

**Akademia Nauk Stosowanych
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**MANAGEMENT SYNERGY: TECHNOLOGIES AND
STRATEGIES**

**SYNERGIA ZARZĄDZANIA: TECHNOLOGIE I
STRATEGIE**

**СИНЕРГІЯ УПРАВЛІННЯ: ТЕХНОЛОГІЇ ТА
СТРАТЕГІЇ**

Monograph

Edited by Mykola Ohienko

Tadeusz Pokusa

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45-085 Polska, Opole, ul. Niedziałkowskiego 18
tel. 77 402-19-00/01
E-mail: info@poczta.wszia.opole.pl

Reviewers

prof. dr hab. Marian Duczmal, prof. dr hab. Volodymyr Lagodiienko

Editorial Board

Mykola Ohiienko, Tadeusz Pokusa, Alona Ohiienko,
Andrii Skomorovskyi, Liudmyla Bezuhla

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Akademia Nauk Stosowanych
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INTRODUCTION

The synergy of management technologies and strategic approaches is a pivotal factor in addressing the challenges of contemporary economic and organizational transformations. The collective monograph *Management Synergy: Technologies and Strategies*, edited by Mykola Ohienko and Tadeusz Pokusa, explores this dynamic interplay through a multidisciplinary lens, focusing on the integration of innovative tools and adaptive strategies in diverse sectors to foster efficiency and resilience. This work, prepared under the auspices of Akademia Nauk Stosowanych – Wyższa Szkoła Zarządzania i Administracji w Opolu, aims to provide a comprehensive analysis of how management practices, digital advancements, and sector-specific innovations can respond to modern demands, promoting sustainable development.

The monograph is organized into two thematic sections, each addressing a critical aspect of management synergy:

Current Management Problems: By Type of Activity. This section examines contemporary challenges in management across diverse domains, including administrative models, human resource systems, marketing adaptations in crises, and the evolving IT market. It highlights innovative approaches to optimizing processes, balancing work-life dynamics, and enhancing organizational competitiveness in a globalized context.

Hospitality and Tourism Industry: Current State and Prospects. Focused on the pivotal role of tourism in economic and social recovery, this section explores the preservation of cultural heritage amid conflicts, the integration of sports for tourism potential, and the development of niche activities like equestrian tourism. It addresses the need for resilient strategies, infrastructure enhancements, and adaptive policies in an era of geopolitical and technological shifts.

By integrating theoretical insights with practical applications, this monograph offers valuable perspectives for researchers, practitioners, and policymakers. It underscores the importance of synergistic strategies in navigating the complexities of modern management and industry evolution, contributing to the broader discourse on technological and strategic progress.

Part 1

**CURRENT MANAGEMENT
PROBLEMS: BY TYPE OF ACTIVITY**

**АКТУАЛЬНІ ПРОБЛЕМИ
УПРАВЛІННЯ: ЗА ВИДАМИ
ДІЯЛЬНОСТІ**

Thus, Ukraine and European countries demonstrate different approaches to key elements of governance. While Europe is predominantly focused on decentralization and the introduction of advanced technologies, Ukraine is still at the reform stage. Further development is possible due to integration with the EU and borrowing successful governance practices.

