards system engineering. Its essence is manifested in working with a genuinely existing object. In this regard, an organizationally distinct complex of tools is utilized, based on which the extraction of the system from the environment occurs, steadily functioning throughout its entire lifecycle. The sustainable operation of an enterprise necessitates possessing a comprehensive knowledge base, enabling timely detection and prevention of potential hazards that could lead to a cessation of activities. Consequently, it is essential for the management system to promptly react to such cessation and prevent the system from transitioning into a malfunctioning state. This real-time response requires an understanding of the mechanisms determining the loss of stability.

**Key words:** *purposefulness, wisdom, sustainability, diagnostics, efficiency, evaluation, functioning.*

Existing approaches to evaluating the state of organizations rely on standard procedures configured to a specific set of coefficients. Their application does not allow for a comprehensive assessment of the organization's stability as a whole. The absence of algorithms for managing the system in crisis conditions is the primary reason for the superficial identification of the problem. As a result, current state assessment tools are geared towards dealing with a non-existent object. Moreover, when the same tools are used for the same object at the same time, different problems are formulated. This discrepancy arises from the varying perceptions of the object among the specialists tasked with identifying the emerging issue. This contradiction is fueled by different levels of knowledge utilized in forming objective conclusions. "It is impossible to form a representation of the genuine object in the absence of objective means of fundamental

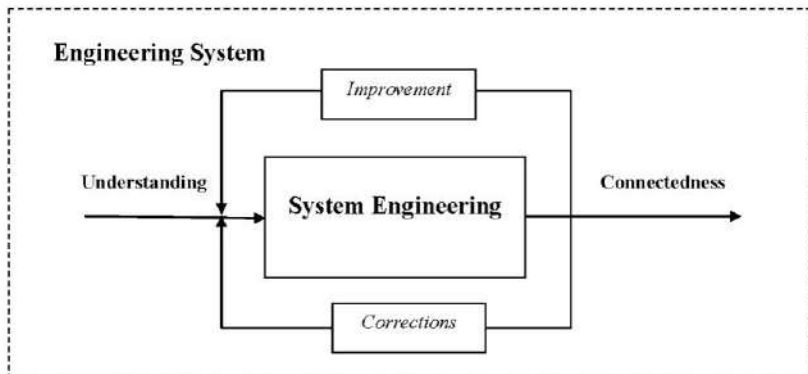
diagnostics, without which organizational management cannot accurately diagnose and provide measures for restoring operations in a timely manner." The research subject is the implementation of the Engineering System approach, aimed at eliminating all uncertainties regarding the utilized toolkit.

The aim of this current research is dedicated to developing mechanisms for assessing the operational state of an organization. This procedure ensures the sustainable functioning of the system while maintaining its characteristics before and after the influence of large-scale circumstances, including crises.

The established goal has enabled the formulation of the following tasks:

- To elaborate on the content of the system's life cycle, including its description in terms of the Engineering System technology.
- To develop options for assessing the system's states considering the phases of the DIKW model.
- To devise a scenario for a comprehensive evaluation of activities based on the ROI model.
- To create a program for describing an object operating in the long-term perspective.

Figure 1 depicts the structural diagram of an approach oriented towards system engineering.



**Figure 1. Scheme for forming a genuine object**

Given the specified inputs and outputs, this study employs a modified Russell Ackoff model as the initial framework. This model facilitates the identification of system-forming elements and enables transitioning

to a technology capable of indicating a path toward sustainable goal orientation. This establishes the fundamental basis for developing a tool that can be applied in the event of disruptive processes occurring within the organization.

In the proposed approach, the vector of goal orientation is directed towards examining a new quality of the system, induced by justified changes. The primary significance of this concept lies in the system's management ability to influence external environmental influences.

In the example provided, a comprehensive analysis of the enterprise's activity using the ROI model is conducted, identifying key features that allow for the replication of the object's properties. The detailed approach permits the development of current state assessment tools amidst a series of contour transformations, outlining measures for necessary changes and creating a program for restoring full functionality.

Thus, through the systematization of concepts, it is possible not only to eliminate uncertainty but also to describe rules that provide effective guidance for action. This facilitates the accumulation of knowledge and the honing of skills to counteract negative external influences on the management system.

This approach enables ensuring the coherence of all system elements, allowing for the description of the object's sustainable functioning throughout the entire lifecycle of the system.

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## EVALUATION OF UNIVERSITY POSITION: ENGINEERING SYSTEM APPROACH

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### **Abstract**

The study connects with needs for a full-scale assessment tools that identifies the weak links found within the university. The high level value is examined within the framework of a prepared programme. This programme allows to ensure the organization's potential discovery in conditions where traditional means do not work.

**Key words:** *methodology, endowment, assets, contribution, requirements, value, product/*

### **1. Introduction**

The study includes three parts. The first part analyses methodologies of the endowment of the university in unusual conditions [1]. The second part deals with calculation of the share of intangible assets contributed by the students and alumni of the higher education institution employed in business would [2]. The third part presents the results of diagnostic tools makes it possible to unlock the growth potential of an organization in a new environment [3–4].

### **2. New Requirements: Engineering System Evolution**

Despite the need for Engineering System in value-based development, in some cases, rapid changes and may pose challenges in determining and sustaining the education's value. The flexibility and speed required for value-based product development, at times contrary to Engineering System methods, can complicate the process of delivering value in alignment with long-term strategic goals. The fundamental premise behind "Engineering System" revolves around integrating principles and methodologies with a focus on delivering tangible value to end-users. Besides it, Systems Engineering focuses only on technical system design, whereas Engineering Systems encompasses technical, social, and managerial systems. So the problem of the study was expressed in the following wording. "It is

impossible to effectively measure the change in the potential of an educational organization with a loss of trust on the part of all its participants [4]”. The definitions underscore the critical role of requirement analysis and need analysis in understanding system scope and establishing a genuine need for a value based education product (VBEP). Additionally, the emphasis on assessing the technical feasibility of a system meeting operational objectives highlights the importance of early visualization and abstract reasoning in system development. The object of the Engineering System making is the management tool used in the stability reconstruction entire VBEP lifecycle. Aim of the research is to design program, which finding informed the ways of the VBEP improving. In accordance with the aim the following tasks were formulated:

1. To define the current analysis features of VBEP.
2. To formulate the requirements for a programme VBEP maintenance.
3. To make a choice of an effective tools. These frameworks enable teams to work in a more organized and efficient way.
4. To interact and transparency between teams supports the successful completion of projects.

The program provides an overview of the system approach in engineering, focusing on the classification grounds, system model, requirement analysis, need analysis, and translation of operational objectives into system functions. It emphasizes the hierarchical structure of complex systems and the importance of understanding the scope of a system. The need analysis phase is highlighted as crucial for establishing a genuine need for a product, and the translation of operational objectives into system functions is discussed in detail.

#### **4. Conclusions**

The use of new system tools makes it possible to find the loss potential of an organization in a new environment. This delves into contrasting system products and systems perspectives, emphasizing their unique aspects. It addressed the challenge of aligning unchanging product demands with the need for adaptability and forward-thinking. The novelty of this study consists in the fundamental approach to identification of the reasons leading to the growth of performance, taking into account the application of new projects to its activities. Such reasons are revealed on the basis of the

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## APPROBATION OF THE ENGINEERING SYSTEM PROCEDURE

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### **Abstract**

The relevance of this project is to identify deviations found during the examination of scenarios for the development of the BPO enterprise. As a result of their identification, business information is accumulated, on the basis of which situations of exit from the mode of sustainable functioning are studied. Processing information allows you to avoid potential losses in the future, which reduces the time when enterprise is in an unstable state. This is achieved through the sequential collection of data on more than six hundred parameters.

**Key words:** *standards, rreproducibility, readiness, change, needs, study, growth.*

### **1. Introduction**

In the course of their processing, eight-fold compression of business used as part of a unified diagnostic system takes place. Such a system is tuned to an assessment based on well-defined standards, such as: the reproducibility of a sustainable process, the average proportion of critical attributes, the length of the route for passing a distance in the zone of sustainable operation. Based on the system of standards, reasonable conclusions about the state of the organization are formed. Thus, it is possible not only to respond to external influences in a timely manner, but also to determine the user's readiness degree. This level is especially important in an environment where the demands for performance improvement outpace the introduction of new process improvement proposals. As a result, traditional service-oriented change acceptance approaches conflict with the needs of the organization, thereby reducing the performance of the organization as a whole. Moreover, typical evaluation tools lead to the selection of proposals that destroy the effectiveness of the organization. Because of this, the content of the problem is defined, expressed in the statement: "It is impossible to ensure an effective improvement of the process

in the absence of objective mechanisms for selecting the proposed improvements".

## **2. Requirements for the organization**

The research shows that the object of testing the system is the Engineering System Procedure (ESP), the support of which is carried out at the level of the established ranges of key indicators [1, 2]. The support subject is focused on the timely improvement of the ESP [3]. At the same time, the ongoing changes are carried out as part of the developed procedure. The purpose of the validation procedure is to develop a standard to ensure that reasonable system improvement specifications are met at the level of determining the state of each element in a well-defined measurement sequence of fourteen nodes. In accordance with the goal, four tasks are solved. The first task is related to identifying the features of the application of the enterprise standard in the field of supporting unique assessment tools. The second task required a description of the activities of the selected BPO enterprise [4]. As part of the solution of the third task, a full-scale assessment of the activity of the investigated enterprise was carried out [5]. The final task is related to determining the effectiveness of the use of ESP in the enterprise under study.

## **3. Results**

The results obtained show that the two-level selection system made it possible not only to compress the initial number of parameters to seventy (we are talking about a compression ratio: 9 to 1), but also to identify the key reasons that hinder the increase in value. Their neutralization contributes to the growth of the organization as part of development scenarios. Moreover, improvement requests are prepared on the basis of ESP, and not using a typical, low-performing, three-factor cost sensitivity model. As a result, the compatibility of reproducibility indicators represented by dimensionless values and cost indicators has been achieved. The use of algorithms of the third level of selection provides control over the compliance with established norms and consumed measures. In the event of deviations, elements that interfere with the achievement of performance are identified and solutions are developed for recovery. Thus, the experience of overcoming anomalous situations is accumulated, which contributes to the improvement of self-learning programs. If necessary, justifications are prepared for the "launch" of a new project, set to revise the ranges of norms and measures.

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## DISCLOSURE OF THE CONTENTS OF A ENGINEERING SYSTEM

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### **Abstract**

This research identifies mechanisms that fail to validate the contribution of a new proposal during the course of enterprise improvement. Modifying them in a timely manner prevents the organisation from making changes that lead to a loss of performance. This is achieved through a careful selection of innovative proposals made on the basis of unique assessment tools. The assessment is based on readiness monitoring algorithms that allow the organisation to draw reliable conclusions about the state of the organisation. The implementation of the algorithms is described in terms of a system for collecting, processing and analysing business information. This gives access to a credible determination of an organisation's performance in the format of issuing conclusions at a reasonable range of key business indicators, including the discount rate and capitalisation rate.

**Key words:** *fundamentality, contradiction, comprehensiveness, algorithms, value, cycle, willingness.*

### **1. Introduction**

Engineering System tools ensure that a phase-by-phase fundamental assessment is carried out [1, 2]. In doing so, the determination of the organisation's operability is made with a view to issuing recommendations for exiting an unsustainable state. The ability to exit is conditioned by a perceived contradiction. It boils down to the fact that since the needs of the external environment outstrip the offerings of the evaluation industry, continuous maintenance of the evaluation toolkit is necessary to produce reliable solutions. In the course of accompaniment, a transition is made from piecemeal assessment to a fundamental in-depth diagnosis of the organisation. The wording of the highlighted problem is summarised this way: "It is not possible to issue objective recommendations for improving the organisation without introducing unique assessment tools". The object

of a full-scale evaluation is its completeness. This category applies to a system of means of determining the fitness for work of an organisation, developed based on algorithms for assessing its condition at a particular point in time.

## **2. An approach to developing a unique assessment tool**

In the context of Engineering System comprehensiveness, the subject of assessment manifests itself in the fact that each element of the assessment system is configured to use uniform algorithms to reproduce a sustainable process". The purpose of consistent disclosure is to develop a procedure to ensure that states are defined in a strictly defined manner.

Four tasks were formulated in accordance with the purpose. First, the content of the approach to developing a unique assessment tool needs to be disclosed. Secondly, the phases of the life cycle of a full-scale assessment should be described. Thirdly, the life-cycle stages of a full-scale assessment need to be explored. Fourthly, it is sufficient to apply Sensemaking technology to form the diagnostic toolkit. In application terms, it has been determined that algorithms tuned to determine the health of an organisation can find the weak links in the organisation that prevent the organisation from being in a sustainable state. They are determined by going through four phases of a full-scale assessment. Talking about scientific ways, the developed tools allow you to evaluate the organization in a system of reasonable-specified standards with clearly defined ranges. Going beyond such boundaries is associated with corrective actions to get out of an unstable state. In addition, there are effective mechanisms available to management to change the boundaries of key business indicators when necessary.

In terms of the comprehensiveness of the evaluation, it is established that deliberate coordination requires a reasoned judgement based on unique assessment tools (UAT).

There are two important conditions to consider when developing an UAT. First, the adaptation of standard assessment methods requires constant monitoring and improvements. Secondly, changes occurring in the external environment occur faster than changes in evaluation algorithms within the organization.

The current formal approach to the evaluation of business projects forces the parties interested in their implementation to carry out a thorough examination of the calculation of all analytical indicators, which is carried out with various forms of investment. And only after the actions of verification and control have been carried out, it is necessary to start

developing the UAT. The essence of the UAT assessment tool is not the ability to assess the state of the enterprise for various periods of time, but the readiness of management, based on a specially developed tool, to obtain a reliable conclusion about the true state of the organization.

In this way, a modern evaluation tool is a management tool that establishes the fact of the organization's performance. The management tool is a “Engineering System-based mean” that includes an associated set of evaluation mechanisms that provide a complete evaluation cycle.

### **3. Results**

The analysis of the disadvantages of generic assessment tools revealed a problem reduced to the incompatibility of external requirements and internal changes. The market is changing faster than the industry is adapting. The application of valuation tools becomes ineffective. In difficult situations, recommendations for escaping from an unstable state come down to changing the ranges of key parameters. As a result the enterprise's strategic objectives change. In order to maintain consistency of purpose, each enterprise needs a unique assessment tools. A study of such tools has shown that the objectivity of the assessment recommendations issued in the context of a rapidly changing environment has been reduced by the willingness of management to move towards a fundamental diagnosis of the condition. As a result, at the disposal of the enterprise there are reliable conclusions about the true position of the organization.

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## **RIGHT TO DESIGN A NEW VERSION SYSTEM**

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### **Abstract**

The relevance of the study lies in the timely removal of the control system from an unstable state. As a result, the property of emergence is restored by replacing ineffective elements. This is achieved by identifying links of loss of efficiency. Such links are proposals for improving the system, considering private interests, contradicting the requirements for the development of the system. As a result, the changes made are detrimental to the organization, which ultimately leads to the spread of the so-called “commoditization effect”, in which potential users cease to value the development of the product.

**Key words:** *characteristics, object, ability, satisfaction, establishment, consumption, needs.*

### **1. Introduction**

Resolving commoditization prerequisites requires a change in image priorities. The focus on eliminating inconsistencies made it possible to identify the research problem, which was reduced to the following formulation: “It is impossible to ensure the efficiency of an organization in the absence of means for a reasonable selection of innovative proposals”. As a result, the technology of deep knowledge comes to the fore. On its basis, the formation of development tasks is carried out since agreed high-level specifications. This not only prevents losses, but also improves the reputation of developers. In other words, the object of study is associated with reputational grounds, configured to use a fundamentally new approach to maintaining systems, so named “Engineering Systems” [1–3]. Its essence lies in working with a real object, for which a complex has been developed for measuring the value of all types of assets, including intangible ones. Such means are a built-in block of the control system, with the help of which changes in the system are managed as part of crisis prevention technology, considering the distributed responsibilities of individual participants in the organization.

## 2. Methodologies

The subject of the study is the use of high-level specifications that protect the system from the influence of ineffective innovations and extend the life cycle of the system. Such specifications, which allow timely replacement of worn-out system elements, are in fact the main asset of the organization. A real asset that contributes to the growth of the rating of the main developer guarantees him the right to develop a new version of the system.

The purpose of this study: Development of a procedure to ensure a timely response to violations of requirements as part of an approved program for the phased introduction of system changes. Such a program is configured to adapt image proposals to requirements of a reputational nature. This is the main difference between the approach of Engineering System and the System Engineering approach.

In accordance with the goal, the following main tasks were formulated:

- To conduct an ongoing analysis of improved options for a system that implements synchronization of requirements and innovative proposals.
- To select the best scenario, considering the identification of key factors and symptoms.
- To justify the implementation of a medium-term scenario for improving the system, considered in conditions of sustainable growth of the enterprise.
- To develop instructions for the long-term development of the organization in conditions of confirmation of its growth potential.

Based on the assigned tasks, powers are distributed between all participants in the organization, highlighting the adjustment of the external image side to the requirements for preserving the reputation of the system. The customization process improves the organization's efficiency by superimposing a new improvement program on the current version of the system.

## 3. Conclusions

The practical value of the study lies in the fact that the results of testing the developed procedure showed that this approach makes it possible to unlock the potential of the organization, but also to ensure its sustainable functioning in times of crisis. As a result, stoppages in the enterprise's activities are eliminated, which helps reduce losses and create a development fund.

The scientific novelty of the research lies in the fact that the transition to the principles of "Engineering Systems" ensures the implementation

of an integrated approach that allows us to assess the performance of the organization of the new version of the system as a whole, as well as to identify shortcomings in its production at individual stages . As a result, as the consequences of large-scale circumstances are painlessly overcome, the professional qualities of the system developers are revealed, while expensive, ineffective traditional means of external PR fade into the background.

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## DEVELOPMENT OF TECHNOLOGY FOR ASSESSING THE VALUE OF AN INFORMATION SYSTEM

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### **Abstracts**

This work is devoted to the detection of subtle that influence the identified loss of system. Missing such signals causes a loss of the emergentness property. Its assessment requires knowledge of the organization's full system of assets, a significant part of which is intangible assets. The work uses assessments of the organization's position, described in terms of «image-reputation». The work shows that knowledge of the position prevents potential losses in the future.

**Key words:** *efficiency signals, value, innovations, emergentness, performance, ROI.*

### **1. Introduction**

To assess the position, the condition is accepted that Unreasonable innovations cause the destruction of the system. Fulfillment of the condition requires synchronization of external factors and internal symptoms. System developers are interested in having a means to select promising improvements [1]. For this purpose, the approach of preserving the property of emergentness is used. This approach is focused on the valuation of intangible assets.

The five key factors:

- financial decision making;
- resource optimization;
- risk management;
- strategic planning;
- competitive advantage.

The destructive nature of private opinions negatively affects the reputation of system developers. In this regard, continuous performance measurement is necessary to maintain their image and improve their ranking. This measurement prevents the value of key elements of the system from

being compromised as it changes. It is impossible to make reliable decisions in the absence of means to identify the degree of destructive impact of innovations on business performance.

In this regard, five symptoms have been identified

- complexity of information systems;
- uncertainty and variability;
- inadequate cost visibility;
- dynamic business environment;
- limited integration with project management practices.

The presence of the identified symptoms allowed us to formulate the following problem: “It is impossible to make reliable decisions in the absence of means to identify the degree of destructive impact of innovations on business performance”.

## **2. Description of the Approach**

The identified attributes made it possible to determine the object of the study, which is: developing tools and methodologies that enable organizations to effectively measure the value obtained from their investments in information systems [2]. The subject of the study is a diagnosis of losses incurred by an organization due to the disability to recognize the contribution of effective proposals for changing the system. Identification of losses is carried out under conditions of maintaining the property of emergentness.

The purpose of the study is aimed at developing a procedure that ensures the issuance of an objective conclusion about the current state of the system of analysed assets and the prospects for its development.

In accordance with the goal, four tasks were formulated:

- Revealing the property of emergentness.
- Analysis of the methodology for the current analysis of the components of intangible assets in the context of the Andriessen-Tissen approach [3].
- Assessment of the current position of the system taking into account the influence of factors and the response impact of symptoms.
- Improving the methodology for calculating ROI in terms of assessing the contribution of intangible assets to measuring efficiency.

Having systematized the elements of the Andriessen-Tissen classification, it turned out that their unity makes it possible to prevent the organization from losses.

### 3. Conclusions

Reputation includes everything of value that has been created over the years, is internal in nature, and is aimed at a narrow audience, including partners, investors, and suppliers. In the context of time, reputation lasts a long time and is difficult to correct. Symptoms of this nature of intangible assets are compensatory mechanisms that prevent one from falling under the influence of «private opinions», including untested ideas.

In practical terms, the main result of the study is the full-scale diagnostics, the peculiarity of which is the organization's ability to justify the amount of damage prevented.

Novelty is that Instilling a culture in the developer to care about his rating, confirmed by the quality of the developed product. Such a product is focused on providing effective improvements to the system without losing the value of the underlying assets.

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## TECHNOLOGY DEVELOPMENT OF REQUIREMENTS FOR THE MAINTENANCE OF SOFTWARE PRODUCTS

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### **Abstract**

The result-oriented means of evaluating the effectiveness of developed systems are aimed at the sustainable functioning of enterprises. The consistent application of such means enhances the operational capacity of the organization. Identifying deficiencies at early stages, which lead to inefficiency, reduces the financial losses of the enterprise. However, the methodological toolkit used over various periods of time of varying durations carries a contradictory nature.

**Key words:** *needs, conflict, wisdom, framework, algorithm, data, value.*

### **1. Introduction**

The use of system engineering to increase productivity and prevent the effect of commoditization is integral to this study [1, 2]. Utilizing a comprehensive framework, we aim to bridge the gap between technological advancement and user needs, thereby enhancing software product maintenance. By integrating algorithms and data-driven approaches, we seek to uncover valuable insights essential for addressing conflicts and achieving strategic goals in software development. Additionally, there are multiple methods for forming the goal of software product development [3, 4]. The problem under study revolves around the assertion that 'It is impossible to ensure effective product improvement in conditions of only technological orientation'.

### **2. General**

Based on the identified problem, the *object* of the current research is a tool that makes it possible to understand how to find the weakness of the system. Subject of the study is the use of high-level specifications that synchronize market requirements and industry proposals prevents the spread of the commoditization effect.

The aim of the research is focused on developing a procedure that ensures the exploration of methods to preserve the uniqueness of the product.

In accordance with the formulated aim, the following tasks were set:

- To reveal the effect of commoditization through the use of high-level specifications [2].
- To develop an algorithm for resolving the commoditization effect.
- Identify weakness in the system that cause dissatisfaction with the product users [5].
- To propose an approach for designing the target indicator of the system.

Taking into account the formulated tasks, a set of recommendations has been developed for utilizing high-level specifications. Their application enables the implementation of the developed procedure for improving ROI calculation technology.

### 3. Conclusions

The practical value of the research lies in the fact that the proposed approach necessitated refinement of the ROI technology. Specifically, the system identified parameters were monitored, including determining measurement ranges. Consequently, it will be necessary to implement coordination of functions at the level of individual departments.

The scientific novelty of the research lies in the development of a comprehensive document containing instructions aimed at improving the effectiveness of decisions by addressing the shortcomings of the initial version of the management system.

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## INTRODUCTION TO ENGINEERING SYSTEM METHODOLOGY

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### **Abstract**

The present study is devoted to a design of a program previously gathered data and the necessary funding to bring this project to fruition. Through data collection, assessment, and feedback, operations analysis aims to identify areas for improvement, streamline processes, and optimize resource utilization. Engineering System helps organizations enhance their capabilities, address deficiencies, and align operations with overarching business goals. Operations analysis is a key tool in continuous improvement efforts, fostering adaptability and resilience in dynamic business environments. Engineering System is used for organize a performance activity in the conditions of the environment's influence. It will allow management enterprise react to external challenges. This provides a structured framework to understand, model, and improve complex systems by considering their interdependencies and emergent properties. So Engineering System Methodology sets itself apart by its holistic approach, which considers the system as a whole rather than focusing on individual components.

**Key words:** *information, understanding, cognition, reconstruction, purposeful, reconcilability, defects.*

### **1. Introduction**

Deep appreciation of policy and regulation is possible through the increasing capability of a new kind of engineer: an engineer who not only provides technical expertise but assumes a leadership role in the overall design and development of these complex systems. A flexible approach and continuous refinement of the concept during development can improve project outcomes. Contradictions in Engineering System Methodology (EMS) arise when the goals, constraints, or design choices of different system components are in conflict with each other. These contradictions must be identified and resolved through careful analysis and optimization to ensure the overall system functions effectively. Reasons in ESM refer

to the challenges and issues that arise during the design, implementation, or operation of complex systems. These f aspects can range from technical limitations to organizational and social factors and must be addressed through a systematic approach. Identifying and resolving pressures is a core aspect of EMS, as it helps to ensure the monitoring tools and establishing feedback loops of the system. Monitoring and optimization post-deployment are necessary to track real-time system performance and identify areas for improvement. So problem of is this study is: “It is impossible to reach a set level reliability, efficiency, and sustainability of the system when there are no means for identifying technical limitations to organizational and social factors”.

## 2. Main Part

In summary, the object of EMS is allocated as the elimination of uncertainty existing between the purposeful symptoms and the sustainability factors.

Subject of study presents the unique position about how to improve on the commonly disparate thinking about the Long Term Goal-Setting Means (LTGSM) using the traditional Data-Information-Knowledge-Wisdom (DIKW).

The purpose of the research is the development of a procedure witch coordination a goal-setting tools towards overcoming obstacles. The procedure is to define the overarching inputs, and desired outcomes for the design, implementation, and operation of the system. Clearly establishing the tool helps to guide the decision-making process and ensure that all system components and activities are aligned towards the same purpose.

The determinate purpose has provided the phrasing of the successive tasks:

- To fulfill Current Analysis: Detailing of Deference between System Engineering and Engineering System.
- To develop Short Term Variants: Using Purposeful System Approach.
- To design Middle Term Scenario: Adopting DIKW Model to Deming’s Profound Knowledge Methodology.
- To create Long Term Manual: ROI Based Value.

The tasks in ESM refer to the specific activities, steps, and milestones that must be completed to achieve the overall aim of the system. Defining and organizing these tasks is crucial for effective project management and ensuring the successful delivery of the engineered system. The tasks serve as the roadmap for the ESM, guiding the team through the design, implementation, and optimization of the system.

### 3. Results

In practice, the procedure's implement increase a life of system and improve the security's means. It includes a set of warning measures to prevent the loss in effectiveness, diagnosed during a fundamental knowledge. Security plays a crucial role at every stage of development. Practices such as secure coding, data encryption, and strict access control measures are employed to ensure information protection. Thorough documentation of code, architecture, and processes is essential for transparency and the rapid on boarding of new team members. Knowledge transfer sessions facilitate the training and integration of new developers. A post-implementation review allows for the identification of successes and lessons learned from the project. Gathering feedback from clients and users is a key element for continuous improvement.

The results of the ESM should demonstrate the effectiveness of the system in achieving its intended goals and objectives. The results should also showcase the optimization of the system's performance, efficiency, and resource utilization. Furthermore, the results should highlight the novel and innovative aspects of the engineered system that contribute to its success.

Novelty in ESM refers to the introduction of new technologies, approaches, or ideas that push the boundaries of what is currently possible. Embracing novelty is essential for driving innovation and continuous improvement in the design and operation of complex engineering systems. Incorporating novel elements into the ESM can lead to significant advancements in system performance, efficiency, and sustainability.

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## VALUE-BASED BPO ENTERPRISE ASSESSMENT

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### **Abstracts**

The relevance of this study is to develop an assessment tool that identifies the weak links found outside the organisation. Their timely identification and prevention allow the organization to avoid potential losses in the future, which reduces the time the enterprise is in an unstable state. This is achieved through the consistent execution of instructions for the collection, processing, and analysis of business information used as part of a unified diagnostic system. Such a system is set up for assessment based on reasonably defined standards.

**Key words:** *improvement, solutions, performance, coordination, mechanisms, value, damage, superposition.*

### **1. Introduction**

The new process improvement solutions implemented as part of the new version of the system are contrary to the requirements for performance improvement. Traditional approaches to adopting change that focus on improving service functions reduce performance of the organization. The selection of innovative offers is subject to uncertainty during the state-of-the-art assessment. With this in mind, the wording of the highlighted problem is reduced to the following: "It is impossible to provide effective improvement of activity in the absence of unique means of reasonable selection of innovative offers". Such tools represent a valuable resource for an organization that is difficult to copy.

### **2. Main Part**

The object of the full-scale assessment is the management tool developed at the level of the guide used in the coordination of external requirements and decisions made. The subject of comprehensiveness focuses on diagnostic mechanisms to reject offers that violate the 'Performance criterion'. The goal of developing an impact tool is to standardise procedures

for using compatible assessment techniques to find informed ways of improving the organisation.

In accordance with the goal, the following *tasks* were set:

1. To identify the features of a full-scale performance assessment [1].
2. To formulate the requirements for a full-scale assessment of the enterprise.
3. To make a choice of an effective technology for a full-scale performance assessment [2].
4. To use the Copeland-Dolghoff's (pentagram of value) technology to create a system that organizes the evaluation of an enterprise over its entire life cycle [3].
5. To make the transition from the value pentagram to the Value-Based Assessment (VBA) life cycle.
6. To develop an VBA condition diagnosis procedure.

As a result, it has been established that the full scope of the assessment characterises the organisation's ability to justify both the magnitude of the additional benefit and the value of the damage avoided. Their relevance is determined on the basis of the means of validating the decisions taken. Such tools allow you to draw conclusions at intervals of varying lengths of time. As a result, recommendations are developed to restore the loss of value as the localization of places leading to loss of efficiency.

### **3. Conclusions**

The use of new diagnostic tools makes it possible to unlock the growth potential of an organization in a new environment. This is achieved at the level of exploration of elements that lead to loss of emergence. The increase in value is determined on the basis of algorithms that provide fixation of the change in the position of the organization's coordinates by converting dimensionless values into a cost equivalent. This ensures that performance standards and performance measures are synchronized. During synchronization, organizational distortions caused by unreasonable decisions are revealed. This protects the organisation from ineffective changes causing inefficiencies.

In summary, VBA as a performance tool is used to assess the superposition of the organization, allowing the organization's performance status to be determined and, if necessary, to make recommendations for recovery from an unsustainable state, including measures to deal with a crisis of interest.

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## SECTION 7. IT PROJECT MANAGEMENT AND GOVERNANCE

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### MODELS OF MANAGEMENT OF ECONOMIC SUSTAINABILITY OF INDUSTRIAL ENTERPRISES

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#### **Abstract**

This article presents a model for ensuring the economic sustainability industry based on controlling systems which is based on a number of principles and consists of a number of successive stages. Given the modeling of management on the determination of the parameters of the selected systems that must be taken into account at the stage of determining the goal, secondly, the assessment and forecasting of target indicators taking into account the situation and uncertainty, and thirdly, over time, make it possible to conduct analysis based on the implementation of controlling systems. Developed a model for ensuring economic sustainability of the oil and gas industry based on controlling systems is developed, the principles of strategic and tactical management decisions are highlighted, and principles for ensuring economic stability in the oil and gas industry based on controlling systems are highlighted.

**Key words:** *controlling, economic sustainability, conjuncture, inflation, evaluation, forecasting, management modeling, tactical and strategic goals, management, financial accounting, organizational structure.*

## **Introduction**

The environment of a modern market economy is characterized by complexity and instability. This is reflected in the movement of a large number of financial, market, inflationary, social and other influences on the economic sustainability of any enterprise. Such effects negatively affect the sustainability of the enterprise due to a decrease in production volumes and demand for manufactured products, which ultimately led to a decrease in profits and solvency and bankruptcy. In this regard, for any enterprise, especially in the industrial sector, it is important to find effective ways and means to ensure the economic sustainability of the enterprise in order to prevent the above factors and the negative consequences of environmental uncertainty. In this context, in our opinion, the management system is an effective model for ensuring the economic sustainability of industrial enterprises, and its widespread implementation is relevant in conditions of uncertainty in the operating environment of oil and gas enterprises.

At a time when it is difficult to make management decisions in a market economy, many managers feel the need for a colleague who can not only provide them with the necessary information, but also give them advice. Controlling is a set of a much broader multi-functional management concept, the purpose of which is to combine the control of the planning and information system.

## **Materials and methods**

In the context of rapid integration and globalization of the world economy, the priority of any enterprise, especially in the industrial sector, is to make a profit or gain a foothold in the market for industrial products, compete with others, etc. In this case, controlling directs the actions of enterprises towards these goals and can be considered as a profit management system for an enterprise. In this regard, S.V. Slabinsky notes that the majority of managers (61.6%) do not take into account uncertainty factors when making tactical and strategic management decisions, which affects the efficiency of the enterprise. However, “85% of managers explain this situation by the lack or incompleteness of information, the complexity of practical methods of managing an enterprise in an unstable environment”.

The first stage in the formation of a system for controlling the economic sustainability of industrial enterprises is the creation of a special, separate structure of this control service and department. The purpose of this section is to identify measures that can destabilize the economic stability of the enterprise or reduce the likelihood of its bankruptcy.

The experience of implementing controlling systems in large oil and gas companies shows that this department often consists of the following personnel: head of the control service, supervisor of the production process, financial flows (management accounting specialist), curator of information flows.

The approach to managing the sustainable development of an industrial enterprise involves viewing the organization as an open system. Therefore, there is an influence of both external and internal factors. The state of the enterprise as a whole depends on the stability of each element of the system. Thus, sustainability at the enterprise level depends on a balanced combination of production, social, personnel, marketing, technological, financial, environmental and management subsystems exposed to external and internal factors in order to achieve predetermined results. A category such as sustainability is often used in the phrase “sustainable development”. The first definitions of the category “development” are considered to be Plato’s concept, which speaks of development as the disclosure of something, while it was believed that certain possibilities were already inherent. In addition, there was a mechanistic concept that interpreted development from the point of view of improvement, quantitative increase.

### **Results and discussion**

We would like to consider some significant theoretical approaches to the concept of sustainable development:

1) sustainable development – is a promising model in which the vital needs of the current generation of humanity are met without compromising the opportunities left for future generations to meet their own needs;

2) sustainable development – is a model of progressive development of society that meets the vital needs of the present generation without depriving future generations of humanity of such an opportunity;

3) sustainable development – is the management of the total capital of society in the interests of preserving and expanding human capabilities;

4) sustainable development – harmonious development of production, social sphere, population and environment. Based on the approaches outlined above, it should be noted that the world community is focused on globalization and sustainable development while preserving the resource base, ensuring that the needs of the present generation are met without harming future generations, and achieving economic and social balance.

The principles of the model for ensuring economic sustainability based on the management system can be divided into the following main stages:

- Identification of the object and subject of the controlling system;
- Identify areas for controlling economic sustainability;
- formation of a system of benchmark indicators;
- Formation of approaches to the implementation of the goal-setting process;
- Development of a system of quantitative control indicators for the purposes of tactical management, forecasting indicators for the purposes of strategic management;
- Development of a management modeling methodology based on the implementation of controlling systems;
- Formation of a mechanism of responsibility for management decisions;
- Formation of monitoring supports;
- Formation of a system for assessing the effectiveness of controlling implementation.

The final step in ensuring economic sustainability based on the controlling system should be the formation of a system for assessing the effectiveness of the implementation of this system. In this case, the effectiveness assessment should be probabilistic in nature, which is due to the presence of a system for controlling random factors that may affect.

Clarification of strategic goals at the stage of development of strategic plans and activities planned within the framework of the controlling system, formation of a development program in terms of sustainable operation, formation of a comprehensive development plan for an economic entity, assessment and interpretation of indicators, the methodology for calculating key performance indicators must be determined. At the stage of developing a tactical plan and activities for an industrial enterprise, it is necessary to clarify tactical goals and coordinate them with the main strategic goals of the enterprise. After the final directions of goals and possible dynamic boundaries of these goals (level of economic sustainability) are formed, the production program, budgets, purchasing and sales plans, etc. and a program of measures to improve the economic sustainability of the enterprise.

### **Conclusion**

Monitoring of work carried out in industrial sectors to ensure economic sustainability based on a management system should include: document flow, adjusted taking into account the goals and objectives set at previous stages, regulations for the provision of information for each link of the enterprise. In addition, if necessary, the methodology for calculating the

resulting integral indicators used to monitor the effectiveness of work to ensure economic sustainability based on the controlling system should be adjusted in detail taking into account the goals and objectives.

The final stage of the model for ensuring the economic sustainability of industrial sectors based on the controlling system is the analysis of the results obtained, adjustment of plans, development of management decisions aimed at achieving the set goals. The company must have a methodology for interpreting the results obtained at this stage, and principles for making management decisions must be formed, taking into account some of the obtained integral indicators. In addition, industrial companies must be supported to analyze, evaluate and predict the level of compliance with tactical and strategic goals.

There should be guidelines for making proactive and adaptive management decisions in case of deviations from the goal, and a database of corrective decisions should be available to increase the speed of the system's response in case of possible deviations from the goal..

Thus, the model for ensuring the economic sustainability of oil and gas enterprises based on the controlling system, on the one hand, gives a clear idea of the principles of the management system, on the other hand, contributes to the formation of optimal management decisions that can be improved based on development.

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## **FORMATION OF THE STRATEGY OF THE SUBJECTS OF ENTREPRENEURIAL ACTIVITY IN INTERNATIONAL BUSINESS**

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### **Abstract**

Globalization are shaping a new strategic approach for international business. Recent years have highlighted the need for new formation strategies as international companies look for ways to optimize their operations in the face of global competition. The study focuses on identifying optimal strategies to effectively exploit new opportunities arising from global trends. The article explores the social and economic aspects of these trends, including changes in the labour market, social relations, and interaction with global consumers. The authors provide the need to develop new strategies for the subjects of entrepreneurial activity in international business in the context of the current challenges of globalization transformation.

**Key words:** *international business, international companies, entrepreneurial activity, strategies, globalization.*

### **1. Introduction**

Global changes are forcing international businesses to review their development strategic approach of the subjects of entrepreneurial activity. On the one hand, globalization is opening new opportunities for companies to improve efficiency and competitiveness in international business. On the other hand, globalization requires businesses to formation strategies that will allow them to operate successfully in different cultural, economic, and political environments.

The main issue is to identify the main challenges that arise in the context of these trends and methods to improve efficiency and competitiveness in

international business. Important elements are also an overview of the various strategies used by international enterprises in the context of digital transformation and an analysis of specific practical examples of successful adaptation to global challenges.

## **2. Theoretical frameworks**

The analysis of the study was preceded by systematic analytical reviews. Deduction and induction methods are used in the theoretical aspects of the research. The method of deduction made it possible to identify the priority directions of the development of international entrepreneurship based on general features and principles and to outline the main problems of the to develop new strategies for the subjects of entrepreneurial activity in international business.

As part of the research, study of the influence of global changes on the development strategies of international enterprises in the context of globalization. These data were used to conduct a quantitative analysis of indicators and identifying optimal approaches to the formation and implementation of international strategies in the context of globalization.

Modern forms of manifestation of globalization create new intelligent digital networks that radically change the way business processes are managed formation, shared and implemented strategy for the subjects of entrepreneurial activity. At the same time, the expanding opportunities arising from digitalization are creating significant pressure on companies to respond to technological change in a timely and effective manner. This is reflected in the significant impact of technology on the current strategy of the enterprise, which must systematically and early identify new business opportunities. These opportunities should be adapted to the current business model or used to create a new model to replace the current one.

In this context, it can be assumed that global changes actually affect most of the entrepreneurial activity businesses in many sectors of the economy, as it introduces changes to existing strategies that need to be rethought and adapted to the new realities brought by digital transformation.

Globalization also opens new opportunities for developing entrepreneurs, but on the other hand, it can also lead to serious harm for those entrepreneurs that have not established their position in the international economy and have not developed a competitive strategy in international business. Some subjects of entrepreneurial activity may become stronger in the face of globalization and its competitive challenges and exploit their potential, while others may fail dramatically. Thus, the modern problem of national

competitiveness goes beyond mere interest or struggle for individual market segments [1].

### **3. Results**

Formation of the strategy is a necessary process aimed at meeting the requirements of international competition and introducing various quantitative and qualitative changes in the competitive dynamics of countries, with both positive and negative consequences.

The transformation of business strategies involves not only changing traditional methods and approaches to performing various functions and operations that have been in place in the company, but also introducing modern technologies and innovations. The main goal of such transformation is to increase the efficiency and productivity of business processes, reduce costs, improve the quality of a product or service, and increase customer satisfaction [2].

An effective digital strategy sets the right path and allows business leaders to implement digital initiatives, track their progress and flexibly expand the business as needed. However, at the stage of implementing a digital strategy, management must decide whether to adopt a customer acquisition strategy or a digital solutions strategy in international business. Without a clear understanding of digital transformation, managers cannot formation a strategy that connects digital technologies to their business. This can lead to missing potential threats that may emerge before they are properly addressed.

Therefore, digital transformation can upend even the most well-established revenue strategies, creating more value for consumers than for companies. These circumstances are critical for businesses and industries seeking to harness digital opportunities for economic gain. Instead, they are faced with a situation where digital transformation deconstructs a profitable product or service into its components, allowing consumers to purchase only what they need. The use of digital technologies should lead to the creation of new business systems and strategies with a corresponding direction of economic growth business in general.

### **4. Discussion**

The modern transition of the international business to the modern globalization trends and the active influence of digital transformation are driving a new stage in the formation of the strategy of the subjects of entrepreneurial activity. These processes are giving rise to new strategic challenges that require companies to adapt and implement these strategies in

international business. The ongoing global changes are forcing international enterprises to rethink their management strategies, opening up new opportunities for efficiency and competitiveness, but at the same time requiring the formation of strategies to operate successfully in different cultural, economic and political environments.

Support of the subjects of entrepreneurial activity continued in the form of real assistance to Ukraine during the war. The European parliament with global partners adopted a resolution in support of Ukraine and of the subjects of entrepreneurial activity in Ukraine. The European Parliament called on the EU and its members to continue sanctions against the aggressor country, to ensure the effective implementation of all 13 packages of such restrictive measures and to eliminate the existing opportunities for circumventing them. Since the beginning of the full-scale Russian invasion in February 2022, the support of the Ukrainian economy from the EU has been focused on helping the subjects of entrepreneurial activity to overcome fundamentally new challenges: from maintaining or reorienting production to military needs to business relocation, adaptation to work in conditions of limited technological capabilities, lack of labor force, loss of sales markets and partnerships.

Therefore, the continuation and support of such a strategy will significantly influence the business processes of conducting business for entrepreneurs. Preservation and development of entrepreneurship in Ukraine is defined as a key factor in the implementation of positive scenarios for formation of the strategy of the subjects of entrepreneurial activity [3].

## **5. Conclusions**

Formation of the strategy in international business is a rather important topic in economic science, which has been studied since its inception and up to the present day. The conducted analysis indicated that the development of the growing complexity of managing international enterprises in the context of globalization and digital transformation requires new strategies, including adaptation to a changing environment, selection of optimal markets and partners, and effective management of global teams. These strategies should take into account the unique characteristics of each market, promote global competitiveness and contribute to the creation of a sustainable and innovative business in the context of an active digital transformation process.

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## **INSTITUTIONAL PROVISION OF ECONOMIC, INFORMATION AND ECOLOGICAL SECURITY**

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### **Abstract**

In the modern conditions of the world economy, the structural components of economic security can be considered at different levels of the hierarchy of relations, in particular: 1. The global level, where the key factors affecting the economic security of the world economy are determined. This includes international agreements, economic relations between countries, international organizations and other global instruments affecting the state of economic, information and ecological security. 2. Regional level, where specific aspects of economic, information and ecological security are considered in individual regions or a group of countries. Regional agreements, trade blocs, energy cooperation, economic integration and other regional initiatives are key components of economic security at this level. 3. National level – components of economic, information and ecological security that reflect the policies and strategies of a specific country. This includes internal reforms, the level of economic stability, foreign trade policy and other internal aspects affecting the economic security of the country. 4. Sectoral level – reflects economic, information and ecological security in specific sectors such as finance, energy, information technology, and other industries that may be critical to overall economic, information and ecological security. Depending on the level of the hierarchy, these components interact with each other and affect the general state of economic, information and ecological security at different levels of the global economy.

**Key words:** *security-oriented information environment, economic security of Ukraine, ecological security of society, ecological threats, ecocide.*

## **Introduction**

Interaction between subjects can contribute to the formation of joint strategies, information exchange, joint decisions on economic policy and security measures, which is key to achieving stability and security in international economic relations.

The key aspect of the development of the system of international economic security is the institutional mechanism. Institutions play an important role in ensuring security, as they create rules, norms, procedures and mechanisms to regulate economic relations and respond to external threats.

## **Overview**

The purpose of the article is to study the institutional provision of economic, information and ecological security.

## **Decision**

The modern development of international economic security includes:

1. Hierarchical levels, which can refer to different levels of management, adaptation or influence in the international economic sphere – from global to regional or national.

2. Internal and external determinants – various influencing factors – internal (economic policies, state of the economy, internal conflicts) and external (international agreements, geopolitical situation, global market and trade trends).

3. Objects of protection and subjects of security, which includes economic objects that need protection (infrastructure, financial systems, trade, etc.) and subjects responsible for this security (governments, international organizations, companies).

4. Coordination of interests. Ensuring economic security requires coordination of the interests of various subjects, which can occur through diplomacy, negotiations, creation of joint strategies, etc.

5. Effective interaction between subjects is a key element for ensuring security at various levels – from cooperation between countries to interaction between sectors of the economy and government structures.

National institutions are state authorities that make decisions and develop policies in the field of economy, finance, trade, create legislation, regulate the functioning of markets and ensure the stability of the country's economy.

Supranational institutions are organizations that cross-national boundaries and have an impact on the economic policy of several countries. For example, the International Monetary Fund (IMF), the World Trade

Organization (WTO), the World Bank, etc. These organizations promote the development of international trade, financial stability and cooperation between countries.

Civil society institutions are informal organizations, such as trade unions, charitable foundations, etc., which influence the formation of economic policy through public pressure, expert recommendations and participation in decision-making processes.

The institutional mechanism is a key factor in the formation of an effective system of international economic security. Its effectiveness lies in the ability of institutions to interact, cooperate and respond to changes in the geopolitical situation and economic conditions to ensure stability and development [1].

Thus, the institutional environment consists of various forms of interaction between various institutions, which can be represented in the form of an institutional matrix. This matrix reflects different types of interaction, cooperation, interweaving and influence between different institutions in the system of economic security.

The nature of the development of the institutional environment determines the conditions for the formation of an effective system of economic security management. These conditions may include [2-3]:

1. Interaction between different levels of management. Organizations at the international, national and regional levels cooperate and work together to achieve common goals of economic security.

2. Coordination and coordination of actions. It is important that institutions work together and in concert to achieve common security goals, avoid duplication of functions and maximize impact.

3. Formation of rules and procedures. Creation of clear rules and procedures for interaction between institutions facilitates cooperation and prevents conflicts.

The institutional matrix helps determine the structure and nature of interaction between institutions in the system of international economic security, which in turn determines the development and effectiveness of this system.

The United Nations (UN) plays a key role in ensuring global security and promoting sustainable development. The UN recognizes sustainable development as a primary goal, and this is reflected in various resolutions and documents, including the 2030 Agenda for Sustainable Development.

At the 40th session of the UN General Assembly, it was recognized that international economic security is an important condition for progress and socio-economic development. This means that ensuring stability, promoting

economic growth, and maintaining equal opportunities for all countries in the global economic space are key to achieving the goals of sustainable development.

The term «economic security» has received official recognition thanks to the efforts of the United Nations, which reflects the importance of ensuring economic stability as a component of global security and development. This emphasizes the need to coordinate the efforts of all countries and international organizations to ensure economic stability and support the sustainable development of the entire world.

### **Conclusion**

The study of the institutional support of the international security environment in the world economy can help identify the levels and types of institutions that provide security in the international economy. Usually, the institutions responsible for international economic security can be divided into several levels, from global to regional and national.

Global level:

1. United Nations. The UN includes various agencies and programs that work in the fields of economy, development and security.

2. The World Bank and the International Monetary Fund. These institutions are aimed at ensuring financial stability and development on a global scale.

Regional level:

1. European Union (EU). The EU has its own institutions and mechanisms for ensuring economic security in Europe.

2. Asia-Pacific Economic Community (ATEC). An organization aimed at cooperation in the field of economy and trade in the region of Asia and the Pacific Ocean.

National level:

1. Central banks are responsible for financial stability and money circulation management within each country.

2. Ministries of Economy and Finance – institutions that develop economic policies and strategies to support the economic security of the country's domestic economy.

Each of these levels has its own tools, policies and strategies to ensure stability and development in the global economy.

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## GLOBAL VALUE CHAINS IN THE CONTEXT OF POST-WAR RECOVERY OF UKRAINE

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### **Abstract**

The purpose of this work is to review the sectors of the Ukrainian economy in global value chains, their optimization in order to advance to the links with the highest added value, and the search for new sectors in view of the post-war recovery of Ukraine.

**Key words:** *structure of the Ukrainian economy, value chain, value-added activities, active recovery, post-war period.*

Nowadays Ukraine faces off difficult tasks in the field of national security and defence. It is obvious that their relevance will remain for many years, because, as the experience of this country shows, ignoring security problems can often be used by aggressive neighbours to temporarily occupy territories, destabilise the political situation, and artificially exacerbate various social conflicts. However, the dogma of safety factors should not be perceived in the context of decreasing attention to economic issues. Already in the first months of the war, it became evident that Ukraine has to strengthen the effectiveness of economic reforms, overcome existing imbalances in the economic sector. Such an approach will be especially significant during the period of post-war recovery of this country. Various scenarios of Ukraine's economic development after the end of hostilities are already being discussed in scientific circles. An important step on this path should be the "inclusion" of domestic business in global value chains (in specific sources – global added value chains).

For the first time, M. Porter introduced the concept of "value chain" into scientific circulation as a coordinated set of activities that create value for an enterprise, starting from the initial sources of raw materials for the suppliers of this enterprise up to the finished products delivered to the end buyer, including customer service [1]. From the given definition, it can be concluded that M. Porter considered the value chain in the context

of a certain set of activities that are characteristic of any enterprise. Added value is formed at each of the stages, which ultimately creates value for the business unit.

G. Gereffi and K. Fernandez-Stark give the following definition: "...it is a sequence of interrelated types of value-added activities located on at least two continents or within two trade blocs that ensure the production of a good or service, starting from an idea regarding their creation and ending with delivery to the end consumer" [2]. As we can see, the "globality" of the value chain implies that activities are located on at least two continents or within two trade blocs.

As noted by domestic authors I. Kravtsova and S. Sidenko, "...the focus is on the issue of creating added value, namely where and at what stages it is created in a certain industry, which firms create the most value and where they are located (geographically and relative to others links of the chain), as well as how firms and the countries in which they are based can move up the value chain to the links with the highest added value" [3].

Eventually this approach determines a clear task for domestic business units – to occupy a place in global value chains where the greatest added value is formed. One can agree with the position of domestic authors T. Melnyk and Y. Konrad, who claim: "The high growth rates of developing countries, as evidenced by world experience, became possible due to the increasing level of their involvement in global value chains, the use of imported materials, raw materials and semi-finished products for increasing production and export" [4]. This conclusion can be fully applied to Ukraine and its enterprises.

It is quite obvious that the beginning of open aggression against Ukraine also determined radical changes in the structure of the national economy. It must be objectively recognised that until February 2022, the architecture of the Ukrainian economy did not contribute to the rapid integration of domestic enterprises into global value chains. Therefore, according to the results of 2021, the share of agriculture in GDP production was 10.8%, processing industry – 10.28%, wholesale and retail trade – 13.6% [5]. Even more revealing are the data on exports from Ukraine in the specified period. Thus, the export of grain crops is 18.1% of the total volume of exports from Ukraine, a similar indicator for ready-made food products is 5.6%, for ore, slag and ash – 10.5%, ferrous metals – 20.5% [5]. It is clear that the active recovery of this state in the post-war period is possible solely due to changes in the structure of the Ukrainian economy. It is difficult to count on the growth of the state's competitiveness in conditions when the main specific weight of added value is produced in agriculture, processing

industry and trade, and exports are dominated by grain crops and ferrous metals.

Ultimately it is possible to conclude that in the context of the post-war recovery of the national economy of Ukraine, the “inclusion” of domestic enterprises in global value chains will play an important role. However, this approach determines the need to implement a package of structural reforms aimed at changes in the architecture of the economy of our state.

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**SMART CITY ECOSYSTEM:  
EVOLUTION, APPROACHES TO DEFINITION  
AND COMPONENTS**

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**Abstract**

The article reveals the essence of the smart city and its ecosystem. Systematized approaches to defining a smart city. The evolution of the development of smart cities is presented and four stages of their development are highlighted.