1.2. General characteristics of the IT market and its key trends

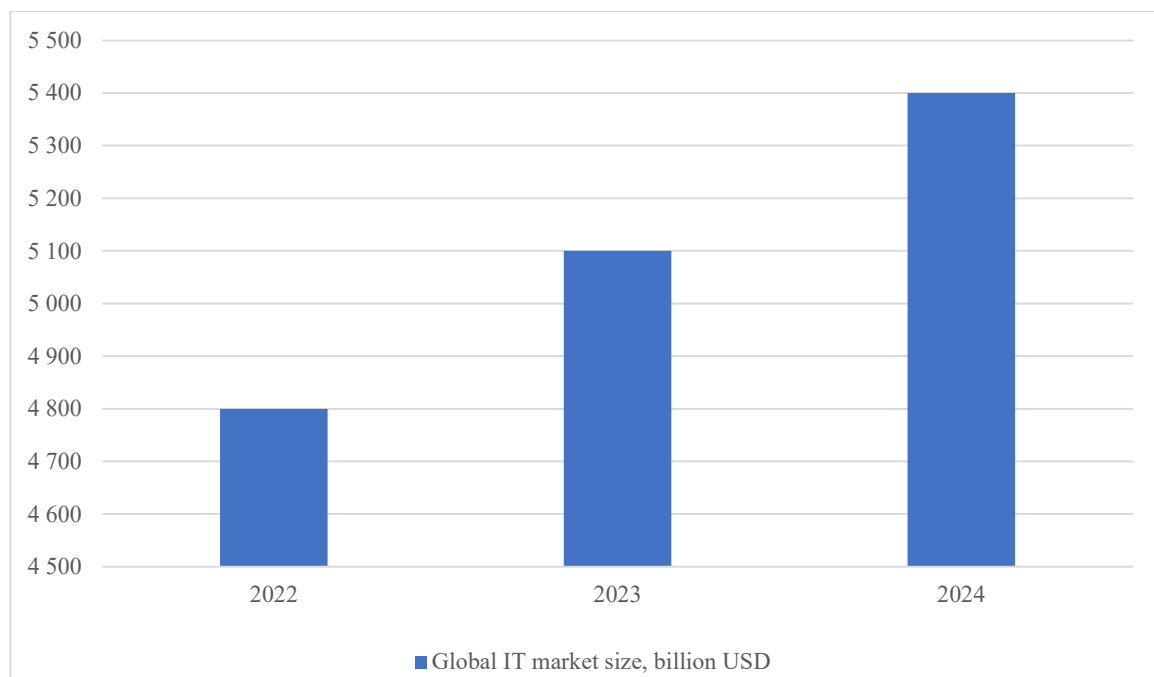
Information technology today occupies a central place in the development of the global economy, social processes and everyday life. The modern IT market is a dynamically developing industry that includes many segments - from the production of hardware and software to services in the field of cloud computing, artificial intelligence, cybersecurity and digital business transformation.

In recent years, the IT market has undergone significant changes due to technological progress, changing user demands, and global economic and social challenges. Today, the IT market is a set of all economic relations and processes related to the development, production, distribution, and use of information technologies and products based on them. It includes the following key segments:

- **Hardware**– servers, computers, network equipment, mobile devices.
- **Software**– operating systems, application programs, corporate solutions, games.
- **IT services**– consulting, systems integration, technical support, outsourcing.
- **Cloud technologies**– cloud platforms, SaaS (software as a service), IaaS, PaaS.
- **Cybersecurity**– data protection tools, information security systems.
- **Artificial Intelligence (AI) and Machine Learning (ML)**– technologies of data analysis, automation and robotics.

According to analytical agencies, the global IT market is showing stable growth at an annual rate of about 7-10%, which is associated with the growing demand for digitalization in various sectors of the economy - from industry and finance to education and healthcare (Fig. 1).

Figure 1. Volume of the global IT market for 2022-2024, billion USD



Source: Compiled by the author based on research.