**Key words:** *smart city, ICT, smart technologies, smart infrastructure.*

Accelerated global urbanization and the complication of the system of cities actualize the issue of their effective functioning and development, use of their infrastructure, budget formation, etc. This requires comprehensive solutions and strategies from city governments and communities to address the economic, environmental, social and infrastructural challenges associated with urbanization. In general, more than 4 billion people live in cities, and according to forecasts, by 2050; the urban population will grow to 7 billion [1].

The history of the emergence and development of smart cities begins in the second half of the 20th century and includes several key stages:

Stage 1 – the first attempts (20–60 years of the 20th century) to create smart cities included the introduction of telephone systems, electrification and other technologies to improve urban life. This period was characterized by limited possibilities of information technologies.

Stage 2 – Emergence of computers and networks (70-90 years of the 20th century). With the advent of computers and the development of communication networks, it became possible to automate many city management processes. For the first time, transport, utility and infrastructure management systems were created.

Stage 3 – Growth of data volumes and the Internet of Things (2000 – present). The development of computing technologies, as well as the emergence of the Internet of Things (IoT), has made it possible to create more integrated and intelligent city management systems. Cities have started using big data to make decisions, ensure security and optimize resources.

Stage 4 – Development of smart infrastructure and 5G. The launch of 5G networks and the development of smart infrastructure open up new opportunities for smart cities. Fast and reliable access to the network will allow the implementation of even more connected devices and control systems.

Modern smart cities use a wide range of technologies, including IoT, Big Data analytics, artificial intelligence and many others, to ensure efficient management, resource conservation, improve citizens' quality of life and reduce environmental impact. The development of smart cities is an important direction for the future sustainable development of cities and global society in general.

At the same time, the definition of "smart city" does not have a consistently accepted interpretation in the scientific literature, a significant number of approaches to understanding are defined through a technological basis. For example, Sharon Shea's definition states that "A smart city is a municipality that uses information and communication technologies (ICT) to improve work efficiency, exchange information with the public, and improve both the quality of public services and the well-being of citizens" [2]. According to this study, the main mission of a smart city is to stimulate economic growth to improve the quality of life of citizens with the help of technology, data collection and analysis, and the value is determined depending on the sphere of implementation of technology in the life of the city, and not only on the actual presence of the technology itself.

The key characteristics of a smart city are defined as:

- high-tech infrastructure projects;
- environmental initiatives;
- extensive and functional public transport system;

- competent urban planning;
- opportunities for the public to effectively live and work in the city, effectively using its resources [2].

A Smart City is an effective integration of physical, digital and human systems in an artificial environment for a sustainable, prosperous and comprehensive future for citizens. This is the definition provided by the British Standards Institute (BSI) [3].

A smart city is a place where traditional networks and services are made more efficient by digital solutions for the benefit of its residents and businesses. A smart city goes beyond using digital technologies to better use resources and reduce emissions. The first priority involves the formation of smart transport networks, modernized water supply and waste disposal, as well as more efficient methods of lighting and heating buildings. It also means a more interactive and responsive city administration, safer public spaces and meeting the needs of an aging population [4].

Michael Wade and Michelle Pfeffy in their work define a smart city as “an urban area that has become more efficient and/or more ecological and/or more socially inclusive through the use of digital technologies. The goal of a "smart city" is to increase its attractiveness for citizens and/or businesses by improving and/or adding city services" [5]. It is worth noting that this definition is expanded due to environmental and social factors that can determine the quality of a smart city and the possibilities of building its ecosystem. However, building a smart city is not a final goal, but a process that involves constant improvement of its environment depending on existing factors [5].

National Geographic defines a smart city as a system of hundreds and thousands of sensors that collect information on the efficiency of infrastructure use and quality of life. At the same time, citizens can be provided with programs that allow them to expand access to city services and services, receive information about breakdowns, traffic jams, etc., pay for certain services [6].

Conceptually, a smart city is understood as the integration of digital technologies into city networks, services and infrastructure, which makes it more efficient and livable for the benefit of its residents and businesses [7]. According to the European Commission, a smart city uses information and communication technologies (ICT) to improve quality of life, efficiency and competitiveness, while meeting the needs of current and future generations [4].

The United Nations Economic Commission for Europe (UNECE) sees a smart city as a combination of home Wi-Fi connections in public places, smart infrastructure, smart electricity meters, open data, and e-government [8]. A broader definition is provided by Paessler, where the term "smart city" describes the economic, technological and social trends for the envisioned green cities of the future [9].

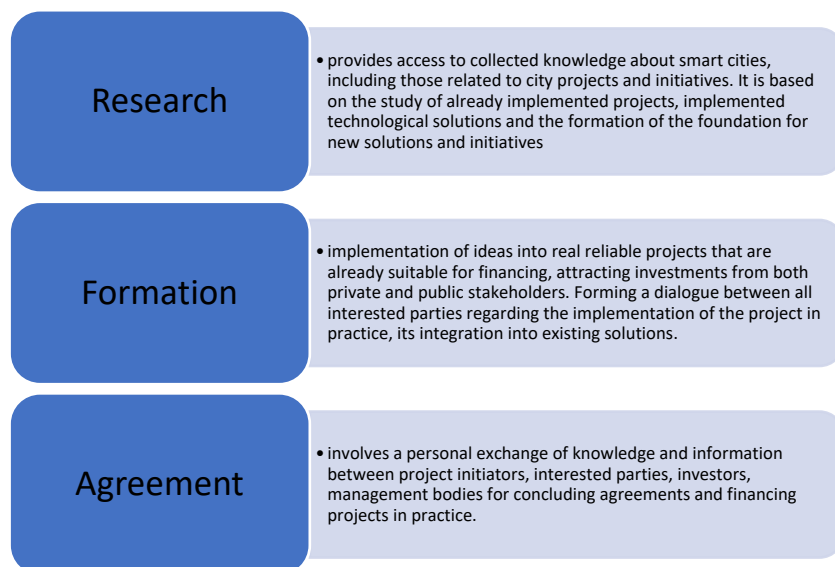
In parallel with the term "smart city", we can meet the definition of "global city", "financial center", etc. The study of financial centers is carried out by the Z/Yen agency, which jointly with the London City Corporation and the China Development Institute issues reports on the study of the functioning of financial centers, trends in their development, etc. As part of their research, financial centers are examined as "full-service international centers with modern settlement and payment systems supporting large national economies. The sources of funds are diverse, and the legal and regulatory framework is sufficient to preserve the integrity of the principal-agent relationship" [10].

The creation of an urban environment that functions to meet the needs of society, ensures a high quality of life for the public, determines the conditions for rapid economic growth, contributes to an increase in the number of services from the city government with lower financial costs. With the growth of the population, adaptation of urban networks is necessary, first of all, through increasing the efficiency of their use, creating new values, which can produce new sources of income or reduce costs [2].

The basis for the smart cities market was the work done as a result of the launch of two platforms "European Innovation Partnership Market for Smart Cities and Communities (EIP-SCC Marketplace)" and "Smart Cities Information System (SCIS)". These platforms aimed to bring together local communities, SMEs, investors, the banking sector, researchers, universities and other stakeholders to create a comfortable environment that would ensure a high quality of life for the population. These initiatives are aimed at increasing the competitiveness of cities and industry, as well as creating prerequisites for achieving the goals of the UN, which are aimed at sustainable development.

The EIP-SCC Marketplace defines the following areas of operation of smart cities: sustainable urban mobility integrated infrastructures and processes in energy, information and communication technologies and transport, sustainable districts and the built environment, citizen orientation, policy and regulation, knowledge exchange, integrated planning and management, baselines, performance indicators and metrics, open data management, standards, business models, procurement and funding [11].

In general, the activities of the Smart Cities Marketplace form certain structures with the help of an integrated process of searching for answers Explore-Shape-Deal Matchmaking, which is aimed at forming a knowledge exchange system, developing and implementing new technologies as part of the Smart City ecosystem, their replication to other cities and localities. The key stages of this process cover the following issues (Fig. 1).



**Figure 1. Stages of implementation of the Explore-Shape-Deal Matchmaking initiative [4].**

A smart city is formed not as a new product, but as an ecosystem built into already existing agglomerations and must take into account the peculiarities of the functioning of the city, its culture and established traditions. The formation of the digital environment takes place within the framework of data management, which in turn is collected by both governmental and non-governmental organizations, which form a single network of various companies, suppliers, and other participants. For example, surveillance equipment for busy streets can be from one company, cameras from another, a server from a third, data analysis will be performed by a third-party organization, etc. The chain can be continued at the expense of companies that are called to solve certain identified problems as a result

of the discovered data. Therefore, the construction of a smart city becomes not just the implementation of a project, but a constantly functioning program that requires constant updating, rejuvenation and the search for new forms of work.

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## INTERNATIONAL EXPERIENCE IN UTILIZING MECHANISMS OF STATE GOVERNANCE FOR ENVIRONMENTAL SAFETY

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### **Abstract**

In the contemporary world, issues pertaining to the ecological sphere are acute and highly significant. This study primarily focuses on examining the experiences of foreign countries in the field of ecology, specifically drawing insights. The key aspects defining the effectiveness of the European Union's strategies and policies in environmental protection are analysed. Special attention is given to examples of addressing unforeseen situations related to the environment.

**Key words:** *ecology, environment, sustainable development, natural resources, state, management, mechanisms, state governance, Eurointegration.*

### **Introduction**

In the modern world, where ecological issues are becoming increasingly pertinent, the question of improving governance mechanisms in the environmental sphere gains particular significance, especially in the context of Eurointegration. Foreign countries, either joining the European Union or developing partnership relations, actively implement innovative strategies and standards aimed at ensuring effective management of natural resources and ecosystem preservation.

The experience of European Union countries, in particular, can serve as a crucial source for studying and adapting best practices in environmental management. Significant attention is devoted to the creation of effective legal frameworks that consider the interests of all parties and incorporate the latest environmental standards [1].

## **Overview**

Significant contributions to the development of research on ecological aspects in state governance have been made by Ukrainian scientists such as L. Bolduresku, O. Krasnova, O. Dragan, O. Pavlenko, O. Lazor, O. Veklich, N. Salatiuk, L. Melnyk, V. Kravtsiv, A. Kernichna, I. Hryshchenko, Y. Khrutba, I. Halak, and R. Lysak. Issues of ecological regulation and the analysis of the effectiveness of nature conservation activities have also been addressed by foreign researchers such as V. Medous, and M. Reimers. Researching the experience of foreign countries in the field of environmental management is crucial for Ukraine in the context of Eurointegration. This necessitates the implementation of effective mechanisms of state governance in the environmental sector in Ukraine that align with European standards and requirements [2].

The object of the study is the experience of foreign countries in state governance in the environmental sector. The subject of the study includes specific mechanisms of state governance in the environmental sector applied in foreign countries.

The uniqueness of this work lies in the analysis and synthesis of global experience in improving mechanisms of state governance in the environmental sector, particularly within the framework of Eurointegration processes. The main goal is to identify key strategies, tools, and principles that assist countries in effectively managing natural resources and ensuring sustainable development. Specific tasks include<sup>3</sup>:

1. Analysing various instruments used for monitoring environmental conditions and preserving natural resources in foreign countries.
2. Studying the interaction between the government, business, and the public in making and implementing decisions in the field of ecology to ensure transparency and openness in decision-making.
3. Identifying how environmental governance factors interact with European Union standards and requirements, as well as identifying potential benefits and challenges of this interaction.

## **Decision**

The analysis of mechanisms of state governance in European Union (EU) countries in the context of environmental issues reveals several key aspects that determine the effectiveness of their strategies and policies in the field of ecology.

Integrated resource management is a key element of strategies in EU countries for addressing environmental problems and achieving sustainable development. This approach involves a systematic approach to managing

natural resources, encompassing water, land, and biological resources. Integrated Resource Management (IRM) is a process aimed at increasing the efficiency of natural resource utilization and reducing pollution. It entails considering all aspects of resource utilization, including economic, ecological, and social dimensions<sup>3</sup>.

Within the EU, there are various mechanisms aimed at supporting IRM, including<sup>4</sup>:

- Direct oversight: The EU establishes regulatory requirements for natural resource use, directed at reducing pollution and enhancing resource efficiency.

- Financing: The EU provides financial support for projects that contribute to IRM. This support can be provided in the form of grants, loans, or investments.

- Information and education: The EU conducts informational campaigns and training programs to increase awareness of IRM.

Public participation in the management of environmental issues is a crucial aspect of the governance model in European Union (EU) countries. The EU has various mechanisms that promote public involvement in managing environmental issues. These include:

- Right to access information: Citizens have the right to access information about the state of the environment and measures taken to protect it, guaranteed by Article 10a of the Lisbon Treaty.

- Right to participate in decision-making processes: Citizens have the right to participate in decision-making processes that affect the environment, guaranteed by Article 11 of the Lisbon Treaty.

- Right to access to justice: Citizens have the right to access justice to protect their environmental rights, guaranteed by Article 263 of the Treaty on the Functioning of the European Union.

In summary, the analysis of public participation mechanisms in the governance model of EU countries underscores the recognition of the importance of involving citizens in decision-making on environmental issues. This approach helps build trust and legitimacy in environmental policy, making the governance process more effective and accountable<sup>5</sup>.

## **Conclusion**

The study of international experience in improving mechanisms of state environmental management in the context of Eurointegration yields several key conclusions. Firstly, Eurointegration serves as a powerful incentive for countries to enhance their environmental management systems by adapting European standards and implementing modern approaches.

A second crucial aspect involves the successful implementation of standards and legal mechanisms to regulate the environmental sphere. Foreign countries employ rigorous control mechanisms and high compliance requirements for environmental norms, contributing to maintaining air and water cleanliness.

The third aspect emphasizes the importance of collaboration and knowledge exchange. Effective cooperation between countries, including the exchange of advanced technologies and successful practices, is a vital element in achieving common goals in the environmental sector.

A common trend is that countries aspiring to join the European community actively implement innovative and standard solutions to address environmental issues. By deepening the study and implementing these approaches, Ukraine can significantly improve its mechanisms for managing the environmental sector and pave the way for sustainable development.

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## THE CURRENT CONTEXT OF INCREASING MILITARISATION OF COUNTRIES

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### **Abstract**

In light of the worsening military and political situation in Europe and other regions of the world, military spending is on the rise in most countries. Statistics on military expenditures across various countries and regions have been compiled and analysed. This confirmed the trend of increasing military expenditures both in absolute and relative terms, including the percentage of GDP, level of militarisation, and defence expenditures per capita.

**Key words:** *defence expenditures, level of militarisation, defence budget.*

The current system of collective security in Europe is in need of radical revision, as well as the entire system of global security in the world. The current geopolitical situation is characterised by extreme turbulence: the situation and the balance of power in the world are changing at an extremely rapid pace. Undoubtedly, the growing tensions in the world are milestones in the formation of not only a new world order, but also global civilisational shifts in general. In the modern context, there is a need to build a fundamentally new system of regional, collective, pan-European and even global security.

In recent years there has been a steady increase in defence spending in absolute and relative terms: 2020 r. – USD 2,091.9bn (3.1% growth); 2021 – USD 2,104.1bn (3.1% growth). The growth in defence spending in absolute and relative terms has been steady in recent years: 2020 – USD 2,091.9bn (3.1% growth); 2021 – USD 2,104.1bn (0.6% growth). In 2022 – USD 2,181.9bn (growth of 0.6%), 2022 – USD 2,181.9bn (growth of 3.7%). In 2022 – \$2,181.9bn (growth of 3.7%) [1]. According to the Global Firepower website, at the beginning of 2024 the top five leaders in terms of absolute defence spending were: the USA (\$831.8bn), China (227), Russia – 109), India (74), Saudi Arabia (71.7) [2]. Together, they together account for 62 per cent of all global military expenditures. Obviously,

the transition of the military conflict in Ukraine to a protracted stage means for all European countries (and not only Europe) an increase in military expenditures in the strategic perspective.

Overall, NATO countries' defence budgets increased from \$910,407 million to \$1,050,779 million between 2015 and 2022, an overall increase of 15.5%. On average, the share of military spending in NATO countries' GDP is 2.57% in 2022. The Baltic-Black Sea region countries among NATO countries take a small part of the total budget, but it is growing. If in 2015 the combined budget of Lithuania, Latvia, Estonia and Poland was 1%, in 2022 their share in the total budget is already 1.4%, which is quite significant for such small countries. In general, the countries of the Baltic-Black Sea region in 2023 are among the top 10 countries with the highest defence budgets (Table 1):

Table 1

**Top 10 NATO countries by defence budget level  
(%BBII, 2021, 2023) [3]**

<b>№</b>	<b>Country</b>	<b>%GDP, 2021</b>	<b>%GDP, 2023</b>
1	Greece	3,82	3,0
2	USA	3,52	3,5
3	Croatia	2,79	1,8
4	United Kingdom	2,29	2,1
5	Estonia	2,28	2,7
6	Latvia	2,27	2,3
7	Poland	2,10	3,9
8	Lithuania	2,03	2,5
9	Romania	2,02	2,4
10	France	2,01	1,9
10	Finland	–	2,5

Ukraine has also significantly increased its level of militarisation, ranking 6th in Europe in 2021 (vs. 41st in 2014), increasing its military expenditures by 9% (\$5.9 billion) and moving up to first place in 2023. In 2020, the spending level was 4.1 per cent of GDP for the 209,000-strong military. This led to a 3-point improvement in Ukraine's position for 2020, and overall, since 2014.

According to the Militarisation Index, there is also an increase in militarisation in Eastern Europe. The most militarised countries in Europe are Armenia, Russia, Greece, Cyprus, Azerbaijan, Belarus, Montenegro, Turkey, Ukraine and Finland (Table 2):

Table 2

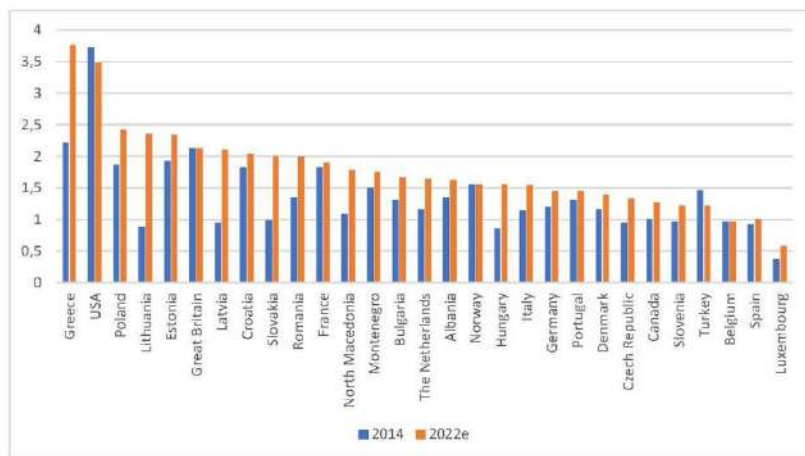
**Most militarised countries in Europe, 2019-2022 [4; 5]**

Country	Military Expenditure Index		Human Capital Index		Heavy Weapons Index		GMI value		Rank	
	2019	2022	2019	2022	2019	2022	2019	2022	2019	2022
Armenia	2,2	2,0	1,7	1,79	2,3	2,28	310	223	2	3
RF	2,1	2,05	0,9	1,06	2,7	2,45	285	204	8	10
Greece	1,6	1,89	1,1	1,13	2,7	2,71	269	211	12	7
Cyprus	1,2	1,25	1,5	1,05	2,7	2,66	268	182	13	17
Azerbaijan	2,1	2,37	0,9	0,93	2,1	2,26	254	204	16	9
Belarus	1,0	0,97	1,4	1,49	2,3	2,27	231	174	17	19
Montenegro	1,0	1,11	1,5	0,96	1,3	1,59	226	134	18	42
Turkey	1,8	1,04	0,7	0,7	2,0	1,94	223	135	20	41
Ukraine	1,9	5,11	0,8	1,29	1,8	1,75	221	335	22	1
Finland	1,1	1,19	0,7	0,68	2,3	2,28	203	152	29	26
Lithuania	1,36	1,55	0,99	1,01	1,66	1,84	200	162	31	21
Estonia	1,38	1,39	0,54	0,59	1,95	1,94	193	144	33	29

We can note that it is the Baltic States that demonstrate the greatest dynamics and increase in the level of militarisation, with the Eastern European countries in second place in terms of dynamics. Obviously, the presence of such a strong aggressive country as Russia contributes to the growth of militarisation and the level of armaments in the bordering countries. For example, Finland has increased its position from 33rd

to 29th place (facilitated by the presence of more than 1,000 kilometres of border with Russia), spending more than \$5.6 billion (1.5% of GDP) on armaments in 2021 [5]. In turn, Norway invested over \$7.4 billion in weapons systems and the military, representing 1.7 per cent of GDP (increasing its figures relative to 2014, when spending was 1.5 per cent of GDP). These funds were spent, among other things, on the purchase of heavy weapons systems (increasing their number to over 800), fighter jets (F-35), and armoured personnel carriers.

Almost all countries are experiencing an increase in military expenditures, except for the USA and Turkey. The highest rates in 2022 are in the USA (3.47%), Greece (3.76%), the UK (2.12%), Poland (2.42%), Lithuania (2.36%) and Estonia (2.34%) (Fig.1):



**Figure 1. Defence expenditure as a share of GDP (%), 2014-2022 [3]**

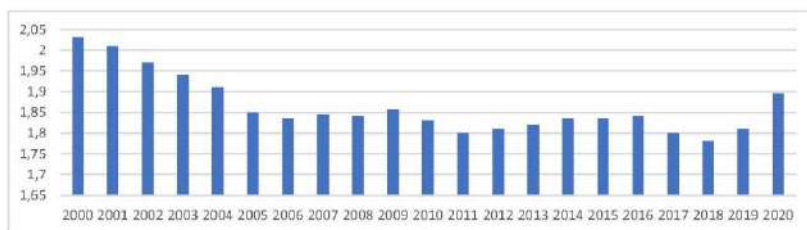
Also quite revealing is the level of funding of the military sector compared to the level of funding per capita. According to Table 3, we can see that the list of the top ten players varies slightly: USA – US\$2351.1, Norway – 1312.0, Korea – 892.1, Great Britain – 872.6, Denmark – 855.2, France – 808.1, Finland – 737.7, Netherlands – 734.1, Switzerland – 658.8, Sweden – 639.0, Germany – 629.8, Belgium – 471.2, RF – 422.9 (Table 3):

Table 3

**Military expenditure per capita by country, 2000–2020  
(in current US\$) [5; 6]**

Country	2000	2005	2010	2015	2020	2021	2022
Canada	271,3	403,8	565,6	497,9	611,6	666,2	700,6
USA	1136,2	1807,5	2388,3	1975,3	2351,1	694,8	–
Korea, South	291,3	455,0	568,7	719,6	899,5	991,6	903,3
Estonia	56,0	150,8	249,4	352,5	541,2	565,0	613,4
Latvia	29,4	121,0	122,5	141,5	393,5	440,9	459,0
Lithuania	40,1	90,9	104,5	160,7	431,3	485,8	650,7
Poland	81,6	153,7	229,3	268,5	353,2	399,8	439,1
Belarus	14,2	47,3	81,5	75,2	74,9	80,8	87,0
RF	63,0	190,3	409,3	458,1	422,9	451,7	592,4
Ukraine	14,3	44,2	56,5	65,9	135,5	136,7	1018,7
Denmark	448,0	639,7	810,7	591,3	843,8	907,2	937,1
Finland	300,3	570,3	692,7	620,2	698,2	676,3	868,2
France	481,3	727,1	827,7	708,2	808,1	865,8	817,9
Germany	325,5	371,6	532,3	466,7	636,4	673,6	664,7
Sweden	539,2	610,5	626,8	551,7	621,0	746,3	755,7
UK	667,7	1022,7	1008,2	910,9	859,3	989,6	999,5

Based on these data, the Global Expenditure Index is formed, which is part of the Global Militarisation Index. It is worth noting that this indicator (the percentage of military expenditures relative to the GDP of countries) tended to decrease until 2018 (Fig. 2).



**Figure 2. Dynamics of the Global Expenditure Index, % GDP [3]**

Since 2020, there has been a steady increase in the Global Spending Index, indicating rising global tensions and increasing defence spending by countries in absolute and relative terms.

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## **DIGITALIZATION AND INCLUSIVE GROWTH: NAVIGATING TOWARDS SUSTAINABLE COMPETITIVENESS**

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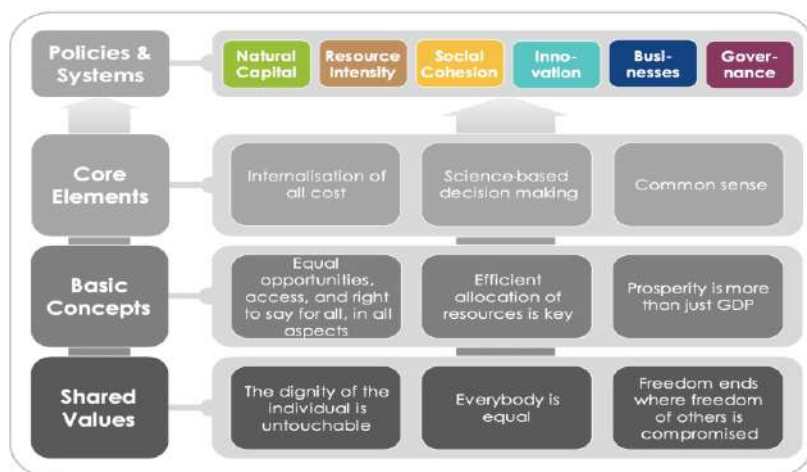
### **Abstract**

The article explores the nexus of digitalization, sustainable competitiveness, and inclusive development in the contemporary global context. It investigates the role of ICT and digital technologies in driving economic productivity and societal progress, emphasizing the imperative of digital inclusion to bridge disparities.

**Key words:** *digitalization, sustainable competitiveness, sustainable development, ICT, digital divide, inclusive growth.*

Despite the cyclical pattern of economic development and the evolving landscape of research determinants, achieving sustainable competitiveness remains a central focus of economic science. This dynamic shift is connected with the pressure of challenges of various origins (including climate, energy, migration and changes in local labor markets, pandemics, etc.).

Sustainable competitiveness emphasizes economic competitiveness as a catalyst of prosperity and sustained growth, while simultaneously recognizing the imperative of addressing environmental and social concerns (Fig. 1). Innovation traditionally holds a pivotal role in competitiveness analysis. However, within the framework of sustainable competitiveness, innovation is considered across all facets of sustainability – environmental, social, and economic—throughout the innovation process [1].



**Figure 1. Framework for Sustainable Competitiveness**

*Source: [1]*

Having a multidimensional character, the concept of sustainable development is based on economic, environmental and social principles to promote social well-being and prosperity. Regional sustainable industry involves creating conditions for firms to develop in order to make a sustainable contribution to society and overall industrial activity in a particular region [2].

According to the Global Sustainable Competitiveness Index (GSCI), the global average score for sustainable competitiveness stood at 43.4 out of a possible 100 points in 2023 (see Fig. 2). This highlights a substantial 56.6-point deficit from the ideal mark of sustainable competitiveness, indicating that society is still distant from achieving inclusivity and harmony with the natural environment. Despite concerning trends in natural capital depletion and a significant performance gap in intellectual capital, achieving sustainable competitiveness remains paramount. This necessitates identifying and promoting key drivers that can bridge this gap and foster environmental responsibility alongside economic growth [3].



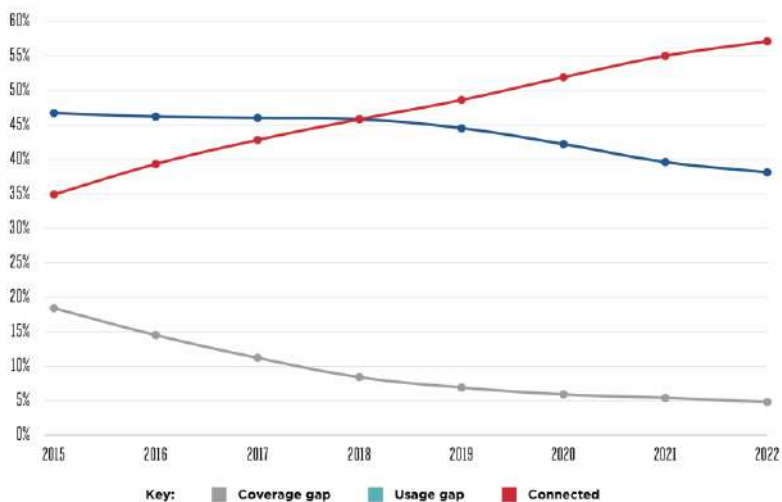
**Figure 2. The Global Sustainability World Map 2023**

*Source: [3]*

The contemporary phenomenon of the digital economy facilitates the integration of diverse economic activities within the context of an information society, facilitated by various platforms and the Internet. ICT and digital technologies serve as foundational elements in the digital transformation of traditional sectors within the global economic community. This transformation enables rapid changes across industries and societal spheres. Consequently, a new service-oriented economy emerges, characterized by altered value chains, digitized business models, networked structures, and increased participation from market actors, accelerating market transactions. The advent of digital technologies heralds the introduction of innovative business models, the creation of new digital products, and the provision of novel digital services [4].

In the context of the digital society, it is digitalization that acts as a catalyst for accelerating the implementation of sustainable development goals (SDG), thereby enhancing the pace and scale of economic and social transformation. Digitalization assumes a central role in fostering innovative, integrated, and cross-sectoral sustainable development outcomes, thereby exerting an integrative influence on society as a whole. The systemic impact of digitalization on sustainable development is inherently multifaceted, underscoring its significance in shaping the future trajectory of societal progress.

ICT, especially mobile broadband, stands as pivotal infrastructure platform for achieving the sustainable competitiveness. About half of the world's population is still unable to benefit from social and economic benefits due to the lack of ICT solutions, such as those that mobile Internet can provide (Fig. 3). Moreover, many individuals, both in developed and developing nations, remain unaware of the potential benefits encompassing access to medical information, governmental services, and digital payments. Achieving inclusive growth to maximize digital divide closure and poverty eradication in the context of building an inclusive economy is closely linked to sustainable competitiveness. Contemporary trends in digitalization underscore the imperative for economic growth to embody both social inclusivity and sustainability, thereby engendering enduring human development benefits [5].



**Figure 3. The global mobile internet connectivity from 2015 to 2022, including the percentage of people connected, the coverage gap and the usage gap**

*Source: [5]*

At the same time, the COVID-19 pandemic has highlighted the importance of the digital ecosystem in the global environment, accentuating the growing reliance of developing nations on systems and solutions sourced from other regions worldwide. Consequently, the development of indigenous

digital transformation models emerges as a paramount priority for each nation.

Today, digital inclusion stands as a cornerstone priority for nations across the globe. Addressing the digital divide represents a monumental endeavor necessitating concerted efforts from the global community, particularly in fostering collaboration between the private sector and national governments [6]. In nations characterized by excessively heterogeneous and undiversified production structures, predominantly informal and unprotected labor markets, and where significant segments of society remain excluded from value creation via digital technologies, connecting the populace assumes critical importance. Ensuring equitable access to high-speed broadband and technological devices is imperative, directly impacting the realization of fundamental rights such as health, education, and employment. Failure to address these disparities can exacerbate socio-economic inequality. Moreover, escalating debt levels among vulnerable populations and precarious lending practices further compound the challenges posed by globalization, underscoring the urgency of achieving inclusive digital development to restore equilibrium. This requires a global economic system built on three pillars:

- a productive economy with full and decent employment at high wages;
- a just society that eliminates socio-economic disparities;
- an inclusive community that protects vulnerable populations and economic rights.

Deepening digital integration often necessitates governmental leadership. The extremely complex level of coordination between ministries, departments, and companies requires complex management. Digital initiatives encompass a wide array of public life facets, spanning community development, education, and workforce enhancement. The realization of contemporary strategies for bridging the digital divide can be viewed through the lens of four primary policy directions adopted by nations worldwide, each with its distinct focus and stakeholders, intricately interlinked with one another (Table 1). These directions serve as guiding frameworks for navigating the complexities of digital integration, paving the path towards inclusive economic development and societal advancement [7].

Table 1

**4 main directions of existing policies to overcome the digital divide**

<b>Type</b>	<b>Goal</b>	<b>Indicator of implementation</b>	<b>Focus</b>
Technological	Creation and distribution of digital technologies	Access to basic technologies (number of Internet users, etc.)	Physical access to technologies
Economic	Support market competitiveness and innovative development	Affordability of technologies by the cost implementation	Access to technologies and participation of stakeholder
Educational	Formal and informal ICT education	Readiness for technology adoption	Digital skills of the population
Social	Inclusion of all participants	Readiness and relevance	Participation of all stakeholders

In light of the strong positive correlation between the technological structure of production and economic productivity, it is evident that digital inclusive transformation not only impacts productivity but also triggers substantial shifts in competition dynamics and the configuration of value creation chains. Furthermore, the emergence of new business models fosters heightened involvement of new stakeholders, inherently constituting digital market participants. They, through the utilization of digital channels, compel traditional players in the global market to conform to the latest trends in the digitization of global economic processes.

In the pursuit of enhancing prosperity, it is imperative to recognize that increasing competitiveness serves as a fundamental prerequisite. However, this pursuit must be accompanied by transformative measures that effectively adapt to evolving technological, geopolitical, and environmental landscapes, ensuring that the trajectory of progress aligns with the goal of advancing human development for all. Moreover, placing sustainable competitiveness at the forefront of sustainability discourse is crucial, given that competitive economies exhibit traits of innovation, resilience, and adeptness in responding to external disruptions. Consequently, prioritizing sustainable competitiveness not only fosters economic growth but also sustains a high level of prosperity into the future.

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## THEORETICAL FOUNDATIONS OF THE CONCEPT OF SMART ECONOMY IN THE GLOBAL SPACE

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### **Abstract**

The evolving concept of the smart economy is delved into, characterized by a reliance on digital technologies, big data, and innovation in economic activities. The smart economy is discussed in the context of digital transformation influenced by Industry 4.0 and 5.0, with an emphasis on the integration of Information and Communication Technologies (ICT), the Internet of Things (IoT), and other innovative technologies to foster more efficient, sustainable, and intelligent economic systems. Various scientific approaches to defining the smart economy are reviewed, including urbanistic, spatial, digital transformation, sustainable development, and ecosystem-based perspectives, highlighting the diversity of interpretations among scholars. The interconnections between smart cities, smart rural areas, and the global smart economy are explored, contributing to the understanding of digital transformation's impact on economic paradigms and the importance of an integral approach for sustainable development.

**Key words:** *smart economy, digital transformation, industry 4.0 and 5.0, sustainable development, green economy*

The concept of the smart economy considers a relatively new state of the economic system characterized by the transformation of established societal relationships, the emergence of new business models, and social connections through digital solutions. The study of relationships between economic agents in the smart economy, in the context of digital transformation based on Industry 4.0 and 5.0, is crucial for understanding contemporary economic dynamics.

This topic was reflected in the works of many Ukrainian and foreign scientists. Let's note such as D. Y. Artyomov, T. Bosona, J. Bruneckiene, V. Voronkova, L.P. Galperina, G. Gebresenbet, A.T. Girenko, B. Dahiya, X. Zhang, Z. Zhang, V. Nikitenko, I.S. Kalenyuk, D. Colbrey, T. M. Vinod

Kumar, D. Lupu, V.P. Mazurenko, N. Mandaluniz, L.G. Makha, N. Metelenko, A. Nasirahmadi, D. Patterson, H. Persson, J. Sinkiene, O. Sunstsova, I. M. Uninets, M. Tsai, Z. Zhao, B. Fischer and others. Concurrently, the rapid transformations within the global economic landscape necessitate the timely update of research in this direction.

A review of the literature reveals that scholars and practitioners interpret the term "smart economy" differently, depending on the chosen scientific approach. Specifically, several primary scientific approaches to the formulation of the smart economy concept can be distinguished:

- Urbanistic (concept of smart cities) [1; 2];
- Spatial (concept of smart rural areas and smart villages, smart regions within a country) [3];
- Digital transformation (network economy, innovative economy, learning economy, and knowledge economy, smart business) [4; 5; 6];
- Sustainable development (circular economy, green economy) [7; 8];
- Ecosystem-based [9; 10].

Many scholars advocate for an integral approach. For instance, J. Bruneckiene and J. Sinkiene have identified the following general characteristics of the smart economy: innovation and the knowledge economy; the learning economy; the digital economy; the competitive economy; the green economy; the network economy; and the socially responsible economy [3]. O. Sunstsova proposes several dimensions (technological, economic, and organizational) [6]. I. Uninets distinguishes three main components of the smart economy from the perspective of types of economic growth: intelligent; stable and sustainable; intensive [10]. The scientific approaches are inherently integral in terms of sustainable development [7] and ecosystem-based, as demonstrated in the works of I. Kalenyuk and I. Uninets [9].

Irrespective of the chosen research approach, a common characteristic of the smart economy concept is its affiliation with an economic paradigm that is marked by an increased dependency on digital technologies, big data, and innovations in economic activities. This concept envisages the integration of ICT (Information and Communication Technologies), IoT (Internet of Things), and other innovative technologies based on Industry 4.0 and 5.0 frameworks to create more efficient, sustainable, and intelligent economic systems.

In this context, Y. Ostropolska notes that the development of the smart economy is not limited solely to rapid economic growth. For sustainable growth, an appropriate development strategy and effective state policy are required, which would leverage the opportunities presented by the new phase in the development of the global economy, termed the smart economy.

Within this framework, the traditional approach to restructuring the economy and institutional reforms, while important, focuses on eliminating existing inefficiencies and regulatory barriers. It often overlooks the potential of new technologies and digital transformation as components of the smart economy [11].

Thematic studies of economies or sectors that have undergone significant digital transformations can provide specific examples of "smart" economic activity characterized by a dynamic interplay of causes and effects. For instance, Vinoda Kumar and B. Dahiya highlight the potential of smart city management technologies to foster entrepreneurial industrial cultures. Conversely, the implementation of smart city technologies acts as a catalyst for smart economic development, as demonstrated by case studies: "Ottawa, St. Louis, Stuttgart, Bologna, Cape Town, Nairobi, Dakar, Lagos, New Delhi, Varanasi, Vijayawada, Kozhikode, Hong Kong" [2]. As the authors of this study note: "Smart cities and smart economies are interconnected by causal relationships" [2, p. XI]. Specifically, we concur with the authors' reasoning that, on one hand, "there is a greater likelihood that smart city management technology will be invented, tested, and adopted in a city with an entrepreneurial industrial culture. On the other hand, smart city technology can facilitate smart economic development" [2, p. XI].

A. Yudono, D. Satria, A. Erlando emphasize that the smart economy constitutes a form of sustainable economy and can be characterized as a "green economy" or "green industry" [12]. The authors cite the example of Ireland, where the "Foundations for Sustainable Economic Recovery," adopted by the government in 2008, stated that a significant aspect of the smart economy is the greening of the economy and the development of green entrepreneurship. In this document, the smart economy and the green economy are equated: "the smart economy is a green economy as it recognizes the interconnected issues of climate change and energy security" ([13] as cited in [12]).

Therefore, in accordance with the imperative of digital transformation, the concept of the smart economy is in constant evolution, as technological advancements alter the interrelations within its component structure. This necessitates a dynamic approach to the development of the smart economy concept in the global arena.

A pertinent topic for research into smart economic development in the global space today includes the interrelationships between smart city technology and smart economies; between smart villages and smart rural areas and the smart economy; and the role of smart megacities in shaping the global smart economy.

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## **SYSTEM OF INDICATORS FOR ASSESSING THE EFFICIENCY OF USING THE NEWEST TECHNOLOGIES IN HUMAN CAPITAL MANAGEMENT**

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### **Abstract**

The purpose of this work is the theoretical and practical substantiation of the system of indicators for evaluating the effectiveness of human capital and HRM processes at the enterprise. Within the framework of the proposed system, the result of evaluating the effectiveness of human capital and HRM processes at enterprises can be visualized in order to improve management.

**Key words:** *human capital, HRM processes, HRM technologies, effectiveness, indicators of effectiveness.*

The study of existing approaches and methods of evaluating human capital and HRM processes, which are based on the calculation of indicators (groups of indicators, coefficients) characterizing the human and technological potential of management and its components prove that scientists usually use indicators that cover the assessment of personnel and technical technological potential of the enterprise, but do not fully reflect the capabilities and reserves of the latest HRM technologies.

To analyze the effectiveness of HRM processes at domestic enterprises, the authors developed a system for evaluating the effectiveness of human capital and HRM processes using a number of relative indicators that characterize the level of technological activity of the enterprise and are divided into the following two groups:

Table 1

**A system of indicators for evaluating the effectiveness  
of human capital and HRM processes at the enterprise**

№	Indicator's name	Calculation formula	Conventional designations in the formula for calculation
1	2	3	4
1. Indicators of the effectiveness of the use of personnel and operational control of HR functions			
1.1. Indicators of efficiency / profitability of human capital			
1	Profitability of human capital	$Phc = I / Asb$	I – income of the enterprise (minus operating expenses and expenses for salaries and bonuses), UAH.; Asb – the total amount of salaries and bonuses that the company pays to its employees,UAH.
2	Return on investment in a qualified employee	$ROI = Aii / Iqe$	Aii – annual increase in income, UAH.; Iqe – investments in qualified employees,UAH.;
1.2. Performance indicators of personnel selection			
1	Coefficient Staffing completeness	$Csc = Nac / Ns$	Nac – the actual number of employees, persons; Ns – the number of employees according to staff list, persons.
2	Personnel selection ratio	$Rps = Ncs / Nc$	Ncs – the number of candidates selected from the number persons willing to work; Nc – the number of candidates for the position, persons.
1.3. Indicators of the effectiveness of material motivation of personnel			
1	The share of the variable component in wages	$Svc = Sv / Sa$	Sv – variable salary at the enterprise,UAH.; Sa – average salary at the enterprise, UAH.;
2	Salary motivation Coefficient	$Csm = Sqee / Sqec$	Sqee – the average salary of a qualified employee at the enterprise,UAH.; Sqec – the maximum salary of employees of the corresponding qualification from competitors,UAH

1	2	3	4
1.4. Indicators of assessment of the management of activity efficiency			
1	Efficiency management coverage ratio	$R_{em} = N_{rhr} / Na$	$N_{rhr}$ – the number of employees who directly report to the HR manager; $Na$ – the average number of employees, persons.
2	Employee engagement rate	$R_{ee} = N_{ea} / Na$	$N_{ea}$ – the number of employees who agree to recommend the company, persons. $Na$ – the average number of employees, persons
1.5. Indicators of training and development effectiveness			
1	Coefficient of professional level of employees	$C_{pl} = N_{hq} / Na$	$N_{hq}$ – the number of highly qualified employees, persons; $Na$ – the average number of employees, persons
2	Percentage of employees who have completed training	$P_{ct} = N_g / Na$	$N_g$ – the number of workers who have graduated; $Na$ – the average number of employees, persons.
1.6. Indicators of staff turnover and permanence			
1	Staff turnover rate	$R_{st} = N_d / Na$	$N_d$ – the number of employees, dismissed for all reasons; $Na$ – the average number of employees, persons.
2	Staff retention rate	$R_r = N_e / Na$	$N_e$ – the number of permanent employees with more than 3 years of experience, persons; $Na$ – the average number of employees, persons.
1.7. Career and succession indicators			
1	Employee promotion rate	$R_{ep} = N_i / Na$	$N_i$ – the total number of increases; $Na$ – the average number of employees, persons.
2	Part of the personnel reserve	$P_{pr} = N_{vcr} / N_{vc}$	$N_{vcr}$ – the number of vacancies closed due to promotion and rotation of the personnel reserve within the enterprise; $N_{vc}$ – the number of closed vacancies at the enterprise.

1	2	3	4
2. Indicators of the level and efficiency of personnel management automation through the use of HRM systems			
1	The amount of additional income associated with the implementation of the HRM system	$AIs = Ibs - Ias$	Ibs – the amount of income before the implementation of the HRM system, UAH; Ias – the amount of income after the implementation of the HRM system, UAH.
2	Reducing the labor intensity of business processes due to the HRM system	$Li = Lcb / Lca$	Lcb – labor costs for specific tasks before the implementation of the HRM-system man-hours; Lca – labor costs for specific tasks after the implementation of the HRM system, man-hours.
3	Satisfaction of HRM system users	$Su = Bi / Bmax$	Bi – a score given by the users of the HRM system, points; Bmax – the maximum score, 10 points.
4	Reduction of the duration of work at the expense of the HRM system	$Rdw = Dwb / Dwa$	Dwb – the duration of work before the implementation of the HRM system, hours; Dwa – the duration of work after the implementation of the HRM system, hours.

*Note.* Built on the basis of materials of author's research and summarization of sources [1–6]

1) indicators of the effectiveness of the use of personnel and operational control of HR functions (indicators of the effectiveness and profitability of human capital; indicators of the effectiveness of personnel selection; indicators of the effectiveness of the material motivation of personnel; indicators of the evaluation of the management of the effectiveness of activities; indicators of the effectiveness of training and development; indicators of staff turnover and permanency; indicators of kar' eras and successions);

2) indicators of the level and efficiency of personnel management automation through the use of HRM systems.

The procedure for calculating the integral coefficient of efficiency of human capital and the integral coefficient of efficiency of HRM processes at the enterprise according to our proposed system of indicators consists of the following three stages:

1. Calculation of relative indicators for each individual group and subgroup based on enterprise data.

2. Calculation of integral efficiency coefficients of human capital and HRM processes at the enterprise for each group and subgroup.

3. Calculation of the total integral efficiency coefficients of human capital and HRM processes at the enterprise, which are defined as the total value of the normalized integral efficiency coefficients separately for the first and second groups.

We note the following main advantages of the given system of indicators:

- it is based on the careful selection and development of indicators (subgroups are selected in the main groups of indicators);

- it built on the relative values of indicators that can be quantitatively measured;

- it is inextricably linked with both quantitative and qualitative analysis and takes into account such components as administrative and economic criteria, staffing criteria, social orientation criteria, technological efficiency criteria;

- it built on the basis of statistical analysis and standardized and measurable indicators;

- both general economic and unique indicators are taken into account in the system;

- does not contain specific parameters, which makes it possible to compare enterprises that differ in size, number of employees and level of development;

- provides consideration in the analysis of the strategic direction of management, which makes it possible to identify real prospects for the use of the latest technologies;

- does not require significant time for evaluation, and the calculation of parameters can be automated.

Within the framework of the proposed system, the result of evaluating the effectiveness of human capital and HRM processes at enterprises can be visualized by constructing a structural comparative diagram.

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## **CORPORATE VOLUNTEERISM BORN OF WAR: THE CASE OF UKRAINE**

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### **Abstract**

The purpose of this work is the theoretical and practical substantiation of the concept and phenomenon of corporate volunteering, factors and directions of its activation during the war, optimization of its positive impact on society and in the aspect of approaching Victory, and from the point of view of the post-war recovery of Ukraine.

**Key words:** *corporate volunteering, war, policy of corporate volunteering, corporate social responsibility, corporate culture.*

Developed volunteer activity is an indicator of a highly moral society that strives to improve its country with the help of conscious, purposeful, active actions. Currently, the share of the population involved in volunteering is growing in many countries and in the world in general. Together, volunteers improve the quality of life on the planet. Also, many studies show that countries with a higher level of citizen involvement in volunteering have more successful economies [1; 2]. According to the UN Volunteers program, which takes care of the development of volunteerism and the organization of volunteer activities, approximately one in seven people in the world is a volunteer – almost a billion (970 million) of them. Their work is the equivalent of 125 million full-time jobs or \$1.348 trillion per year (which is 2.4% of the world economy). These are very different people with different professions, fortunes, interests and goals, but they all have a common value – concern for people, nature and society [3; 4].

In the conditions of a cruel, terrible, protracted war, Ukraine became one of the countries with the most developed volunteer movement. Therefore, in such a multifaceted phenomenon as "volunteering", different directions have emerged. In this work, the authors explore the direction of corporate volunteering. This topic has become very important for Ukraine since 2014,

and has become especially relevant during the last two years of Russia's full-scale war against our people and civilizational values in general.

Using scientific developments [1; 5], as well as the Law of Ukraine "On Volunteering"[6], we formulate the following definition: *Volunteering* is a form of voluntary activity in which a person uses his human resources, namely: his time, talents, strength, skills to help others or to support a specific good cause, organization or initiative without financial compensation for this activity. Volunteers are treated with great respect in Ukraine today. After all, since 2014 and especially after February 24, 2022, our volunteers have demonstrated to the whole world that they are a powerful force capable of organizing, uniting and helping to solve very serious issues. Currently, Ukrainian volunteers are the most important support for the Armed Forces. They find and deliver necessary things, including military supplies, food, help evacuate the wounded, and support the morale of soldiers even in the hottest spots. Volunteers also help affected children and adults, ensure their comfort and safety, take care of abandoned animals, etc.

Volunteerism, which was born and gained popularity as an individual choice of conscious people, nowadays begins to acquire corporate features, because acting unitedly by a familiar team with the support of management means significantly reducing the problems of limited resources, lack of opportunities, lack of important information, etc., and therefore – to significantly increase the results of voluntary work activity.

Corporate volunteering is based on the following main pillars: 1) high-level corporate social responsibility; 2) developed strong corporate culture [7; 8]; 3) respect of enterprise managers and employees for universal human and national civilizational values.

Accordingly, there are various corporate programs aimed at solving social problems: environmental, cultural, sports, technical, educational, career guidance, aimed at the development of 21st century skills (creativity, systemic approach, teamwork), etc. Corporate volunteering programs are expedient events organized by the enterprise to involve internal and external stakeholders in socially useful voluntary free activities. Repetitive and then systematic volunteer programs need to be systematized and over time are formalized into a corporate volunteering policy.

*The policy (concept) of corporate volunteering* is a system of views, a defining idea, a set of principles, methods, evaluation criteria and tools of influence on the processes of organization, improvement and use of corporate volunteer programs of the enterprise. It includes the planning and procedure for conducting volunteer activities, the implementation

of regulatory documents to determine how the company promotes and supports the voluntary participation of its staff in social and charitable initiatives. A social initiative is a specific activity of a person aimed at solving social problems, improving the quality of life of citizens or solving specific challenges in society.

Volunteering encourages people to step out of their comfort zone, see new realities, and challenge themselves to solve an actual social problem [9]. One of the characteristic features of volunteer programs for employees is their connection with training components at work, which demonstrates the interaction of volunteering and corporate involvement of employees, contributing to social development, team cohesion, and corporate responsibility.

The main *principles* of corporate volunteering can be summarized as follows: voluntary, free of charge, social utility, high relevance. It is worth highlighting the following main tasks of corporate volunteering: creating social value, supporting important non-profit projects, mobilizing resources, solving/mitigating current problems.

Many Ukrainian enterprises, in our time of unprecedented and terrible challenges, cooperate with a large number of citizens, study their problems, analyze the most common needs and show their concern and respect for society through the prism of various volunteer activities. Corporate volunteering programs demonstrate this interconnectedness between business and society. Noticeable activation of Ukrainian corporate programs began in 2014, after the invasion of Russia on the territory of Ukraine. Many companies started to hold various corporate programs, at most companies employees were the first to express their desire for this type of volunteering.

First of all, these programs include: online fundraising for the needs of defenders, weaving camouflage nets, training in first aid, support for victims, care for animals, etc. During all these years, the companies themselves mainly involved their employees in volunteer activities: cleaning and restoration of territories, collecting essential items for the needy, direct assistance to the victims, etc.

We conducted research on the example of 20 domestic and international companies operating in Ukraine (of various types of activity, scale and level of development of corporate volunteering) using surveys, in-depth interviews with managers and thematic analysis method.

The study showed that in 18 out of 20 organizations, corporate volunteering existed to a greater or lesser extent until 2022, but with the beginning of a large-scale war, it arose in 2 and significantly intensified in all organizations. Almost all employees of the studied organizations take part in

corporate volunteering at various levels. There was a need to spread clear and informative messages about volunteering: different areas of volunteering, opportunities to volunteer with colleagues, friends or family, and tools for this were quickly created in corporate chat. And 14 enterprises have created special chats ("I want to help", "Help us", "For Victory", etc.). Active volunteering in the first months of the full-scale war gave many people the opportunity to find their role in the approach of Victory, to direct noble anger in a constructive direction, to feel like a participant in the national movement of resistance to the aggressors.

Investigating the development of corporate volunteering over time, we noted an interesting fact: a spontaneous, powerful surge in the first months of a full-scale war has been regulated over time and is increasingly based on professional competencies, integrated with the values and internal culture of the organization. Volunteering helps spread corporate values both within and outside the organization. It can also be noted that joint work for the sake of Victory has become one of the most important values at many enterprises.

Such forms of corporate volunteering as events accompanied by the collection of funds for the needs of the army, systematic donation, constant assistance to mobilized employees and their families, etc., are regular at all the investigated enterprises. At the same time, new areas of corporate volunteerism are emerging, related to the reintegration of combatants into civilian life, the creation of jobs for people with special needs, the restoration of de-occupied territories, the support of social enterprises, and the renewal of the competencies of demobilized and internally displaced people to increase competitiveness and effective return to the labor market.