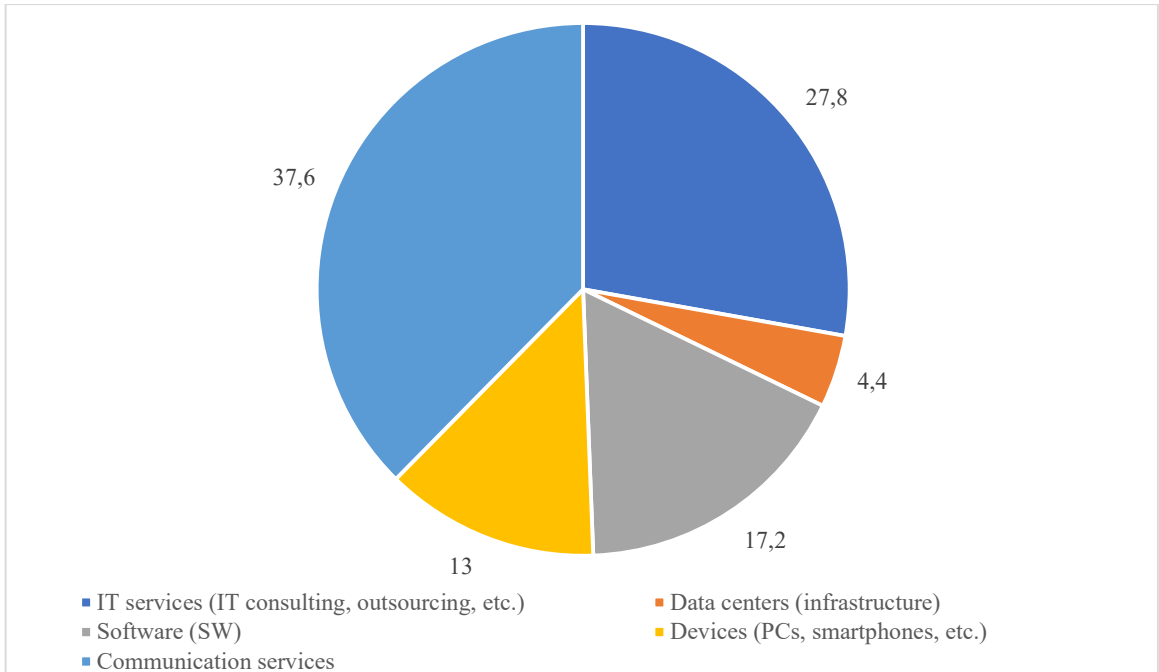
Analysis of the dynamics of the global IT market for 2022–2024 shows a steady growth trend. In 2022, the market was about \$4.8 trillion, in 2023 it increased to \$5.1 trillion, and in 2024 it reached \$5.4 trillion. According to forecasts from analytical agencies (Gartner, IDC), in 2025 the IT market is expected to further increase to \$5.7 trillion, which confirms the continued high rate of development of the industry.

For a more detailed understanding of the scale and development directions of the global IT industry, Fig. 2 presents the structure of the IT market by main segments for 2024. These data allow us to identify priority investment areas and determine which segments have the greatest impact on the development of the global digital economy.

An analysis of the global IT market structure for 2024 shows that the largest share is occupied by the communications services segment – about 37.6% of the total volume. This indicates the high importance of telecommunications infrastructure for ensuring global digital connectivity. In second place are IT services (27.8%), including consulting, solution implementation and outsourcing, which confirms the growing demand for professional support of digital transformation. Software also occupies a significant share (17.2%), reflecting interest in business applications, platform solutions and AI technologies. The device (13.0%) and data center infrastructure (4.4%) segments remain important, but demonstrate more moderate growth. Thus,

the market structure indicates a shift in emphasis towards the service and cloud model, where IT services and communications play a key role.

Figure 2. Structure of the global IT market by segments for 2024, %



Source: Compiled by the author based on research.

The market includes both large international players (Microsoft, Apple, Google, Amazon, IBM) and numerous startups, which often become a source of innovation. IT development is becoming a driver of economic growth in various regions, especially in countries with active digital transformation.

One of the main market trends is the large-scale implementation of digital technologies in business processes. Companies are actively switching to digital platforms, implementing automation systems, analytics and cloud services, which allows them to increase efficiency and reduce costs.

The COVID-19 pandemic has become a catalyst for accelerating digital transformation, forcing many organizations to switch to remote work, more actively use digital communications and cloud technologies. With the rapid growth of digitalization and the need to quickly adapt to changes in the business environment, cloud technologies have become an integral part of the IT strategy of most companies. Cloud solutions are used not only for data storage, but also for deployment, scaling and management of applications, which makes them a universal tool for organizations of any size.

Amazon Web Services (AWS), Microsoft Azure, and Google Cloud Platform

(GCP) are the world's leading cloud services platforms today. They provide a powerful infrastructure that enables companies to run high-load applications, process large amounts of data, and quickly respond to user requests. The scalability and flexibility of these platforms allow businesses to adapt to changing market demands without significant capital investments. This is especially important for startups and fast-growing companies that need on-demand resources and the ability to pay only for the capacity they use.