Corporate volunteering, when it is aimed at the implementation of common values and takes into account important aspects of the company's strategy, has a lasting and significant impact on all participants. At the same time, it is important to constantly adapt programs in accordance with changes in the socio-economic environment and internal development of the company.

### **Conclusion.**

In the modern world, volunteering is an indicator of the development of the welfare state and a highly developed, respectable society. Corporate volunteering programs are an indispensable sign of a high level of organizational culture and corporate social responsibility. Corporate volunteering becomes not only socially, but also economically significant if it is aligned with business strategy. The integration of corporate volunteering into the daily activities and tasks of companies reflects the modernization of business development.

The study showed the large-scale spread of corporate volunteering in Ukraine since 2014, and its intensification unprecedented in the world since February 2022. The generalization of forms and methods of corporate volunteering at the most active enterprises provides an opportunity to promote its development and popularization throughout the country among all employees.

Despite the benefits that volunteering brings to all its participants, there is still a lack of strategies for disseminating information and evaluating the results, a scientific approach to determine the impact on society. This will be the subject of our further research.

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## MODELLING OF INVESTMENT PROCESSES IN A CONSTRUCTION CORPORATION

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### **Abstract**

The article characterises the peculiarities of the modern method of construction management – investment process modelling. The main directions, stages, tasks and key elements of investment processes modelling in the construction corporation are consistently disclosed.

**Key words:** *Business Process Modeling, BIM technologies, Integrated Project Delivery, construction management.*

Business Process Modeling is a modern method of improving the efficiency of a construction firm, which is based on the process approach to construction management. The management of investment resources of a construction corporation is carried out in three directions:

- through the management of production capacities and investment attractiveness to budgeting and economic support of investment activity development directions;
- through planning and forecasting of investment activities to the effective development of investment flows;
- through technical support of investment activity within the framework of BIM using.

Modelling of investment processes in construction involves the sequential execution of stages, including all stages of the life cycle of a construction project. The use of BIM technologies allows to represent the construction object in virtual space, including structural and architectural elements, to define construction and installation works, to calculate the required amount of materials, to assess the level of costs and the efficiency of money investment.

The key elements of the investment model of an investment project are:

- investment objectives, which are generally aimed at ensuring financial stability, increasing the company's capitalisation, income generation, long-term growth and tax efficiency;

– risk tolerance, which manifests itself in the construction company's ability to mitigate external and internal risks. Investors with high risk tolerance are willing to accept higher levels of risk to achieve higher returns. Conversely, investors with low risk tolerance prefer less volatile investments;

– investment time horizon involves determining the relationship between the time period and opportunities to invest in assets with higher volatility (large-scale investment construction projects);

– asset allocation is the process of dividing an investment portfolio between different asset classes such as equities, bonds and financial resources;

– diversification and rebalancing, which involves allocating investments across different investment construction projects that have different values.

The main tasks of the technical customer within the framework of information modeling are formed in accordance with the requirements within the framework of the main stages of the implementation of the investment construction project. At the same time, the tasks of information modeling of a technical customer are logically divided into external (participants in an investment construction project) and internal (technical customer).

External tasks:

– formulation of the customer's information requirements for all participants of the investment construction project (reflected in the contracting agreement);

– creation of a common data base (a common platform for placing, storing and retrieving project data for all participants).

Internal tasks:

– information modelling for investment performance justification;

– information modelling for construction control.

In accordance with the stages of an investment construction project, it is necessary to define the main tasks of the technical customer at the pre-project and design stages, as well as at the construction stage.

The pre-project (pre-investment) stage includes the development of a feasibility study, preparation of the technical task for design and obtaining permits. The main tasks of the pre-project stage include formulating a project idea, searching for and evaluating a facility, evaluating a land plot, and developing a business plan.

For this purpose, work is carried out, including assessment of the land plot, development of variants of volume-planning and technological solutions, determination of engineering loads, assessment of environmental

impact, determination of sources and volumes of financing, assessment of economic feasibility of investments, determination of social and environmental benefits of operation of the construction object.

The result of the pre-project stage is the development of the project feasibility study and the preparation of the design specification. All collected documentation is the information basis for further modelling, so it is important to get it in a certain format. This work can be carried out either in-house by the technical customer or with the involvement of an external organisation.

Also, within the framework of the pre-project stage in many construction corporations in Europe, the quality system of investment projects is actively used, which is functionally aimed at establishing the priorities of owners, investors and clients; identifying reserves to improve competitiveness; identifying potential opportunities to reduce the time for preparatory work; market research; building a planning matrix "investor preferences – opportunities of the construction organisation". In general, the quality system of investment projects of a construction corporation combines the means of achieving the goal and the results, with the means of achieving the goal accumulating the investor's expectations embodied by the activities of the construction corporation, and the results depend entirely on the effectiveness of programme management. At the same time, four consecutive documents form the basis of the investment strategy:

1. The planning matrix, which translates the investor's requirements into the technical characteristics of the project.
2. Project Characteristics Structuring Matrix, which facilitates the transformation of the output of the planning matrix into the characteristics of the construction project in the previous stages.
3. Process plan and control charts providing for planned characteristics and means of their control.
4. Process instructions based on the project parameters and detailing the production operations.

The design stage (investment stage) includes the development of design documentation required to ensure the implementation of the investment project at the construction stage. The main task of this stage is the development of the project of works, creation of the project information model of the object, including detailed design documentation, as well as the creation of the information model for passing the expert examination.

In this case, the information model should meet the technological requirements of the investor (customer), ensure the possibility of using all data entered into the project database created on the basis of BIM by all

project participants, including construction contractors, and be the key (main) source of data for construction control implementation.

At the design stage, the use of BIM is carried out in accordance with the requirements of the technical customer, which are reflected in the technical task for design. Solving the tasks of the design stage involves the use of BIM Level 3, which allows to perform design work by sections, create a unified information model of the object, solve design problems to pass the expert examination. This model includes all sections of the project, ensures consistency of information, allows to verify the accepted design decisions and make changes at the construction stage. The model is transferred to the technical customer for further use during the construction phase. The main result of the design stage is the creation of an information model of the object for passing the expertise and fulfilment of the project at the construction stage.

At the construction stage, information modelling involves solving many different tasks in terms of complexity and content, including construction and installation works, project logistics and construction control. The main document at the construction stage is the information model of the construction project, which contains information about the object to be built, is in a database of common data, and is available for use by all construction participants and for the construction control system.

During the construction phase, the technical customer ensures that the information model is adjusted to reflect changes made to the work design, logistical models and construction control results. The corrected information model is a source of information on the object and is generally available in the general data base. Logistics is a separate stage of information modelling of the object and is carried out on the basis of the object model in parallel with other stages.

Information modelling of construction control contains information on processes and results of control, analysis of results, management of the process of remediation of remarks. The information model of the object and the model of the project of work production during the construction process are supplemented with flow charts and used for construction control.

As a result of implementation of the construction stage, an operational information model of the object is created, including project adjustments and information requirements of the investor or operating organisation. It should be noted that information modelling of investment construction project implementation is carried out under the guidance of the technical customer at each stage of the project life cycle.

To organise effective interaction between project participants, it is recommended to use Integrated Project Delivery (IPD), which is designed for information modelling projects. Integrated Project Delivery (IPD) is a tool for the implementation of investment construction projects, allows to reduce costs and increase efficiency at all stages of planning, design and construction. The use of IPD makes it possible to unite in a single process the fulfilment of all stages of the project, as well as to take into account the interests of the participants of the investment cycle. The principles of IPD approach realisation are fixed in special contractual relations between all participants of construction object creation. The main task of IPD is to ensure the fulfilment of the construction schedule, including compliance with the deadlines for the development of working documentation and delivery of necessary construction materials during the construction process. The use of IPD allows the distribution of risks and responsibilities in the process of investment construction project realisation between the project participants.

The result of the construction stage is the commissioning of the facility and the creation of a model of the facility for operation. At the operation stage (operational stage), information modelling of the facility operation is performed, including marketing strategy, facility maintenance plan, operation risk management strategy.

Implementation of BIM technology facilitates effective design decisions and provides the following advantages for the construction corporation:

- unlimited possibilities to make the best design decision taking into account all available data;
- the ability to share information between all project stakeholders;
- reduction of costs and design errors;
- reduction of time spent on project development, as it becomes possible to realise some operations jointly;
- BIM-technologies make it possible to accurately build the engineering systems of the building;
- faster and easier selection of required equipment;
- accurate specification through automation;
- the main economic and ecological characteristics of the building are determined already at the stage of preliminary design, which allows to make changes in the project in advance;
- the management and control process are optimised in accordance with the work schedule. As a result, a 30% reduction of construction and operation costs is achieved; a 40% reduction of errors, errors in project documentation; a 50% reduction of project implementation time;

– reduction of technologists' work time by 20%; reduction of architects' work time by 10% [1].

Applying BIM-technologies allows to create an effective management system at all stages of the project life cycle. In this case, the information model is a reliable and objective source of information about the object, which significantly increases the efficiency of the design, construction and operation processes.

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## SECTION 8. EMERGING TRENDS IN TOURISM MANAGEMENT

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### UNDERSTANDING THE ENTREPRENEURSHIP ECOSYSTEM: A COMPREHENSIVE ANALYSIS

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#### **Abstract**

Entrepreneurship ecosystems play a crucial role in fostering innovation, economic growth, and job creation. This paper provides a comprehensive analysis of entrepreneurship ecosystems, exploring their key components, dynamics, and impact on entrepreneurial activities. Drawing upon existing literature and case studies, this research paper examines the elements of successful entrepreneurship ecosystems, including access to capital, supportive regulatory frameworks, networking opportunities, and a culture of innovation. Additionally, it explores the challenges faced by entrepreneurs within these ecosystems and proposes strategies for policymakers, investors, and stakeholders to enhance ecosystem effectiveness. Through a multi-dimensional approach, this paper contributes to a deeper understanding of entrepreneurship ecosystems and provides insights for fostering vibrant entrepreneurial communities worldwide.

**Key words:** *Entrepreneurship Ecosystems, Innovation, Economic Growth and Employment opportunity.*

#### **1. Introduction**

These The entrepreneurship ecosystem represents a complex interplay of various factors that shape the environment in which entrepreneurs operate and thrive. Understanding this ecosystem is paramount in today's dynamic business landscape, where entrepreneurship plays a crucial role in driving innovation, economic growth, and job creation. This comprehensive analysis aims to delve deep into the intricacies of the entrepreneurship ecosystem,

exploring the multifaceted interactions between entrepreneurs, investors, policymakers, support organizations, and the broader socio-economic context. By examining the critical components, relationships, and dynamics within the ecosystem, this research endeavours to provide insights into how different elements influence entrepreneurial activities, identify barriers and opportunities, and suggest strategies to foster a more conducive environment for entrepreneurial success.

- Gain insights into how different elements influence entrepreneurial activities.
- Identify both barriers and opportunities faced by entrepreneurs.
- Suggest strategies to cultivate a more conducive environment for entrepreneurial success

## **2. What is entrepreneurship?**

Using The word “entrepreneur” is derived from the French verb *entreprendre*. It means “to undertake”. In the early 16th century, the Frenchmen who organized and led military expeditions were referred to as “entrepreneurs.”

The term “entrepreneur” was applied to business initially by the French economist, Cantillon, in the 18th century, to designate a dealer who purchases the means of production for combining them into marketable products.

Entrepreneurship is the process of creating a new business, venture, or initiative with the aim of generating profit and making a positive impact. It involves identifying opportunities, developing innovative solutions, managing resources, and navigating challenges.

### **• Characteristics of Entrepreneur**

Entrepreneur is a key figure in economic progress. He is the person who introduces new things in the economy. He is considered as the business leader and not as simple owner of capital. He is a person with telescopic faculty, drive and talent who perceives business opportunities and promptly seizes them for exploitation. However, to be successful, an entrepreneur should have the following characteristic features:

Table 1

**Characteristics of Entrepreneur**

Characteristics of Entrepreneur	
Need to Achieve	Interpersonal Skills
Independence	Need to Influence Others
Locus of Control	Stress Takers
Risk – Bearing	Time Orientation
Positive Self-Concept	Innovators
Ability to Find and Explore Opportunities	Business Communication Skill
Hope of success	Leadership
Flexibility	Telescopic Faculty
Analytical Ability of Mind	Business Planning
Sense of Efficacy	Decision Making
Openness to Feedback and Learning from Experience	Ability to Mobilize Resources They have to mobilize 6 Ms, i.e. Man, Money, Material, Machinery, Market and Method effectively to realize the final product as entrepreneurship is function of gap filling and input completing
Confronting Uncertainly	Self – confidence

**• Classification of Entrepreneurs**

According to the types of business	According to the stages of Development	According to the growth	According to the use of technology	According to area	Others or unclassified	According to gender and age	According to the motivation
1. Business entrepreneur 2. Trading entrepreneur 3. Industrial entrepreneur i) Large ii) Medium iii) Small and iv) Tiny 4. Corporate entrepreneur 5. Agriculture entrepreneur i) Plantation ii) Horticulture iii) Dairy iv) Forestry 6. Retail entrepreneur 7. Services entrepreneur	1. First generation entrepreneur 2. Modern entrepreneur 3. Classical entrepreneur	1. Growth entrepreneur 2. Super- growth entrepreneur	According to the use of technology 1. Technical entrepreneur 2. Non-technical entrepreneur 3. Professional entrepreneur 4. High-tech entrepreneur	1. Urban entrepreneur 2. Rural entrepreneur	1. Professional entrepreneurs 2. Non-Professional entrepreneurs 3. Modern entrepreneurs 4. Traditional entrepreneurs 5. Skilled entrepreneur 6. Non-Skilled entrepreneurs 7. Imitating entrepreneurs 8. Inherited entrepreneurs 9. Forced entrepreneurs 10. National entrepreneurs 11. International entrepreneurs 12. Bureaucratic entrepreneurs 13. Entrepreneur entrepreneurs 14. Immigrant entrepreneurs.	1. Men entrepreneurs 2. Women entrepreneurs i) Young entrepreneurs ii) Old entrepreneurs iii) Middle-aged entrepreneurs	1. Pure entrepreneur 2. Induced entrepreneur 3. Motivated entrepreneur 4. Spontaneous entrepreneur

**Figure 1. Classification of Entrepreneurs**

### 3. Entrepreneur vs. Entrepreneurship

The term “entrepreneur” is often used interchangeably with “entrepreneurship”. But, conceptually, they are different, yet they are just like the two sides of a coin. Their differences are as follows:

Entrepreneur	Entrepreneurship
Refers to a person	Refers to a process
Visualizer	Vision
Creator	Creation
Organizer	Organization
Innovator	Innovation
Technician & Initiator	Technology & Initiative
Decision-maker & Planner & Leader	Decision & Planning & Leadership
Motivator	Motivation
Programmer	Action
Risk-taker	Risk-taking
Communicator	Communication
Administrator	Administration

**Figure 2. Entrepreneur vs Entrepreneurship**

### 4. Key Components of Entrepreneurship Ecosystems

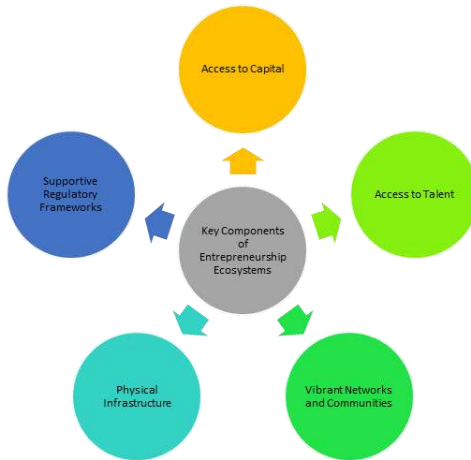
– **Access to Capital:** Entrepreneurship ecosystems rely on access to financial resources and investment networks to fund startups and sustain growth, making capital availability a critical component.

– **Supportive Regulatory Frameworks:** Government policies and regulatory frameworks create a conducive environment for entrepreneurship by establishing legal and institutional support systems that facilitate business operations and innovation.

– **Access to Talent:** The presence of a skilled workforce is essential for driving innovation and executing business strategies effectively. Entrepreneurship ecosystems thrive on access to talent pools capable of contributing to venture development.

– **Vibrant Networks and Communities:** Incubators, accelerators, and mentorship programs form vital components of entrepreneurship ecosystems, fostering knowledge exchange, collaboration, and access to resources among entrepreneurs.

– **Physical Infrastructure:** Co-working spaces, research facilities, and technology hubs provide the necessary physical infrastructure for entrepreneurs to develop and scale their ventures. Infrastructure investments contribute to the overall vibrancy and growth of entrepreneurship ecosystems.



**Figure 3. Key Components of Entrepreneurship Ecosystems**

### **5. Dynamics of Entrepreneurship Ecosystems**

Dynamics of entrepreneurship ecosystems encompass a complex interplay of various factors that influence the evolution and sustainability of entrepreneurial activities within a given region or industry. These dynamics involve several key components that shape the environment for entrepreneurship and drive its trajectory over time. One fundamental aspect is the flow of resources, including financial capital, human capital, and intellectual property, which fuels the creation and growth of startups. Additionally, the regulatory landscape and policy frameworks continually evolve, impacting the ease of doing business, access to funding, and the level of support available to entrepreneurs. Market dynamics, including consumer preferences, industry trends, and competitive forces, also play a crucial role in shaping entrepreneurial opportunities and challenges. Moreover, the presence of supportive infrastructure, such as incubators, accelerators, and co-working spaces, fosters collaboration, innovation, and knowledge exchange among entrepreneurs and ecosystem stakeholders. Social and cultural factors, such as risk perception, entrepreneurial mind-set, and community support, further influence the dynamics of entrepreneurship ecosystems by shaping attitudes towards entrepreneurship and risk-taking behaviour. Finally, external shocks and disruptive events, such as economic downturns, technological advancements, or global crises, can significantly impact the resilience and adaptability of entrepreneurship ecosystems, driving changes in their structure and composition. Understanding the

dynamics of entrepreneurship ecosystems requires a holistic perspective that considers the interactions and feedback loops between these various components, as well as their implications for entrepreneurial activity, innovation, and economic growth.

## **6. Impact of Entrepreneurship Ecosystems**

– Entrepreneurship ecosystems drive economic growth by fostering innovation, productivity gains, and wealth creation. They contribute to job creation, income generation, and poverty alleviation, thereby enhancing overall prosperity and economic resilience.

– Entrepreneurship ecosystems promote innovation and technological advancement by providing a conducive environment for experimentation, collaboration, and knowledge exchange among entrepreneurs, researchers, and industry stakeholders. This leads to the development of new products, services, and business models that address market needs and drive competitiveness.

– Entrepreneurship ecosystems foster inclusion, diversity, and social mobility by providing opportunities for individuals from diverse backgrounds to pursue entrepreneurship and contribute to societal progress. They play a role in promoting social cohesion and reducing inequalities within communities.

– Entrepreneurship ecosystems can have a transformative impact on local communities by revitalizing urban areas, attracting talent and investment, and catalysing broader ecosystem development across sectors. They contribute to the creation of vibrant and dynamic communities that offer opportunities for growth and development.

– The impact of entrepreneurship ecosystems may vary depending on contextual factors such as the level of institutional support, the availability of resources, and the presence of enabling infrastructure. Understanding the nuanced impact of entrepreneurship ecosystems requires considering their contributions to economic, social, and environmental outcomes, as well as their long-term sustainability and resilience.

## **7. Conclusions**

Technical Entrepreneurship ecosystems represent dynamic and interconnected networks of stakeholders, resources, and institutions that collectively support entrepreneurial activity and innovation. Throughout this analysis, we have explored the key components, dynamics, and impact of entrepreneurship ecosystems, highlighting their significance in driving

economic growth, fostering innovation, and promoting social development. From the identification of key stakeholders and resources to the understanding of ecosystem dynamics and their broader impact on society, it is evident that entrepreneurship ecosystems play a crucial role in shaping the economic and social landscape of regions and industries. However, while entrepreneurship ecosystems offer significant opportunities for economic and social development, they also present challenges related to access to resources, inclusivity, and sustainability. Therefore, policymakers, entrepreneurs, and ecosystem stakeholders must work collaboratively to strengthen entrepreneurship ecosystems, address systemic barriers, and leverage their potential for inclusive and sustainable growth. By fostering collaboration, promoting innovation, and supporting entrepreneurship at all levels, we can build more resilient, equitable, and prosperous societies. Moving forward, continued research, monitoring, and evaluation will be essential to better understand the dynamics of entrepreneurship ecosystems and inform evidence-based policy interventions that maximize their impact and ensure their long-term sustainability.

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## **SUSTAINABLE TOURISM: BALANCING ECONOMIC, SOCIO-CULTURAL, AND ENVIRONMENTAL IMPACTS**

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### **Abstract**

This research examines sustainable tourism, examining its guiding principles, obstacles, and effects on the world travel and tourism sector. Utilizing significant studies and publications, such as the WCED report and UNEP and UNWTO publications, the research explores the fundamental idea of sustainable development in relation to tourism. The study underscores the significance of striking a balance between the expansion of tourism and the preservation of the environment and the welfare of the community by analyzing the effects on the economy, environment, and socioculture. It tackles problems including overtourism, environmental damage, and sociocultural upheaval, emphasizing the need for coordinated initiatives to advance eco-friendly travel behaviors. Policymakers, industry stakeholders, and tourists who want to encourage the growth of ethical and responsible tourism can all benefit from the findings.

**Key words:** Sustainable development, tourism principles, environmental impact, socio-cultural impact, economic benefits.

### **1. Introduction**

The concept of sustainable development has gained popularity across multiple industries, including the travel and tourist sector. Sustainable development in the tourist industry is defined as supplying current demands without compromising the potential of future generations to provide their own requirements (WCED, 1987). This requires a comprehensive strategy that takes into account sociocultural, environmental, and economic factors. With the tourist sector expanding quickly and becoming more globalized, there is an increasing awareness of the need to balance the industry's good contributions with minimizing its detrimental effects on the environment and

local populations. The purpose of this paper is to investigate the tenets and goals of sustainable tourism development, looking at the effects on the environment, economy, and society. Stakeholders can ensure the long-term sustainability of tourism by realizing the significance of sustainable tourism principles and putting them into practice.

In the report of the World Commission on Environment and Development (WCED) in 1987, a widely used definition of sustainable development was provided, stating that it is "a process to meet the needs of the present without compromising the ability of future generations to meet their own needs." This definition emphasizes two key concepts: prioritizing the needs of people, especially the poor, and recognizing the limitations of natural resources and the environment. It implies that sustainable development relies on three important indicators: economic, environmental, and social, which are interconnected and essential for sustainability.

Sustainable development principles, as highlighted by the Brundtland Report, encompassing a holistic approach to planning and strategy, protection of the environment and cultural heritage, preservation of essential ecological processes, facilitation of public participation, and ensuring long-term productivity and fairness.

## **2 Sustainable Tourism Principles**

Sustainable tourism principles, as outlined in the book "Making Tourism More Sustainable" by UNEP and UNWTO, focus on ensuring the continuity of tourism activity in the future and maximizing the benefits for society and the environment in a sustainable manner. These principles aim to minimize negative impacts on the environment, social-cultural aspects, and economy while maximizing the positive contributions of tourism, including benefits for local residents and visitors, and protection of natural and cultural resources.

The twelve aims for an agenda for sustainable tourism provide a framework for achieving sustainability in tourism, emphasizing economic, social, and environmental aspects. These aims include minimizing negative impacts of tourism, maximizing positive contributions, and ensuring fairness and opportunity for all stakeholders.

## **3. Sustainable Tourism Strategy**

The main aim of sustainable tourism strategy is to increase the number of tourists while adhering to sustainable development principles. This involves coordinating all stakeholders, inventorying tourism products,

considering local community and environmental interests, assessing marketing perceptions, and developing a comprehensive marketing plan.

Sustainable tourism strategy also involves minimizing negative environmental impacts such as trash, contamination, and over-tourism, while ensuring that local communities benefit from tourism development through protection of their culture, preservation of their environment, and fair distribution of income streams.

#### **4. Environmental Impact of Tourism**

Tourism development can have wide-ranging negative impacts on the environment, including landscape degradation, biodiversity loss, and water imbalance. However, it can also contribute positively to environmental conservation through revenue generation for protected areas and promoting eco-friendly practices.

Sustainable tourism development requires making optimal use of environmental resources, respecting socio-cultural authenticity, ensuring viable long-term economic operations, and minimizing negative environmental impacts such as pollution and habitat destruction.

#### **5. Socio-cultural Impact of Tourism**

Tourism development can lead to changes in local social structures and practices, including commercialization of culture and social conflicts. However, positive cultural changes can be encouraged through supporting local enterprises and promoting appropriate tourist behaviour.

Sustainable tourism principles aim to preserve the socio-cultural authenticity of host communities, conserve their built and living cultural heritage, and contribute to inter-cultural understanding and tolerance. By engaging local communities in tourism development decision-making processes, the negative socio-cultural impacts of tourism can be minimized, and communities can benefit from tourism development in a sustainable manner.

#### **6. Economic Impact of Tourism**

Tourism development presents significant economic opportunities for reducing poverty through job creation and income generation. However, responsible development and management are crucial to realizing the expected economic benefits while minimizing negative impacts such as revenue leakages and inflation.

Sustainable tourism development requires ensuring that economic benefits are fairly distributed among all stakeholders, including local

communities, businesses, and governments. This involves maximizing the use of local products and services, minimizing revenue leakages, and investing in tourism infrastructure that benefits local communities.

**Promoting Sustainable Tourism Practices** Consumer Preferences and Sustainable Tourism Options According to WEF (2009), 6% of international tourists currently pay extra for sustainable tourism options, while an additional 34% express willingness to pay extra for such offerings. This highlights the growing importance of incorporating sustainable practices to meet consumer demand and promote environmentally responsible tourism.

## 7. Results

Our research's findings highlight how important sustainable tourism methods are. Important guidelines have been established, such as giving priority to immediate needs without sacrificing long-term goals, maximizing benefits while reducing drawbacks, and guaranteeing equitable resource allocation. We can maintain tourism, safeguard the environment, save cultural heritage, and foster economic expansion by putting these ideas into practice. It is essential that stakeholders coordinate their efforts, take into account local interests, and create efficient marketing and management plans. In ultimately, sustainable tourism has the ability to help local economies, ecosystems, and upcoming generations in the long run.

## 8. Conclusions

The vital importance of sustainable tourism in the modern world is emphasized by this study. We emphasize the need for a comprehensive strategy to tourist development that takes socio-cultural legacy, environmental preservation, and economic prosperity into account by looking at its tenets, difficulties, and ramifications. Organizations like the WCED, UNEP, and UNWTO support sustainable tourism, which strives to satisfy current and future demands while maintaining the viability of tourism-related activities and their beneficial effects. Our research highlights the advantages and disadvantages of tourism growth. There are problems associated with tourism, including overtourism, environmental damage, and the commercialization of culture, even while it may also spur economic growth, generate jobs, and promote cross-cultural interchange. Therefore, in order to minimize adverse effects and optimize advantages for nearby communities, the environment, and future generations, stakeholders need to implement sustainable practices.

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## IMPROVEMENT OF MARKETING ACTIVITIES OF THE POSCO INTERNATIONAL TEXTILE COMPANY

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### **Abstract**

Marketing is definitely not a new management function, however, very important for the effective functioning of the enterprise. The textile industry is not only an industry that produces non-food consumer goods for the population, but also has a social orientation, as it contributes to the creation of new jobs. With the development of the textile industry in Uzbekistan, hopes are pinned on solving many economic and social problems. This circumstance makes this industry a relevant object for market research. The textile industry is of particular importance for Uzbekistan. Main goal is to develop measures to improve the marketing activities of the Posco International textile company.

**Key words:** Please select a maximum of 5 keywords from the keyword list.

### **1. Introduction**

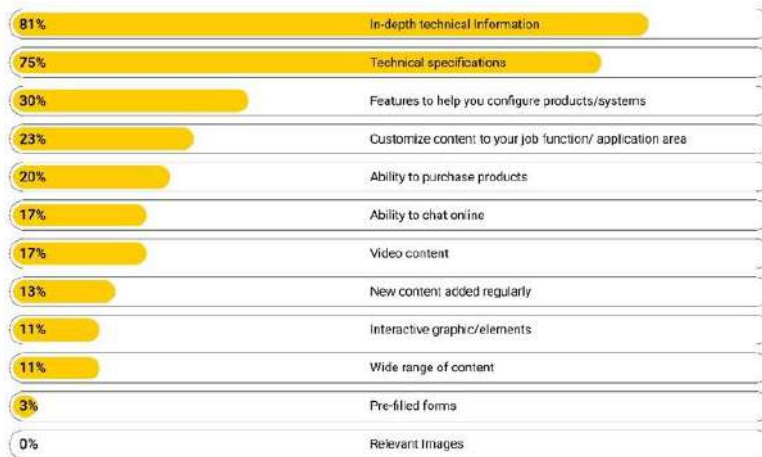
Marketing is one of the fundamental activities of market participants, an organizational function and a set of processes for creating, promoting and providing a product or service to customers and managing relationships with them for the benefit of the organization. The organization's strategy, its pricing policy, production and output volumes, product range expansion are just some examples of the use of marketing.

The textile industry is strategically important for the development of the economy of Uzbekistan. Its own large raw material base, the labor intensity of light industry, and the presence of a relatively massive market in neighboring countries make the development of textile and clothing production in Uzbekistan one of the potential drivers of growth. Unlocking this potential and forming a strong textile and clothing sector in the country is one of the priority areas for the development of the national economy.

## 2. Results

Firstly, authors aims to state importance of the marketing:

- a) Through marketing, companies can reach potential customers and inform them about their products.
- b) Marketing also helps companies to segment their target market and tailor their marketing efforts to specific groups of customers.
- c) In the textile industry, branding is of utmost importance as it helps companies to establish a unique image in the minds of customers.
- d) Marketing also helps companies to keep pace with the changing needs and preferences of customers.
- e) Marketing helps companies to create a relationship with their customers.
- f) It is also crucial in creating a positive image of the company and its products.
- g) Effective marketing strategies can help companies to stay ahead of the competition.



**Figure 1. Most important features for website [1]**

The share of the textile industry in the volume of manufacturing output at the end of 2020 was more than 15%, and in the production of non-food products – over 30%. Today, the entire production potential of Uzbekistan is capable of providing the market with more than 2 million units of finished

products (excluding hosiery), fabrics – 1.2 billion square meters. m, yarn – 705 thousand tons.

The textile industry also has high export potential. In recent years, exports of textile products have increased 2.8 times, from \$1.1 billion in 2017 to \$3.2 billion in 2022. In particular, yarn exports increased 2.2 times (from 646 million dollars to 1.5 billion dollars), fabrics by 3 times (from 59 million dollars to 175 million dollars), knitted fabric by 6.2 times (from 50 million dollars to 308 million dollars), sewing – knitwear by 3.3 times (from \$359 million to \$1.2 billion).

The number of enterprises in the industry over the past six years has increased 2.4 times from 7.7 thousand to 18.4 thousand.

Technology. The Uztekstilprom Association on its website presented a plan for the transition of the textile industry to a digital format. The association spoke about new digital projects – 1fintex.uz, uzbtextile.uz and the Textile Makon media center.

"Posco International Textile" is a modern dynamic enterprise that specializes in production of textile products: cotton rough fabrics and yarn, using the best grades of cotton, grown in Uzbekistan as raw materials.

Achievements:

The sales volume reached 140 mln dollars

Yarn production volume per year – 49 000 t

Number of spindles – 250 000 pcs.

The number of employees – 4000.

### **3. Conclusions**

The textile industry plays an important role in the economy of Uzbekistan and the government supports it. To achieve great results, the company needs to introduce modern marketing methods, which will allow it to increase production volumes, and expand the company's sales channels. Development and implementation of measures to improve the marketing activities of the Posco International textile company will increase the number of customers, which will lead to an improvement in the financial performance of the company.

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## A JOURNEY THROUGH GASTRONOMIC TOURISM

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### **Abstract**

Turkey is one of the countries widely known for its culture, historical places, and definitely gastronomic tourism. However, since the year 2019, when pandemic, caused by Covid-19 arised, industry struggled to recover from the pandemic. However, New official data reveals that tourist arrivals in Türkiye surpassed pre-pandemic levels in January, topping the two million mark. Since the crossing pre-pandemic level, tourism industry is facing new challenges – how to hold this demand and which development directions should be chosen to meet needs of the tourists. Definitely, gastronomic tourism is one of the development directions for Turkey. The aim of the study is to explore Turkey's culinary landscape, cultural significance, economic impact, and sustainable development opportunities.

**Key words:** *tourism, culinary tourism, Turkey, development.*

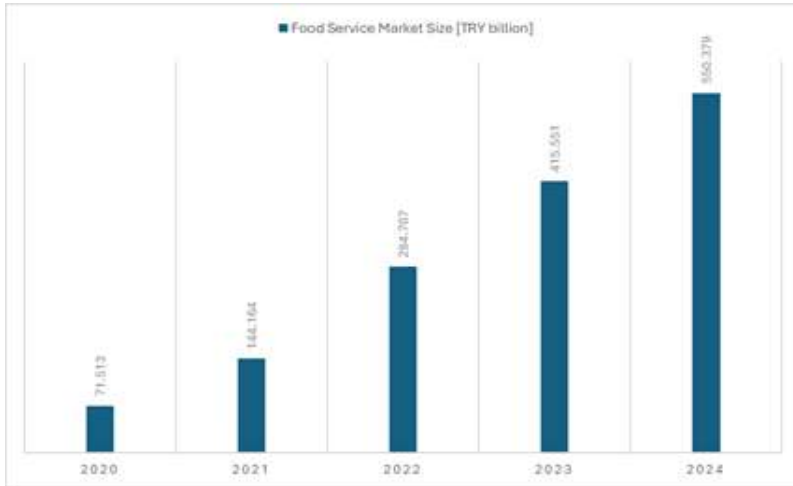
### **1. Introduction**

Turkey, with its rich history, diverse landscapes, and vibrant cultural tapestry, has emerged as a heaven for gastronomic enthusiasts seeking to indulge in a culinary adventure like no other. The fusion of flavors, the depth of tradition, and the warmth of hospitality are combined to make Turkey – a premier destination for gastronomic tourism. The aim of the study is to explore Turkey's culinary landscape, cultural significance, economic impact, and sustainable development opportunities.

### **2. Cultural Significance of Turkish Gastronomy**

Turkey's cuisine is a reflection of its diverse geography and complex history, influenced by ancient civilizations such as the Ottoman Empire, Greece, Persia and the Middle East. The result is a culinary mosaic that is both diverse and delicious, with dishes ranging from the aromatic spices of

the East to the savory kebabs of Anatolia. Each dish tells a story of tradition, innovation, and cultural exchange. Turkish cuisine is not just about food, but also about celebrating life, family, and community. Meals are shared with enthusiasm and hospitality is considered a sacred duty. Turkey invites visitors to explore its history, traditions, and values through its food [3, 4].



**Figure 1. Food service market size in Turkey**

Food service market size, GDP growth and socio-economic indicators is strongly associated. Eating food expenditures are mainly driven by these: population growth, income growth, urbanized lifestyle [2].

COVID-19 outbreak will affect many branches in 2020 and sales decline although the market will continue to grow from 2016–2021 in the first quarter of 2021, with a growth rate of 16.3%. In 2021, transactions per branch Partial, where it is higher compared to 2020 a year of recovery.

Market growth was driven by share of income in developed markets stabilized as expected GDP growth due to not reaching levels continue to remain above will.

### **3. Economic Impact of Gastronomic Tourism**

The rise of gastronomic tourism has had a profound impact on the economy of Turkey. Culinary experiences have emerged as a leading attraction for tourists, drawing food enthusiasts from all over the world. This

has resulted in a range of economic benefits, such as higher revenues for restaurants and food producers, as well as job opportunities in the hospitality industry. Additionally, gastronomic tourism has the potential to stimulate rural development by highlighting local delicacies and artisanal products. By leveraging its rich culinary heritage, Turkey can expand its tourism portfolio, and attract visitors throughout the year, ultimately driving economic growth and prosperity. Gastronomy tourism creates loyal customers in terms of economic returns. Therefore, gastronomy tourism has a great share in destination marketing. Tourism expenditures for local products both stimulate the economy and play an active role in the development of high quality food.

In essence, gastronomic tourism represents more than just a passing trend – it embodies a strategic opportunity for Turkey to leverage its cultural heritage, foster economic development, and showcase its culinary prowess on the global stage. Through strategic investments in culinary tourism infrastructure, the promotion of sustainable practices, and collaborative partnerships with local communities, Turkey can harness the full potential of gastronomic tourism as a driver of economic growth and prosperity for years to come [1].

#### **4. Sustainable Development Opportunities**

As the demand for authentic culinary experiences grows, so too does the need for sustainable practices in food production and tourism. Turkey's rich culinary heritage is a valuable asset that must be preserved for future generations. Sustainable gastronomic tourism involves not only promoting organic farming and traditional cooking methods but also fostering cultural exchange and respect for local communities. By prioritizing sustainability, Turkey can mitigate the environmental impact of mass tourism, protect biodiversity, and empower local producers. Moreover, sustainable gastronomic tourism can contribute to social inclusion by providing economic opportunities for marginalized communities and promoting cultural diversity.

Moreover, sustainable gastronomic tourism facilitates meaningful interactions between visitors and locals, fostering cross-cultural understanding and appreciation. By engaging in cultural exchanges, tourists gain insight into the traditions, customs, and values of the communities they visit, while locals have the opportunity to share their stories and showcase their cultural identity. These interactions promote empathy, tolerance, and mutual respect, laying the foundation for a more inclusive and harmonious society.

In conclusion, sustainable gastronomic tourism represents a holistic approach to tourism that integrates environmental, social, and cultural considerations. By embracing sustainability as a guiding principle, Turkey can not only mitigate the environmental impact of tourism but also protect its cultural heritage, empower local communities, and promote social inclusion. As we continue to explore the diverse culinary landscape of Turkey, let us do so with a commitment to sustainability, ensuring that future generations can continue to savor the flavors of this rich and vibrant culture [5].

## 5. Conclusions

Gastronomic tourism provides a glimpse into the essence of Turkey, revealing the diversity of its culinary heritage, the liveliness of its culture, and the warmth of its hospitality. By embracing its gastronomic treasures, Turkey can unlock new economic opportunities, promote sustainable development, and share its culinary delights with the world. As we savor the tastes of Turkey, let us also cherish the stories, traditions, and values that make its cuisine genuinely exceptional. In doing so, we not only enhance our palate, but also deepen our comprehension of the interconnection between food, culture, and community.

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## MODERN MARKETING INFORMATION TECHNOLOGIES AND THEIR USE IN THE RESTAURANT BUSINESS

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### **Abstract**

The restaurant industry is a service-oriented sector that aims to enhance individuals' quality of life. Effective marketing strategies, public relations tactics, and customer loyalty management are essential components of this industry. This research aims to examine the current landscape of innovative marketing approaches used to strengthen customer loyalty in catering establishments. The study's methodology is based on scientific theories and conceptual frameworks in enterprise analysis and marketing. The key findings highlight the importance of integrating innovative marketing methods to promote consumer loyalty towards restaurant services. In conclusion, it is emphasized that leveraging marketing innovations is a crucial approach to strengthening consumer loyalty. To effectively implement these innovations, it is necessary to develop robust strategies for managing and incentivizing customer loyalty. The practical significance of these findings lies in the viability of employing both traditional and unconventional marketing techniques, coupled with novel customer communication methods, within catering establishments. Such approaches are vital for optimizing service sales and maintaining competitiveness amidst challenging market dynamics.

**Key words:** *restaurant business, restaurant entities, innovative marketing methods, management, marketing.*

### **1. Introduction**

The restaurant business, as a service industry, involves not only providing high-quality food but also building strong relationships with customers, implementing effective marketing and PR strategies, and commercializing innovative developments. Finding new ways to

communicate with customers and reach new audiences is a key area of focus for the restaurant industry in the coming years.

## **2. Literature review**

The issues of development and application of information technologies and their importance in marketing activities have been paid much attention to and discussed in scientific papers and publications by such researchers as: S Karpova [1], D Ryndyuk [2], V Peshko [2], J Kietzmann [3], N Wiers [4], M Rekha [5] and S Asharaf [5], and many others.

Most researchers on information technology believe that the use of modern information and communication technologies will provide enterprises with a much more rational and successful solution to the tasks facing the business. However, given the rapid development of information technology and trends, the latest approaches to marketing, these issues require constant research and monitoring

## **3. Methodology**

Based on the work of Y I Zharkovskyi [6], a survey was conducted to analyze the integration of information technology in the hospitality and food industries. The study examined various restaurant enterprises that use information technology. The results indicate that most restaurants have widely adopted POS systems and online food ordering services. Additionally, mobile apps are favored by both customers and restaurants, while social media platforms play a crucial role in promoting brands and acquiring customers for restaurants.

The research shows that using information technology can help restaurant businesses improve their operations, customer service, and profits. For example, implementing POS systems allows restaurants to manage inventory and monitor financial performance, which helps with effective business administration. Online food ordering services allow restaurants to increase order volumes and speed up food delivery, leading to higher customer satisfaction and revenue.

Additionally, restaurants must ensure the security and privacy of customer data due to the large amount of information they collect. Businesses must comply with relevant laws, data protection regulations, and industry standards. Additionally, it is crucial to provide adequate training to staff on data security protocols.

#### 4. Data analysis and results

In essence, information technology stands as a pivotal factor in the advancement of restaurant businesses, necessitating proactive adoption of novel technologies and innovations for success within the hospitality market. This pivotal aspect determines their trajectory and viability in the market. Drawing from the study, several recommendations can be proposed for restaurant enterprises regarding the utilization of information technology:

1. Implement POS systems and other software solutions to automate operations and monitor financial performance, thereby facilitating efficient business management and profit augmentation.

2. Embrace online food ordering services and mobile applications to streamline customer service, ensuring convenience and promptness, consequently boosting order volume and enhancing customer satisfaction.

3. Harness social media platforms to bolster brand visibility and attract fresh clientele, utilizing content such as food and beverage imagery alongside promotional offers.

4. Prioritize the security and confidentiality of customer data, adhering to data protection standards diligently.

5. Invest in staff training and development initiatives to uphold service excellence and maximize customer contentment.

Table 1

#### The most common information technologies used in the restaurant business used in the restaurant business

Technology	Description
Mobile applications	Apps that allow you to order food and reserve tables on mobile devices
Online services ordering	Services that allow you to order food online from the restaurant's website
POS systems	A point-of-sale system used to collect information and payment
Wi-Fi technology	Wireless Internet in restaurants, allowing customers to stay connected and use online services in touch and use online services
Media	Platforms that allow restaurants to interact with customers and promote their brand on social media
Cloud technologies	Data storage and sharing systems that allow restaurants to access their data from any device and from any location

## 5. Discussion

In the future, restaurants will continue to use information technology to improve customer service quality and efficiency, and to remain competitive in the hospitality market. The development of the Internet of Things and artificial intelligence will allow restaurants to automate most processes while maintaining high service quality and efficient business management.

Furthermore, the popularity of mobile applications and online food ordering services is expected to continue to increase, providing customers with greater convenience and speed. In addition, social media is expected to play an increasingly significant role in promoting and marketing restaurants.

Overall, the advancement of information technologies enables restaurant enterprises to secure competitiveness in the market, increase profits, and improve the quality and efficiency of customer service. To succeed in the hospitality market, restaurant establishments must continually evolve and embrace the latest trends and innovations in information technology (refer to Table 2).

Table 2

**Advantages and disadvantages of using information technologies  
in the restaurant business**

<b>Advantages</b>	<b>Disadvantages</b>
Increase work efficiency	The need for investment in IT
Improving the quality of service	Dependence on technology
Process automation	The need for staff training
Online food ordering	Risk of data loss
Improving marketing	The need for constant updating
Increasing competitiveness	Risk of technical failures

## 6. Conclusions

Therefore, it is evident that information technologies can enhance the efficiency and quality of customer service in the restaurant business. However, it is important to address any negative consequences that may arise from their usage.

In conclusion, information technologies play a crucial role in the development of the restaurant business by improving customer service quality, increasing profits, and maintaining competitiveness in the market.

Restaurants commonly use POS systems, online food ordering services, mobile applications, and social media.

To succeed in the market, restaurant enterprises must be prepared to adopt new technologies and continually improve. Their success and future in the hospitality market depend on how effectively they leverage information technologies.

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## TOURISM BUSINESS AND INFORMATION

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### Abstract

In the world in 2012, more than 900 million tourists left from country to country and more than 5 billion people made tourist trips of varying degrees of duration within their countries. We can say that the fashion for travel is gaining momentum every day. Already, every twelfth working person in the world is employed in the tourism sector. Hotels, roads and entertainment centers are built for tourists, cafes and restaurants are opened, they are accompanied by guides and drivers. Manufacturers of equipment, vehicles, products, souvenirs, and entertainment organizers work for tourists. Many countries would not have received such fame and would not have developed their economies if “tourist” money had not been poured into them every year.

**Key words:** *economics, finance, tourism, information, technology, society, development, communications.*

### 1. Introduction

For many years, the tourism potential of Uzbekistan was very “poorly” used. For example, between 2011 and 2016, the average annual growth rate of foreign visitors was only 8%. However, during the past 8 years situation has changed and a lot has changed. Aim of this paper is to analyse tourism industry in Uzbekistan. It is important to assess what influenced development of tourism industry in Uzbekistan, as well as to determine factors what should be taken into consideration for the future development of tourism in country.

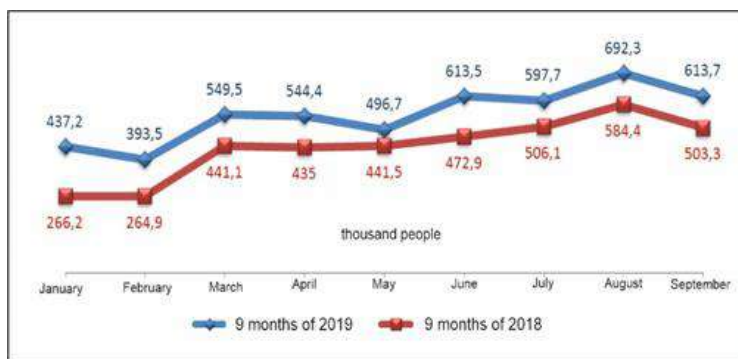
### 2. Results

At the beginning of December 2016, the head of state set the task of “accelerated development” of the tourism industry and signed the

corresponding document. The authorities created the State Committee for Tourism Development, made a number of decisions to provide tax benefits and preferences to entrepreneurs in the tourism sector, and also liberalized the visa regime.

Among the measures taken:

- establishment of a visa-free regime for an additional 9 countries (18 in total);
- increasing the number of countries for whose citizens a simplified regime for obtaining entry visas is applied from 12 to 50;
- simplification of requirements for the operation of hostels and the abolition of 22 requirements;
- creating opportunities to accommodate foreign tourists in private apartments;
- development and approval of a simplified procedure for organizing guest houses in rural areas with the abolition of the certification requirement and the establishment of minimum requirements for their creation.



**Figure 1. Number of foreign tourists arriving in Uzbekistan in 2018 and 2019**

In general, based on the results of 9 months of 2019, the share of foreign tourists who visited the country in August was 14.0%, and in February – 8.0%. The month of September accounts for 12.4% of tourists. The dynamics of the number of tourists clearly shows the seasonality of tourism activities corresponding to the seasons. The peak season is in the summer and with the arrival of autumn, quantitative indicators show a downward trend.

In addition to the fact that tourism brings significant profits, it is one of the few businesses whose money finances major cultural and environmental projects and preserves the historical and natural wealth of countries. In general, it contributes to the development of regions, the emergence of new jobs, and the employment of women. Tourism is one of the most flexible businesses, the income from which begins to flow immediately. True, this coin also has a dark side – for example, tourism can easily undermine the region’s agriculture, attracting those who traditionally cultivated the land and grew crops to work in cafes, restaurants and hotels [1].

There are countries that are a little luckier, and in addition to or instead of agricultural lands, they have seas, mountains, rivers, and unique architectural or cultural monuments. All this certainly attracts tourists. But still, the main word in the phrase “tourism business” is the second, and without infrastructure: roads, hotels, entertainment, shopping, services – the flow of tourists, if not drying up, will decrease significantly. Even if the attractions are unique. Below we will talk about several countries that specialize in summer tourism (this does not mean that they do not have other destinations).

The significance for the country’s economy of increasing the share of domestic tourism and the volume of inbound tourism are problems that have been discussed for more than a decade. The need to change the current situation has become particularly acute in recent years against the backdrop of rising dollar exchange rates, inflation, and sanctions for tourists abroad. In recent years, a situation has been created where the decline in domestic tourism activity has a negative impact on the growth of the tax potential of the regions.

The tourism sector is influenced by many changing factors, for example, the political situation, advertising, fashion. To win the attention of consumers and increase demand for tourism services in your country, you need to invest a lot of money and use the workforce. You can increase the attractiveness of your region as a tourist destination by establishing a positive reputation of the host country in the eyes of potential tourists. Factors such as violation of consumer rights and unfair competition among entrepreneurs, unfavorable political and economic conditions will contribute to a decline in tourism in this region.

The tourism business employs a significant amount of labor. At each stage of preparation and implementation of a tourist service, which often consists of a whole range of services, a large number of workers work. The tourism industry provides jobs and income to a large percentage of the population. However, workers involved in this sector are often

in a vulnerable position, since the tourism business depends on a large number of variable factors. For example, this business is predominantly seasonal due to changing climatic conditions throughout the year in many countries. In addition, in recent years, the coronavirus pandemic has frozen the sale of tourism services and, accordingly, left a significant number of people without jobs and profits from the tourism business.

International tourism undoubtedly contributes to the foreign exchange budget of the host country. In addition to the income of travel companies, these services lead to increased income in all sectors of the economy. Also, an increase in demand for services in the tourism sector contributes to an increase in demand for goods and services from local suppliers. In addition, the success of the tourism business directly or indirectly affects the growth of personal income of the population, which consequently leads to an increase in consumer demand [5].

At the end of last year, international online booking platforms Expedia, Skyscanner and Booking released forecasts for tourism trends for 2024. Some of them:

Trend 1. Budget travelers are ready to spend part of their money on a “beautiful life.”

Tourists are looking for ways to relax comfortably and brightly without spending a lot of money. For example, when choosing budget accommodation in a 4\* hotel, they can pamper themselves with expensive services.

There are many directions for the development of modern tourism. According to the presented classifications of researchers, it can be educational, recreational and health, rural, extreme, cultural, etc. Thus, if a region has conditions for the development of any areas of tourism, then we can talk about the specialization of regions in the development of tourist destinations [2]. It is the presence of a resource base that contributes to the development of a certain type of tourism

Thus, the tourism potential of a region is a set of factors in the territory that can be presented in the form of a tourism product. Determining the tourism potential of a region should be based on a comprehensive assessment of tourism development resources [3].

### **3. Conclusions**

In general, by studying the tourism industry in different countries, we can come to general conclusions. No matter how good the sights and nature are, tourists are unlikely to vote with rubles if the state does not pay due attention to this area and does not provide economic support to tourism-related

businesses. Modern travel is, first of all, comfort of movement, safety and developed infrastructure of roads, hotels, catering establishments, beaches and shopping centers.

Despite the wide variety of types of tourism, a prerequisite for their implementation is the presence of good roads, developed hotel services and active promotion of tourism products using IT technologies [4]. Consequently, it is the development of these types of economic activities that should be primarily influenced by the growth of activity in the tourism industry. Increasing the tax potential of the region in the context of the development of domestic and inbound tourism can contribute to the growth of the tax potential of such types of economic activities as transport and communications, hotels and restaurants, healthcare and the provision of social services, activities for organizing recreation and entertainment, culture and sports.

Thus, we can conclude that international tourism as a type of economic activity makes a significant contribution to the development of the economy of the host country and contributes to the growth of national incomes. The advantages of developing the tourism industry are undoubtedly a quick return on investment, a high degree of efficiency, and the creation of jobs within the industry. However, the current situation requires changes and adaptation to the new order [5]

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**INTERNATIONAL COOPERATION OF UKRAINE  
IN THE FIELD OF TOURISM AS AN EFFECTIVE DIRECTION  
OF POST-WAR DEVELOPMENT**

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**Abstract**

The article analyzes the significance and directions of international cooperation of Ukraine in the field of tourism during the military aggression of the Russian Federation. Tasks for its activation in the post-war period are proposed.

**Key words:** *tourism, international cooperation, digitalization, smart directions.*

The full-scale invasion of the Russian Federation on the territory of Ukraine became an additional trigger for its movement in the direction of the European Union. It especially clearly showed who are actually reliable international partners of Ukraine, who recognize its right to sovereignty and territorial integrity. After the start of the hot phase of the war in 2024, it was the international aid and support of democratic countries that allowed Ukraine to endure and continue the struggle. International cooperation became a very important factor in Ukraine's successful resistance to the plans of the Russian invaders. At the moment, the development of many spheres in Ukraine takes place within the framework of international cooperation and thanks to it.

In the field of tourism, international cooperation takes place in the direction of, firstly, the attraction of external financial and technical assistance, the implementation of joint projects in this field. On the other hand, international support occurs due to the condemnation of the democratic states of the actions of the aggressor country on various international platforms, which negatively affects its international and tourist image; promotes the introduction of sanctions, restrictions on the entry of Russian citizens into their territory.

International support of Ukraine and its tourism industry is also provided in the form of: exchange of information, experience, hospitality standards, opportunities to participate in educational programs for industry specialists. Ukrainian scientists are provided with grants and other support for scientific research in the tourism sector. International cooperation is manifested in the information and media support of Ukraine and the struggle of the Ukrainian people against the aggressor country, in its promotion in mass media, which makes it interesting and attractive to visit, despite the war danger. International support on the diplomatic front is also very important for Ukraine.

It should be noted that the world (especially European) market of tourist services for citizens of the Russian Federation is quite large. For many countries, restrictions on their tourist travel have become a tangible challenge. Especially given the losses the industry has suffered due to the quarantine restrictions associated with the COVID-19 pandemic. However, many states supported Ukraine and imposed sanctions against the Russian Federation and its citizens. The UNWTO also condemned the Russian invasion of Ukraine and suspended the membership of the Russian Federation in April 2022.

At the same time, when the vast majority of European states stopped air traffic with the Russian Federation and Belarus, such countries as Turkey, Armenia, Egypt, Iraq, Qatar, UAE, Tunisia, and China continue to maintain it. Like Serbia, which acts as a transit point for Russians to enter Europe. In 2023, Georgia resumed air connections with the Russian Federation.

Such a situation requires determining the priorities of Ukraine's international cooperation with these countries, combining the efforts of diplomatic missions, international organizations, and a clear position of The State Agency for Tourism Development of Ukraine regarding restrictions on tourist trips by citizens of the aggressor country.

Another way of solidarity with Ukraine was to limit the issuance of visas, including tourist visas, or to significantly increase their cost for citizens of the Russian Federation. The EU's top governing bodies recommended increasing the tourist tax for Russians from 35 to 80 euros. Most of the EU members have implemented the recommendation, and Ukraine's reliable partners Poland, Latvia, Lithuania and Estonia have banned issuing visas to citizens of the Russian Federation altogether. Germany canceled the simplified visa regime for them.

However, some states are finding ways to evade the restrictions. For example, Spain in 2022, on the contrary, issued three times more tourist visas to citizens of the Russian Federation than in the previous year [1]. In

our opinion, such cases should be publicized in the information space, both in the public environment and at the level of international organizations. The State Agency for Tourism Development of Ukraine and other state authorities should be actively involved in the sanctions policy and the introduction of new restrictions on the movement of citizens of the Russian Federation around the world.

It is difficult to overestimate the importance of international cooperation in the tourism industry for the socio-economic development of Ukraine in the post-war period. The acceleration of the European integration of Ukraine in the conditions of the war especially actualized the problem of harmonization of domestic tourism legislation with the European one. Tourist organizations and subjects of tourist activity should jointly participate in this work. It is important that, on the one hand, it simplifies business operations in this field, promotes the implementation of the best European practices, i.e. corresponds to national interests and allows the maximum effective use of the country's tourism potential.

It is very important to implement European standards for providing tourist services. In this regard, the Law of Ukraine "On Tourism" should be amended to take into account the provisions of Directive 2015/2302/EU and UNWTO recommendations. It contains requirements for the formation of package tours and related trips, compensation for losses, the possibility of early termination of the contract and the return of costs to consumers if at least one of the components of the package changes, the implementation of protection mechanisms against the insolvency of the organizer, etc. [2].

The European Union has previously been a permanent partner of cooperation with Ukraine in the tourism industry in various directions, in various projects and programs. For example, in the element of the national program "Basics of recovery: Digital state" there is a project "Tourist services (e-Tourism)". Since the beginning of the implementation of this project, its main donor in Ukraine has been the European Union.

In 2021, the Ministry of Culture and Information Policy in cooperation with the Ministry of Digital Transformation of Ukraine developed e-Tourism, e-Heritage, e-Art and e-Book projects. And although the full-scale war delayed the start of their implementation, they are included in the Recovery Plan of Ukraine "e-Tourism". Digitization of services in Ukraine by 2024 was a rapidly growing trend. Thus, the "DT4UA" program includes measures to digitize registers, develop digital services, exchange information, automate the provision of services, etc., which contributes to the fight against corruption in Ukrainian authorities. The "e-Tourism" project will allow for the formation of a register of tourist activity subjects

and will play a major role in the development of services to popularize the tourist potential of Ukraine.

The military attack of the Russian Federation on the territory of Ukraine led to catastrophic consequences for the tourism industry and its tourist infrastructure. Thus, only in the first year of the war (2022), the number of tour operators decreased by 37.2%, travel agents – by 23.3%, collective means of accommodation – by 22.8%. Thousands of other subjects of the hospitality industry were destroyed or remained in the occupied territories. This led to a significant layoff of staff – its number was reduced by 30% in the small hotel business alone. Sales volume: in the sector "Temporary accommodation and organization of meals" decreased by 64%, and in the sector "Activities of travel agencies, travel operators, provision of other reservation services and related activities" – by 80% [3].

The profitability of the tourist business decreased sharply. The drop in profitability was especially significant for temporary means of accommodation (–44.3%), passenger and air transport (–37.1%), attractions and theme parks (–34.3%) [4]. Air traffic (including international) has stopped. The transport industry of the country suffered significant destruction. According to estimates of The State Agency for Tourism Development of Ukraine, at least 1 billion dollars is needed just to restore the destroyed hotel infrastructure. USA.

Considering the devastating consequences of the war for the tourism infrastructure and the need for its restoration, international cooperation can take place through the movement of joint projects and the involvement of the public sector. Grants are a developed practice in the EU. That is why it is important for public organizations in the field of tourism to initiate grant activities, to involve scientific, educational and business institutions in the implementation of various joint projects in the field of the tourism industry.

A more powerful role in their implementation and coordination should be played by such leading public organizations as the National Tourism Organization, the Association of Hotels and Resorts of Ukraine (UHRA), which together with The State Agency for Tourism Development of Ukraine, for example, is already engaged in the development of a new categorization of hotels according to the European classification, etc.

The development of organizations that unite the subjects of the tourism industry and enable them to implement important projects in a consolidated manner at the expense of grant funding from the European Union is relevant. In particular, projects on the restoration of the country's tourism infrastructure, its modernization to the needs of inclusiveness, rehabilitation, provision of services to forced migrants and other social goals have approval

among EU member states and high chances of funding. However, it is necessary to establish a mechanism for Ukrainian tourism organizations and hospitality establishments to acquire a grant history and positive experience in the implementation of promising projects.

During the war and in the post-war period, international cooperation in the direction of strengthening mutual understanding and trust between countries, which is a very important function of tourism and a factor in its development, acquires special importance. In turn, tourism contributes to the development of mutually beneficial economic, trade and cultural relations between countries. This also determines the need for international cooperation in the tourism sphere [5].

International cooperation should also develop in the direction of digitalization of the tourism industry and hospitality in Ukraine, the development of smart tourist destinations and the implementation of the concept of smart cities. In this regard, the experience of European countries in this direction, the use of existing developments in this field and digital solutions is very important. In the post-war period, this will become a powerful driving force for the development of the Ukrainian tourism industry.

Therefore, international cooperation during the war is not only a powerful factor in the development of Ukraine's economy, but also a manifestation of the general support of our country in the fight against the aggressor. It will become one of the driving forces of its post-war development. International cooperation in the tourism industry of Ukraine in the post-war period should combine the improvement of tourism legislation in accordance with EU requirements, the implementation of joint projects for the reconstruction and development of tourist infrastructure and grant funding, the introduction of progressive practices in the field of digitalization and the creation of smart cities, media and information support.

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## **DEVELOPMENT OF MEASURES TO INCREASE EFFICIENCY OF MARKETING ACTIVITIES OF THE AM SUSHI ENTERPRISE**

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### **Abstract**

At the present stage of development of market relations, the main condition for the financial growth of enterprises is their intensive activity in the market. Marketing activities of an enterprise contribute to the rational use of enterprise resources through the development of specific programs addressed to target groups of consumers, which ultimately leads to the achievement of the desired economic results, i.e. making a profit.

**Key words:** *marketing activities, restaurant, effective marketing, customer needs, target market.*

### **1. Introduction**

In the modern business environment, the main function of marketing is to create and ensure free and competitive exchange between producers and consumers. The market must be provided with effective supply and demand for goods and services. This requires organizing the flow of goods and services between market participants, as well as supporting this process with a flow of information. The role of marketing is to facilitate the process of exchange and communication between sellers and buyers.

Marketing is a method for achieving success. Today, in the process, each company, while setting new ambitious goals, simultaneously faces a large number of problematic situations inherent specifically in a market economy. The real problem of doing business was the problem of finding effective demand. It is not enough to produce a product; company must organize all the work in such a way as to make a profit from the sale of this product.

### **2. Results**

Marketing is about identifying and meeting human and social needs at a profit. One of the shortest definitions of marketing is that it is the process of 'meeting customer needs profitably'.

The authors define the following marketing strategies:

### Restaurant Marketing Strategies

1. Build a Restaurant Website (With Online Ordering)
2. Build Restaurant Mobile App (No-Code)
3. Use Review Platforms like Yelp and TripAdvisor
4. Build engagement with Social Media Platforms
5. Create Restaurant Loyalty Program
6. Increase Website Visibility with Restaurant SEO
7. Take Professional Food Photography
8. Offer Catering Services.

Table 1

### Old Economy Vs New Economy

Old Economy	New Economy
• Organize by product units	• Organize by customer segments
• Focus on profitable transactions	• Focus on customer lifetime value
• Look primarily at financial score card	• Look also at marketing scorecard
• Focus on shareholders	• Focus on stakeholders
Marketing does the marketing	• Everyone does the marketing
Build brand through advertising	• Build brands through performance
Focus on customer acquisition	• Focus on customer retention
No customer satisfaction measurement	• Measure customer satisfaction & retention rate
• Overpromise, under deliver	• Under promise, over deliver

The authors consider the following marketing strategies for restaurants to be effective:

1. Build Restaurant Mobile App (No-Code)
2. Use Review Platforms like Yelp and TripAdvisor
3. Build engagement with Social Media Platforms
4. Create Restaurant Loyalty Program
5. Increase Website Visibility with Restaurant SEO
6. Take Professional Food Photography
7. Offer Catering Services

### **3. Conclusions**

Marketing plays a huge role in a company's activities. Effective marketing can help a company find its consumers and make a profit from the sale of its products. By choosing the right marketing method for a restaurant, the business will increase sales, improve credibility and be able to improve its competitive position.

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## NEW TOURISM TRENDS IN CZECH REPUBLIC

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### **Abstract**

Tourism in Czech Republic is crucial for economic development of the country. However, since the end of the pandemic, countries are trying to reach pre pandemic level of tourism, and Czech Republic is not an exception. Aim of the study is to introduce new trends in the tourism industry in Czech Republic as well as analyse industry in the country itself.

**Key words:** *Tourism, Czech republic, trends, development.*

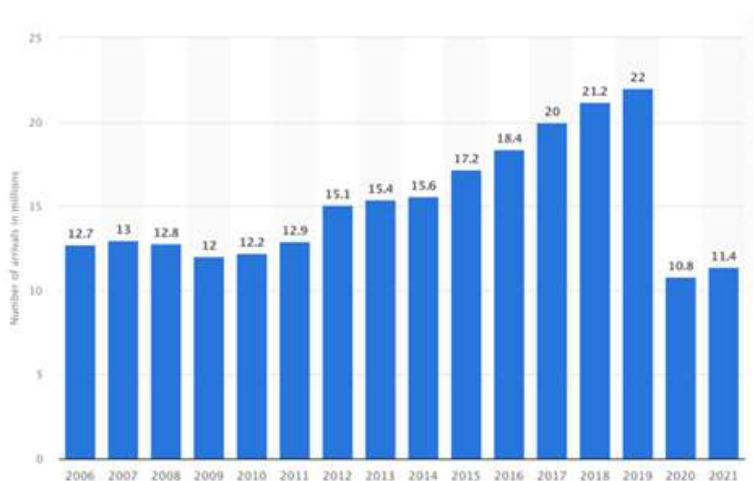
### **1. Introduction**

The Czech Republic, nestled in the heart of Europe, is well known for its rich history, stunning architecture, and vibrant cultural scene. Czech Republic has been famous for its picturesque landscapes, medieval towns, and world-famous beer culture. However, after Covid 19 pandemic, the incoming tourism in the Czech Republic has dropped dramatically. Aim of study is to introduce new trends in tourism in Czech Republic that could bring new visitors. The study will also analyse their future possible benefits for tourism development. The main point of study will be campaigning called Unexpected Wellbeing, created by the CzechTourism, which is designed in order to attract new visitors.

### **2. Tourism in Czech Republic**

Tourism is very crucial for economy of Czech Republic. It has been effected by pandemic Covid 19 as many sectors of economy. In 2020 tourism made only 1,48 % of GDP (about 3,3 billion EUR). That was a huge drop because in 2019 the GDP of Tourism was 2,76 % which was more than GDP formed by agriculture, forestry and fishery together. More than 10 million people have visited Czech Republic in 2020 that is about 72,4 % less than in previous year. On the other hand the Czechs made almost 63 million domestic trips and about 5,4 million international trips. Domestic tourism

helped the economy by generating 64 % of financial resources (almost 2 billion EUR). Employment was effected as well. There were 222 thousands employees and employment dropped by 7,3 %. It means that every 24th Czech worked in tourism. [1]



**Figure 1. Number of arrivals in tourist accommodation in Czechia from 2006 to 2021**

As Figure 1 shows, the situation 2021 was little bit better than in 2020. However the numbers are very low compared to numbers from years before pandemic [2].

Tourism as every other sector of econom is developing. It is influenced by new technologies and idscoveries. Tourism in Czech Republic is influenced as well by these new invetions, but it rather draws from own resources. Famous trebd is accommodation in unusual buildings like old mills, cottages, parrish etc. But tourist can find even stranger accomodation just like tree houses, yurt, marquee or tiny houses. Other trend is sustainable and eco-friendly touris. This trend is worldwide and become more and more popular. The Czech Republic is more suitable for this type of tourism than tourist might think. There are many aspects that are very sustainable, such as: cheap and wide train and bus transport, dense tourist route system, green cities, many protected wildlife locations (including 4 national parks). Off season travelling i salso popular, even in Czech Republic. It is true that the turistic season is not as long as in sea regions, but in off season time the

weather neither cold nor hot. And of course the main point of off-season tourism is that the accommodation and transport is cheaper and the cities and sights are not overcrowded [3].

Purpose of newest two years campaign made by CzechTourism is to lure new tourists to Czech Republic. It is Called Unexpected Wellbeing and it is combination of sports, relaxing and unwinding while travelling. The previous campaign was called Unexpected Traditions and the idea was to combine Czech nature and culture with active tourism. The idea of Unexpected Wellbeing is that Czech Republic is one big spa where tourist can relax and rest in unique Czech nature. Every physical activity is linked to spa experience. Whole campaign is accompanied with slogans placed that visually represents sport, relax and rest. CzechTourism is also planning other activities to further promoting of country as best place where tourist can spend active holidays [4, 5].

## 7. Conclusions

The tourism industry in the Czech Republic, a vital contributor to its economic growth, faced unprecedented challenges following the Covid-19 pandemic. With a significant decline in incoming tourism and a notable impact on employment, the sector experienced a substantial setback. Despite the challenges, there are promising signs of recovery, albeit at a slower pace compared to pre-pandemic levels.

This study has highlighted several important facets of the tourism industry in the Czech Republic, particularly focusing on emerging trends and initiatives aimed at rejuvenating the sector. The analysis underscores the importance of adaptation and innovation in response to evolving market dynamics and changing consumer preferences.

One notable trend observed is the diversification of accommodation options, with a growing emphasis on unique and sustainable alternatives. From historic buildings to eco-friendly lodgings, the Czech Republic offers a range of distinctive experiences for travelers seeking authenticity and environmental responsibility.

Moreover, the concept of off-season tourism presents a promising opportunity for leveraging the country's natural beauty and cultural heritage throughout the year. By promoting the benefits of visiting during less crowded periods, stakeholders can optimize resources and enhance the overall visitor experience.

Central to the revitalization efforts is the role of destination marketing campaigns, exemplified by initiatives such as "Unexpected Wellbeing" by CzechTourism. By strategically positioning the Czech Republic

as a destination for wellness-focused travelers, these campaigns aim to attract new market segments and sustainably drive tourism growth.

Looking ahead, continued collaboration between public and private stakeholders will be essential in fostering a resilient and vibrant tourism sector in the Czech Republic. Embracing innovation, sustainability, and cultural authenticity will be key pillars in shaping the industry's trajectory and ensuring its long-term prosperity.

In conclusion, while the challenges posed by the pandemic are undeniable, the Czech Republic's tourism industry is poised for recovery and transformation. By embracing emerging trends, leveraging its unique assets, and implementing strategic marketing initiatives, the country can position itself as a compelling destination for travelers seeking memorable experiences and unexpected delights

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## **E-TOURISM AND ONLINE TRAVEL MANAGEMENT. OPPORTUNITIES IN CENTRAL ASIA**

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### **Abstract**

The world of travel and tourism has undergone a revolutionary transformation with the advent of e-tourism and online travel management. This article delves into the significance of this evolution, backed by statistical insights, while also shining a light on the landscape of e-tourism in Central Asian countries. From the rise of online bookings to the impact of digital marketing, we explore the trends, challenges, and opportunities that define this dynamic sector.

**Key words:** *E-tourism, Online Travel Management (OTM), Central Asia, Travel Industry, Digital Transformation, Tourism Statistics.*

### **Introduction**

In recent years, the travel and tourism industry has witnessed a paradigm shift, moving from traditional booking methods to the realm of e-tourism and online travel management. This shift has not only streamlined the travel experience for consumers but has also opened up a world of opportunities for businesses in the sector. Central to this evolution are the advancements in technology, the widespread availability of the internet, and the growing preference for convenience among travellers.

### **The Rise of E-Tourism:**

E-tourism, also known as electronic tourism or online tourism, encompasses the use of information and communication technologies (ICTs) in the tourism industry. It includes online booking systems, travel websites, mobile apps, and social media platforms that facilitate various aspects

of travel, from booking flights and accommodations to planning itineraries and exploring destinations.

The global e-tourism market has been on a steady rise. In 2020, the market was valued at approximately \$774.7 billion, with projections indicating further growth in the coming years. This growth can be attributed to several factors, including the increasing internet penetration, the rise of smartphones, and the shift towards digital transactions.

According to the World Travel & Tourism Council (WTTC), the global travel and tourism industry's contribution to GDP reached a staggering US\$9.2 trillion in 2023 [WTTC website]. E-tourism is a major driver of this growth, with online travel sales projected to reach US \$817 billion by 2024 [Statista, Digital Market Outlook for Travel & Tourism Worldwide 2024].

### **Online Travel Management:**

Online Travel Management: E-Tourism in Central Asian Countries:

Turning our focus to Central Asian countries, we find a region that is increasingly embracing e-tourism to boost its travel industry. Countries such as Kazakhstan, Uzbekistan, Kyrgyzstan, Tajikistan, and Turkmenistan are leveraging digital platforms to attract tourists, showcase their cultural heritage, and promote their unique attractions.

**Uzbekistan:** Uzbekistan, with its rich history and architectural wonders, has also made strides in e-tourism. The introduction of e-visas and the development of user-friendly travel websites have made it easier for tourists to explore the country's renowned Silk Road cities such as Samarkand and Bukhara. Online travel agencies like "Advantour" and "Uzbekistan Travel" are offering comprehensive travel packages and online booking options for international tourists.

**Kazakhstan:** Kazakhstan, for instance, the government has launched initiatives to develop e-tourism infrastructure, including online booking systems, digital guides, and virtual tours. These efforts have borne fruit, with the country witnessing a rise in online bookings and a growing interest from international travelers.

**Kyrgyzstan:** Kyrgyzstan, known for its stunning landscapes and nomadic traditions, has seen an increase in online travel agencies offering tailored experiences for adventure seekers. These platforms cater to activities such as trekking, horseback riding, appealing to a niche market of adventurous travelers.

**Tajikistan and Turkmenistan:** Tajikistan and Turkmenistan are also tapping into the potential of e-tourism, with initiatives aimed at promoting their cultural heritage sites and natural attractions through online platforms.

From the ancient cities of Merv and to the majestic Pamir Mountains, these countries are showcasing their hidden gems to a global audience.

### **Challenges and Opportunities:**

While e-tourism presents numerous opportunities for Central Asian countries, it also comes with its own set of challenges. One such challenge is the need for reliable internet infrastructure, especially in remote areas where many of the region's attractions are located. Improving connectivity and access to high-speed internet will be crucial in ensuring the success of e-tourism initiatives.

Moreover, the competition in the online travel market is fierce, with countries vying for the attention of travelers worldwide. Central Asian countries must differentiate themselves by highlighting their unique cultural experiences, eco-tourism offerings, and historical significance.

Despite the potential benefits, some challenges need to be addressed for successful e-tourism and OTM implementation in Central Asia:

- Limited Internet Penetration: In some parts of Central Asia, internet access and infrastructure remain limited, hindering online travel activities.
- Language Barriers: Many tourism websites and online platforms lack local language options, restricting accessibility for regional travelers.
- Security Concerns: Ensuring secure online payment systems is crucial for building trust among international tourists.

### **Conclusion**

In conclusion, e-tourism and online travel management have transformed the way we explore the world. From the convenience of booking flights and accommodations to the immersive experiences offered through virtual tours, technology has become an indispensable tool for travelers and businesses alike. In Central Asian countries, this evolution is evident in the efforts to promote tourism through digital platforms, showcasing the region's rich history, natural beauty, and cultural heritage to a global audience. While challenges remain, the future looks promising as these countries harness the power of e-tourism to unlock new opportunities for growth in the travel industry-tourism and OTM present a significant opportunity for Central Asian countries to transform their tourism industries. By investing in digital infrastructure, promoting online visibility, and addressing existing challenges, the region can attract a wider range of tourists, boost economic growth, and create new jobs

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**FACTORS INFLUENCING MOTIVATION  
AND JOB SATISFACTION OF EMPLOYEES  
WITHIN THE HOSPITALITY INDUSTRY  
IN THE REPUBLIC OF UZBEKISTAN**

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**Abstract**

The topic of motivation and job satisfaction among employees has long been a prominent subject of discussion across various industries, including the hospitality sector. Understanding the primary drivers behind employee motivation and satisfaction in hospitality is crucial for hotel management to enhance performance effectively. It is believed that by prioritizing employee motivation and satisfaction, guest satisfaction can also be improved. Hence, this study aims to identify and elucidate the factors influencing employee motivation and subsequent job satisfaction within the hospitality industry.

**Key words:** *Motivation, Job Satisfaction, Employees, Hospitality Industry, Influencing Factors/*

**Introduction**

In any industry, including the hospitality sector, employee motivation and job satisfaction play a crucial role in determining the success or failure of an organization. This is because employees are considered valuable assets that significantly contribute to the survival and growth of the company. Just as any business asset requires attention, investment, and management from owners, the same applies to employees. Companies will never achieve success if their employees are dissatisfied with their work and are not motivated to perform well [1].

This is because poorly performing employees provide inadequate customer service, which, in turn, leads to loss of revenue and profits for the company. If employees are not motivated in their work, they typically leave the organization early, resulting in high turnover rates.

On the other hand, if employees are motivated, satisfied, and committed to their work, they can significantly help the company increase its overall productivity. These employees can perform their jobs better, providing exceptional customer service, which leads to higher revenue and profits for the company [2].

This article explores the enterprise of Radisson Blu Tashkent – one of the leading hotels within the Radisson Blu hotel chain, owned by the Radisson Hotel Group. Located in the capital of Uzbekistan, Tashkent, this study focuses on the organizational structure of this enterprise, encompassing various departments such as administration, sales department, marketing department, guest service department, kitchen department, technical department, cleaning department, and others. The analysis conducted aims to understand how these structural units interact and influence the motivation and satisfaction of employees in the hospitality industry.

### **Challenges in the Hospitality Industry**

The tourism and hospitality industry undoubtedly has the potential to significantly improve the economic conditions and increase employment levels in countries, including the Republic of Uzbekistan. This sector offers opportunities for various types of workers in the labour market, providing all kinds of positions for employment, whether low-skilled, semi-skilled, or professional jobs at the highest levels. It also provides opportunities for young talents and individuals with minimal qualifications, giving them a platform to demonstrate their value. For these reasons, the tourism industry is considered crucial for any country to reduce poverty levels, enhance the standard of living by increasing income, and provide workers with opportunities for growth and personal development within Uzbekistan.

However, the tourism and hospitality industry, including the Radisson Blu Tashkent hotel, faces challenges. Managers and supervisors in this sector are often criticized for providing their employees or subordinates with poor working conditions, low wages, irregular working hours, and limited opportunities for career advancement. Such exploitation of employees undermines the attractiveness of this industry, making it less desirable for talented and young workers to pursue a career in comparison to other sectors, such as manufacturing, retail, or IT, which become more appealing job markets. This situation leads to high turnover rates in the tourism and hospitality industry.

With the sharp increase in the number of clients worldwide in the tourism industry, there is increased pressure on the top management of hotels, including the Radisson Blu Tashkent, to provide additional training

and development for their staff, especially managers, to enhance the quality of their services. Highly skilled and trained employees are considered an asset for the successful operation of hotels. Additionally, opportunities for higher education related to tourism and hospitality are available in Uzbekistan, contributing to the development of this industry. However, some countries are criticized for not providing sufficient funding for educational institutions in this field.

### Measurements of motivation and job satisfaction

The interrelation between motivation and job satisfaction is vital in hotel management, particularly at establishments like Radisson Blu Tashkent. Motivation drives employees' desire to achieve goals, while job satisfaction reflects their contentment with rewards and work conditions. Enhancing motivation and satisfaction is pivotal for hotel management and HR departments [3].

Satisfied employees tend to be more motivated, boosting productivity and overall hotel performance. Learning opportunities provided by management positively influence employee motivation and satisfaction, emphasizing the need for continuous skill development [4].

Autonomy in work tasks can enhance employee confidence and satisfaction [5]. However, effective workload planning, and task assignment based on employee skills are essential to prevent burnout and maximize productivity [6].

Tsai [7] identifies various aspects of work that influence employee motivation and satisfaction. These aspects include:

1. The job itself: the interest in the work and opportunities for growth.
2. Pay: fairness of compensation and methods of pay distribution.
3. Promotion opportunities: chances for career advancement.
4. Supervision: managerial skills and concern for employees' well-being.
5. Colleagues: support and friendliness from coworkers.



These aspects are considered key when examining the level of satisfaction and motivation among employees in the hospitality industry and other sectors.

Customer satisfaction is determined by how well a product or service meets their expectations. In the hotel industry, such as the Radisson Blu Tashkent hotel, this is particularly important. High-quality service impacts customer satisfaction, their brand loyalty, and recommendations to friends and family. Therefore, to ensure quality service, the role of qualified and motivated staff is crucial. Satisfied employees at the Radisson Blu Tashkent hotel contribute to higher service levels and, consequently, customer satisfaction. Hotel HR departments should actively address staff issues, provide training, fair compensation, and create a favorable work environment to ensure high levels of employee motivation and job satisfaction. This, in turn, contributes to improved service quality and customer satisfaction at the Radisson Blu Tashkent hotel.

### **Conclusions**

From the qualitative analysis conducted above, it can be concluded that the hotel management in the hospitality industry in the Republic of Uzbekistan should take all necessary steps to enhance the motivation and satisfaction of their employees, even if it requires significant financial investment in their development and growth. This is especially crucial for Radisson Blu Tashkent hotel because if employees are not motivated and do not feel satisfied with their work, it directly affects their productivity and undermines the quality of services provided by the hotels. However, if employees are highly motivated, dedicated to their work, and satisfied with their management, they will be encouraged to work diligently and make additional efforts to enhance the efficiency of their operations and provide services to clients, ultimately leading to increased profitability. Customer satisfaction, and consequently hotel profitability, is successfully achieved through such measures.

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## **TOURISM IN UKRAINE DURING THE WAR**

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### **Abstract**

In Ukraine, tourism has always been one of the most promising branches of the economy. The war made adjustments to the development of the tourism industry. Factors influencing the military aggression on tourism in the affected regions are attractions, political instability, economic conditions, marketing and promotion, seasonality, quality, security issues. Investments will help support local economies and restore tourism infrastructure.

***Key words:** factors, attractions, political instability, economic conditions, marketing, quality, security issues, investment.*

### **1. Introduction**

Tourism is one of the main branches of the economy of Ukraine. During its development in the country, the infrastructure is developing in parallel. But the tourist market is vulnerable to various crises: natural disasters, epidemics, socio-economic and political crises, wars that destabilize the situation inside the country. This fact is confirmed by the situation in the tourism industry of Ukraine, which experienced a real collapse with the beginning of a full-scale war. Many tourist companies have closed or repurposed their activities, and hotels, sanatoriums and tourist bases are accepting refugees from the occupied territories.

### **2. Main part**

The Russian-Ukrainian war of 2014–2023 made adjustments to the development of the tourism industry in Ukraine. After all, as a result of the occupation and hostilities, a large part of our territory was excluded from the list of tourist destinations and became unsuitable for tourists. Russia's destructive military aggression against Ukraine caused significant changes in the consciousness of Ukrainians, including the destruction of infrastructure

and numerous human casualties. Nevertheless, after the victory of Ukraine in the liberation war, the potential for military tourism will tend to increase.

It should be noted that before the war, most Ukrainian tour operators and travel agents sold outbound tours: to Turkey in the summer, to Egypt in the winter, to Western Europe all year round. The outbound tourism sector was twice as large as inbound tourism. Currently, only journalists, persons from international humanitarian organizations and foreign soldiers fighting in solidarity are arriving in Ukraine.

The main factors of the impact of military aggression on tourism in the affected regions.

- attractions: the aggressor damaged or destroyed many tourist attractions, including historical sites, cultural sites and nature reserves, making regions of Ukraine less attractive to tourists. The reconstruction of infrastructure and monuments will be important for the recovery and growth of the tourism industry in all regions of the country;

- political stability: political instability in the region also deters tourists from visiting because they are concerned about their security and the stability of the regions;

- economic conditions: economic conditions in the region, including high unemployment and low incomes, have made it difficult for local businesses to invest in the tourism industry and offer high-quality service to tourists;

- marketing and promotion: the lack of marketing and promotion of regions and the entire country as a tourist destination contributes to a decrease in the number of visitors, especially foreign visitors;

- seasonality: the seasonality of the tourism industry, with many tourists preferring to visit in the summer months, also contributed to the decline in visitor numbers, as the conflict made it difficult for tourists to visit during peak seasonal demand;

- quality: the decline in the quality of tourist services is another factor contributing to the decline of tourism. Many hotels and other tourism businesses have closed or reduced their operations due to the drop in demand. This has led to a decline in the quality of services offered to tourists, further discouraging tourists from visiting the region. Improving the quality of tourist services will be important to attract more visitors to the country's regions;

- Security concerns: Tourists are concerned about their safety in the region due to the ongoing conflict, which has forced many countries to issue travel advisories warning their citizens against traveling to affected regions.

Addressing these security issues will be critical to the recovery of the tourism industry in the region.

In general, these factors contribute to the decline of tourism both in the affected regions of Ukraine and in the entire country.

### 3. Conclusions

Eliminating these factors will be crucial for the recovery and growth of the tourism industry both in the affected regions and in the country as a whole. In general, solving tourist safety problems, rebuilding infrastructure and attractions, improving the quality of tourist services, as well as strengthening marketing and advertising efforts will be crucial for the recovery and growth of the tourism industry in the affected regions of Ukraine. Investments in the tourism industry will not only help support the local economy, but will also contribute to the overall peace-building process in the regions by promoting cultural exchange and developing mutual understanding and communication between different communities.

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## MODERN TRENDS IN TOURISM AND HOSPITALITY RESEARCH: METHODOLOGICAL ASPECT

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### **Abstract**

The field of tourism and hospitality is the object of active scientific research. In modern conditions, there is a transition from quantitative to mixed research methods, which include a qualitative component. A valuable methodology for tourism research is narrative analysis, the use of multi-method, mixed and multi-disciplinary approaches.

**Key words:** *tourism, methodology of scientific research, qualitative and mixed methods, field of tourism and hospitality, multidisciplinary approach.*

The field of tourism and hospitality, as an industry with huge prospects for development, is the object of active scientific research. Many scientists, both in Ukraine and abroad, are working on its theoretical and practical problems, which creates a need to determine the optimal research paradigm and methodology.

At the initial stages of the development of the science of tourism, mainly quantitative research methods were used. This was the result of the dominance in science from the middle of the 20th century of the positivist paradigm, which was based on the concepts, ideas and theories of such fields of knowledge as sociology, marketing and management.

Positivism involves the use of positive data based on facts that can be verified by practice. At the same time, qualitative research methods were perceived as not meeting the principles of "scientific" and reliability [1].

Quantitative research consists of testing a theory based on variables that are measured using numbers. Quantitative methods make it possible to identify multidimensional relationships between them, which makes it possible to analyze and explain a certain phenomenon and make forecasts.

They include, in particular, a wide range of statistical methods – from descriptive statistics to factor analysis and structural equation modeling

(SEM) [2]. At the same time, data collection in most cases can be done using interviews, surveys using structured questionnaires, etc. [3].

The main features of quantitative methods are the operation of numerical data from a large sample, which allows to minimize the subjective factor in the study and to give statistically reliable results. In addition, the established approach and standardized measurements allow other researchers to repeat the study.

However, quantitative methods have a number of disadvantages, mainly related to the fact that they do not allow taking into account the context and nuances of the experiences and perspectives of respondents. In addition, their use does not guarantee a deep understanding of the studied phenomenon in general, given that attention is usually focused only on its individual aspects.

Considering this, the use of qualitative and mixed methods in their various forms and conceptualizations is gaining wider use in tourism and hospitality research. Qualitative research – involves focusing on the study of people's experiences, views, and behavior.

This method is often used to investigate complex phenomena that are difficult to quantify, such as beliefs, attitudes and feelings, and non-linear processes. Unlike quantitative methods, they are designed to study a small set of objects, are based not on numbers, but on texts, involve direct long-term contact of the researcher with respondents, contain more of a subjective factor in the interpretation of results.

Data collection for all approaches often takes place during field research using tools such as observation of group participants whose behavior is the object of the study, as well as unstructured interviews and structured questionnaire surveys. They allow you to get information about people's thoughts, their perception of certain phenomena, the reasons for their behavior and the context of the phenomenon. The most popular qualitative methods are: focus groups, in-depth interviews, panel methods, interviews and questionnaires, expert surveys, etc. [4].

For example, the study of such a component of the tourist experience as feeling can be carried out using such a tool as the sensory quasi-Q-sort (SQQS). Audio research methods can also be attributed to subjective methodologies [5]. They involve the use of sound clips, audio music and noise recordings to deconstruct the tourist experience. Projective methods are used to minimize socially acceptable responses or to reveal the subconscious when studying the behavior of travelers.

The main projective techniques are: collage, list of values, word association, photo detection and scenarios. A valuable methodology for

tourism research is narrative analysis, which is used to examine the ways in which people construct meaning in their lives in the changing context and context of their behavior and thinking.

The development of tourism as a science takes place in the direction of abandoning the use of a single quantitative or a single qualitative method of research and moving to the use of multi-method and mixed approaches.

Their difference lies in the fact that the multi-method approach consists in the synthesis of several types of quantitative or qualitative methods, while the mixed approach consists in their single combination.

The disadvantages of using multi-method and mixed methods are their high cost, volume of processes and their multidimensionality, which requires researchers to work in several teams or projects; danger of personal bias; differences in the interpretation of results at the qualitative and quantitative level; the need for systematic and reliable methods of assessing the reliability and validity of the results. Despite this, research in the field of hospitality and tourism is increasingly carried out on the basis of their use [6].

In the scientific literature, a multidisciplinary approach is also highlighted as a factor in the paradigmatic organization of research. It is "considered a general scientific methodological approach. Its essence consists in the use of knowledge from various subject areas to create a generalized scientific picture of the subject of research. This approach has gained popularity in the managerial sphere of the economy, the spheres of high technologies, medicine, nature management, the sphere of communication, and is relevant for tourism [8]

and involves the joint study of a specific complex object by different academic disciplines (for example, studying the process of organizing excursions through history, psychology, pedagogy, management, etc.).

It is important to note that a multidisciplinary approach under certain conditions can be implemented not only in the practice of scientific research, but also in the training of professionals in the field of tourism. Thus, analyzing the new challenges of forming the labor potential of the tourism industry of Ukraine, they proceed from the fact that "the labor potential is formed by specific components ... which change depending on the nature of their involvement."

Among them, the authors single out "components of health, demographic, intellectual, educational, professionalism, behavioral and psychological components, which should be studied at different stages, because they can be formed, used and developed[9]. The specified components relate to different subject areas and their processing contributes to the creation

of a generalized picture of the subject of research – the labor potential of the tourism industry.

Therefore, it should be noted that new opportunities for conducting research in the field of tourism and hospitality involve the use of an interdisciplinary approach that reflects certain features of the development of tourism.

Research results can be used in the educational process, stimulate awareness of the possibilities of building various systems of training specialists, which are in demand for solving socially significant problems. The development and use of digital technologies is important. They, like social media, are valuable sources of research data in the field of tourism and hospitality.

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## **DEVELOPMENT OF MEASURES TO PROMOTE RIGA CAR DETAILING COMPANY**

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### **Abstract**

The world of detailing is developing rapidly, gaining momentum every year. That is why it is important to become a true professional in this field so that competitors do not force the detailing company out of the market. Detailing is a complex of high-quality services for caring for the appearance of the body, interior, luggage and engine compartments of a car.

**Key words:** *detailing studio, promotional events, brand recognition, professional services, effectiveness.*

### **1. Introduction**

Marketing is one of the fundamental activities of Promotion is about converting the changing needs of people into profitable opportunities for the organization. The goal of the promotion is to create value by offering high-quality solutions that help save time and effort that the buyer spends searching and completing a transaction, and provide society with a higher standard of living.

Detailing is distinguished by the high quality of the operations performed, which involves the use of special equipment, highly specialized high-quality chemicals, a large (up to two to three days) time investment and corresponding prices.

### **2. Results**

According to the authors:

Promotion is activities aimed at increasing sales efficiency through a communicative impact on staff, partners and consumers.

Brand image is the image of the goods or service that is formed in the customer's mind. The term brand identity can be used as a description of the image of the brand that the marketer wants to create.

Service Marketing Mix consists of following P's:



**Figure 1. Product Marketing Mix [3]**

Detailing services are innovative, that is, less popular among potential consumers. Therefore, when promoting innovative services, to ensure the flow of customers, the maximum number of marketing tools are selected: groups on social networks, advertising in specialized sections of magazines, direct mail, leaflets, commercial offers, advertising on auto forums, website, SMS mailing, distribution of booklets, promotions, advertising events.

Since the result of the Detailing Center's services is an improved car, the main method of attracting the attention of potential clients to the company's services is to demonstrate the finished work. Therefore, it is very important for the company to achieve high quality of the services it provides.

A satisfied customer will show off their car to their friends and family and attract the attention of potential customers – and personal customer recommendations have the most powerful effect in developing the popularity of innovative products and services.

Successful promotional methods include:

#### **Advertising in partner companies**

Concluding partnership agreements with corporate clients is an effective method of promotion, and if the cooperation policy is properly structured, it will lead to a significant increase in the occupancy level of the studio and minimization of seasonal fluctuations. Partner companies for the detailing studio will be premium car dealerships.

#### **Targeted advertising**

Short videos showing the work process, where you can closely see how the anti-gravel film is stretched and smoothed or how the car body is polished.

Various experiments. For example, a video where a car is scratched, and after that the film is removed and the body remains in perfect condition.

Photos and videos Before/After. Visual results of work always arouse interest. When the interior of a car becomes perfectly clean before your eyes, and the seats turn into brand new car seats, it's always interesting.

### **3. Conclusions**

The detailing industry is developing rapidly, so it is important to use effective promotion methods for a detailing studio. Competitors use the services of marketing specialists, services of Internet marketing companies, social networks, and home pages for promotion. The implementation of marketing measures to promote the Riga Car Detailing company will increase the company's revenue by attracting new customers and will increase the value of the enterprise.

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**STRATEGIC DIFFERENTIATION  
AND THE FOURFOLD COLLABORATION:  
DRIVING INNOVATION AND HOLISTIC ADVANCEMENT**

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**Abstract**

This scholarly work delves into the intricate interplay between strategic differentiation, knowledge exchange, and sustainable progress, highlighting the role of the fourfold collaboration model in stimulating innovation and societal advancement. Anchored in the adoption of the Sustainable Development Goals (SDGs) and the European Union's Research and Innovation Strategies for Strategic Specialization (RIS3), the research underscores the pivotal significance of knowledge-centric assets and regional cooperation in achieving sustainability. It presents a comprehensive framework comprising six crucial stages for formulating strategic differentiation strategies, showcasing exemplary practices from Nordic regions. Additionally, the paper emphasizes the impact of civil society, culture, media, and small to medium-sized enterprises within the fourfold collaboration model, underscoring their importance in innovation processes. The study also evaluates the equilibrium among government, business, science, and society as a critical factor in shaping effective innovation ecosystems. In conclusion, the research advocates for balanced relationships and policy adaptations to optimize the potential of strategic differentiation and measure its influence on holistic economic growth.

**Key words:** Strategic differentiation, Sustainable progress, Knowledge exchange, Fourfold collaboration, Innovation, Holistic advancement, Regional cooperation, Knowledge-centric assets, Inclusive development, Economic advancement.

**1. Introduction**

In the contemporary landscape, sustainability has emerged as a universal imperative, shaping the trajectory of economic, social, and environmental

development. The adoption of the Sustainable Development Goals (SDGs) in 2015, along with the European Union's Research and Innovation Strategies for Smart Specialization (RIS3), has propelled the discourse on intelligent, sustainable, and inclusive growth. This introduction sets the stage for three comprehensive studies that explore the critical intersections of strategic differentiation, innovative specialization, and the equilibrium among government, business, science, and society.

Sustainability has become a universal imperative for all legitimate organizations since the adoption of the Sustainable Development Goals (SDGs) in 2015 at the United Nations General Assembly (United Nations, 2015). SDG 17, which focuses on partnerships, underscores the significance of knowledge-sharing among community members as a crucial element for fostering collaboration and generating fresh solutions to address societal challenges (Cummings, 2004). To achieve sustainability in local contexts, organizations must place greater emphasis on harnessing knowledge-based resources that are both within and beyond their immediate environment, leveraging social and community networks to meet the needs of pertinent members (Cross & Cummings, 2004; Roman, M., Varga, H., Cvijanovic, V., & Reid A., 2020).

Globalization has also reshaped the roles of knowledge and innovation in the sustainable development of any economy (Galvao et al., 2019). A multitude of recent studies have elucidated the pivotal role of knowledge-sharing in bolstering sustainability by cultivating innovation systems within regional contexts, with stakeholders playing a pivotal role in this endeavor (Gouvea et al., 2013; Hasche et al., 2020; Roman et al., 2020; Yun & Liu, 2019). Additionally, the geographical proximity factor should not be overlooked in the knowledge-sharing process, as transferring knowledge between key actors in innovation processes tends to be challenging when it occurs beyond regional or territorial boundaries.

The sole path to ensuring economic growth that is intelligent, sustainable, and inclusive lies in adopting "smart specialization" as a pivotal component of locally-oriented innovation policies. This article investigates the connection between knowledge generation, innovation endeavors, and the heightened competitiveness of regions and nations through the application of smart specialization. It outlines six essential steps that every country or region should undertake to craft a smart specialization strategy rooted in the fundamental principles articulated in the EU's Research and Innovation Strategies for Smart Specialization (RIS3).

These steps are elucidated using exemplary practices from Nordic countries. Special emphasis is placed on the utilization of the quadruple

helix concept within the context of RIS3. This concept expands upon the well-known triple helix paradigm by highlighting the role of society, in addition to science, industry, and government, in the innovation process. Society often acts as the ultimate consumer of innovation, exerting a significant influence on the creation of knowledge and technology through its demands and realization of user needs. The "four-link" model proves to be well-suited for the development of "smart specialization" strategies, even though this approach demands greater effort. Realizing the potential of this initiative and showcasing its benefits necessitates a corresponding revision of policies. Moreover, there is a growing demand for methodologies to quantify the effects of smart specialization.

From the perspective of foreign researchers such as S. Gackstatter, M. Kotsemir, and D. Meissner, society's role is reflected in the establishment and activities of public organizations, including political parties, unions, and associations, as well as the media (). According to G. Kleiner and D. Petrosyan, society's functioning encompasses the actions of individuals in shaping positions on issues affecting the nation or specific regions. Some scholars, like Y. Karayannis, D. Bart, and D. Campbell, within the framework of the Fourth Spiral concept, consider the impact of innovation on civil society through media and culture, where culture comprises values and traditions, and mass media includes television, the internet, newspapers, news outlets, social networks, and communication platforms ( Gackstatter S., Kotsemir M., 2014; Klejner G., Petrosyan D., 2005; Carayannis G., Barth D., Campbell D., 2012).

Similarly, according to these authors, the institutional aspect of the quadruple helix is closely intertwined with the development of small and medium-sized businesses, which play a vital role in realizing society's creative potential. Crucial institutions include legal norms that promote the emergence and growth of new inter-firm innovation-oriented relationships, particularly effective anti-monopoly legislation. The development of small and medium-sized businesses is essential not only for creating innovation infrastructure but also for increasing the demand for highly skilled professionals across all sectors of the economy, thus expediting the development of human capital within the innovation-driven economic system.

Let's explore the interaction among government, business, science, and society within a country's economic framework in the context of structural changes. The effectiveness of the economy hinges on the interplay between these four elements, each possessing its own internal dynamics. However, successful socio-economic development can only occur when these forces

achieve a certain equilibrium, fostering progressive structural transformations. If one element dominates the others, it results in a distorted social structure that hampers effectiveness. When the state dominates and controls production, suppressing societal initiatives, totalitarianism emerges. When society takes the upper hand, authorities appear weak, and economic activity dwindles, leading to anarchy. In situations where economic interests prevail, and societal structures are weak or fragmented, and the state lacks authority, an "economy of individuals" or disorganization takes root. In such a society, competition among individuals prevails, and heads of firms prioritize their personal gain over enhancing production processes or developing new products.

Within the framework of the innovation process, it is imperative to maintain a balanced relationship among the state, business, and society. An unbalanced relationship impedes the innovation process. Under totalitarianism, innovation activities face challenges because the state dictates production parameters, leaving enterprises with limited opportunities to explore new product ideas. Anarchy is similarly detrimental to innovation, as it hinders production altogether. According to P. Windrum and M. Tomlinson, in an "economy of individuals," innovation also falters because managers prioritize personal profit over improving production processes or innovating new products (Windrum P., Tomlinson M., 1999).

### **Conclusions**

In an era where sustainability has become a universal imperative, the concept of smart specialization emerges as a key driver of intelligent, sustainable, and inclusive economic growth. This article has elucidated the critical nexus between smart specialization, knowledge sharing, and sustainable development, emphasizing the pivotal role of the quadruple helix model in shaping innovation ecosystems.

In conclusion, the integration of smart specialization principles, knowledge sharing, and the quadruple helix model represents a promising path towards sustainable economic growth that benefits all stakeholders. However, realizing this potential necessitates policy revisions and the development of methodologies to quantify the impact of smart specialization, ultimately ensuring that innovation drives inclusive and sustainable development in the modern world.

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## **DEVELOPMENT OF DIGITAL TECHNOLOGY IN TOURISM: ONLINE-BOOKING, VIRTUAL TRAVELING, MOBILE APPS**

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### **Abstract**

Digital technologies gives significant influence on tourism sphere. Contributing to the development of online-booking, virtual tours, and mobile apps. In this article are considered digital technologies in tourism: online-booking, virtual tours, mobile apps. The influence of this technologies on the tourism market, in particular, their importance in providing quick and convenient access to services, increasing the level of customer service, creating new opportunities for travelers. Digital technologies have become a necessary component in the modern tourism industry, opening up wide opportunities for development and convenience for users. Highlighting and analyzing these aspects help to understand importance and perspectives of developing digital technologies in tourism for all of interested parties.

**Key words:** *tourism, virtual tourism, information technology, digital technologies.*

### **1. Introduction**

Modern era characterized by rapid developing of digital technologies, that steadily penetrate in different spheres of our life. Tourism is one the industries, that experienced a significant influence of this digital technologies. Let's consider the key aspects of developing digital technologies in tourism, in particular, online-booking, virtual tours, and mobile apps, and their influence on the tourism industry.

### **Overview**

This paper describes the advantages, disadvantages and conclusions on the following issues:

1. Essence digital technologies in tourism;
2. Advantages and features of digital technologies in tourism: online-booking, virtual tours and mobile apps.

### **Decision**

Today online-booking have become an integral part of modern tourism business. Platforms for booking hotels, flights, yours and other services provide convenience and accessibility for travelers. Such services allow customers compare prices and conditions quickly, making the travel planning process more transparent and efficient.

Reservation systems (CRS) are key components for travel agencies, airlines, hotels and other hospitality industries where it is important to manage and control bookings and inventory. For the most popular reservation systems include: Amadeus, that is one of the biggest and the most popular reservation system in the world, that gives services for airlines, hotels, tour operators, and other sectors of tourism; Sabre is another leading system of booking, that gives services for airlines, hotels and other sectors of tourism. Also offers a wide range of tools for managing and optimizing business; Travelpost reservation system, that serves airlines, hotels, tour operators and renting car services. She gives a wide range of services and functionality to optimize booking processes; Galileo as other systems, provides tools for booking airline tickets, hotels and other travel services. She also offers a wide range of integrated solutions for travel agencies and other customers.

These booking systems play important role in travel planning and management and provide a variety of tools and functionality for travel and tourism business.

Virtual tours is new trend in tourism industry. Thanks to development virtual reality and other technologies, travelers can visit exotic places and world attraction, as if they were physically there. This opens new opportunities for tourism, in particular for those who is limited in time and finances, as well as for virtual tourism during pandemics or crisis situation. Consider a new examples of virtual tours that provide the opportunity to travel virtually through the use of various digital technologies:

1. Google Arts & Culture: platform offers huge collection of virtual tours for new museums, attractions and cultural objects. You can visited such iconic places, as museum Louvre in Paris, Ermitazh in Sankt-Peterburg, and many other, without leaving home.

2. AirPano: web-site, that offers impressive 360-degree panoramic video and photo from whole world. You can feel yourself, as on the high of Everest, over underwater reefs or inside Great pyramid in Giza.

3. The Hidden Worlds of the National Parks: virtual tour, developed Google, allows You explore beauty and nature wonders national parks USA. You can deep in the unique eco-systems and see incredible kinds of animals.

4. Explore.org Live Cams: platform offers opportunity to observe by live activity of different places, include wild animal, birds, ocean reefs, and many others, thanks to a network of webcams.

5. CyArk: a non-profit organization that creates digital copies of the world's cultural and historical monuments using laser scanning and photography. They offer virtual tours of places such as Chichen-Itza, the Siberian volcano in Pompeii and many others.

Mobile apps have become an integral part of travel, providing travelers with tools for navigation , finding restaurants, booking transport and much more. They also can give useful information about local attractions, history and culture of the country, that helps tourists maximize their experience. The main advantages of travel mobile applications are: 1. Convenience and accessibility – mobile apps allow users to quickly and easily to book hotels, airline tickets, places in restaurant, rent transport and other services. They are available all the time and from any places, where there is access to the internet connection, which greatly simplifies the planning and execution of travel; 2. Portability – applications usually have an intuitive and easy-to-use interface, making them ideal for users traveling in large cities or remote region, where internet access is restricted; 3. Personalised recommendations, some mobile apps in tourism use artificial intelligence algorithms to analyze your preferences and travel history to provide personalized recommendations, regarding places of recreation, attractions and other interesting objects; 4. Opportunities to use offline. There are many apps in tourism allows download maps, information about local attractions and other useful information for offline use, which is especially useful in remote areas or in areas with poor network activity.

Note that mobile apps in tourism help provide convenience, efficiency and personalisation in process of planning and travel performance, making them more pleasant and unforgettable for users.

## **Conclusion**

Developing of digital technologies in tourism opens lots of new opportunities for travelers and tourism industry at all. Online-booking, virtual tours, and mobile apps significantly making easier process of

planning and travel performance , providing convenience , accessibility and increased opportunities for tourists in the whole world. Achievements in this area provide grounds for efficiency and innovative development in the sphere on tourism.

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