A key factor in the development of cloud technologies has been the widespread adoption of service models:

- SaaS (Software as a Service) – ready-made software available via the Internet (for example, Google Workspace, Salesforce);
- PaaS (Platform as a Service) – a platform for developing, testing and hosting applications (for example, Microsoft Azure App Service, Heroku);
- IaaS (Infrastructure as a Service) – renting a virtual IT infrastructure (for example, Amazon EC2, Google Compute Engine).

These models not only provide convenient and fast access to computing resources, but also contribute to the formation of an entire ecosystem of cloud services. Today, cloud platforms provide integration with data analysis tools, machine learning, artificial intelligence, as well as modern cybersecurity tools. Thanks to this, businesses get the opportunity to use advanced technologies without the need to create their own expensive IT infrastructure.

In addition, cloud solutions help increase business resilience through backup, fault tolerance, and flexible data access management. Companies can quickly deploy new services, experiment, and innovate while minimizing risks and time costs. The number of cloud technologies implemented and invented in 2022–2024 is presented in Table 1.

Table 1. Number of implemented and invented cloud technologies in 2022–2024.

Year	Implemented technologies	Invented/Developed Technologies(new platforms, frameworks, APIs, etc.)	Key directions
2022	≈ 1,200 solutions	≈ 150 technologies	SaaS, IaaS, Big Data, Backup
2023	≈ 1,500 solutions	≈ 180 technologies	PaaS, Multi-cloud Solutions, Cloud Security
2024	≈ 1,800 solutions	≈ 250 technologies	GenAI in clouds, automation, low-code, edge-cloud

Source: Compiled by the author based on analysis.

Thus, in the period from 2022 to 2024, there is a steady growth trend in both the number of implemented cloud solutions and the developed technologies, which indicates the dynamic development of the industry. Thus, the number of implemented solutions increased from approximately 1,200 in 2022 to about 1,800 in 2024, and the number of new platforms, APIs and frameworks - from 150 to 250. If in 2022 the main focus was on traditional cloud services (SaaS, IaaS), backup and working with Big Data, then in 2023 the emphasis shifted towards multi-cloud architectures and cloud security. In 2024, the key areas were generative artificial intelligence (GenAI) in the cloud environment, process automation, low-code and edge-cloud technologies, which indicates a desire for more flexible, intelligent and distributed systems.

Cloud technologies have thus become a key driver of digital transformation. They enable organizations to be more flexible, scalable, and competitive in today's environment. In the coming years, we expect further development of multi-cloud strategies, integration with generative artificial intelligence, and expansion of business process automation capabilities.

Artificial intelligence (AI) and machine learning (ML) are among the most promising and rapidly developing areas in the modern digital economy. Their implementation affects almost all industries - from the automation of office processes to the development of high-tech solutions capable of independently analyzing large volumes of information and making decisions based on them.

One of the most popular areas today is deep learning technologies based on neural networks that can identify complex patterns in data, process images, speech and text, and generate forecasts. When combined with Big Data tools, AI allows companies not only to analyze user behavior in real time, but also to predict future scenarios, optimize supply chains, reduce costs and increase operational efficiency.

AI and ML are actively used to automate routine operations such as document processing, sorting customer requests, and managing warehouse stocks. This reduces the workload on staff and speeds up business processes. In addition, intelligent decision support systems (DSS) built on AI help managers and analysts find optimal solutions based on a large number of variables and criteria.

In a number of industries, AI has already transformed traditional approaches to work.

- In healthcare – for diagnosing diseases based on medical images, predicting epidemics, and developing personalized treatment plans.
- In the financial sector – for fraud detection, automated risk analysis and investment management.
- In marketing – to build individual advertising strategies and analyze customer behavior.
- In production – for predictive equipment maintenance and product

quality control.

- In the IT sphere – for developing smart applications, chatbots, voice assistants and recommendation systems.

AI and ML are becoming more accessible every year thanks to cloud platforms such as Google Vertex AI, Azure Machine Learning, and Amazon SageMaker, which allow models to be developed and deployed without deep knowledge of programming and mathematics (Table 2). This opens up opportunities for even small and medium-sized businesses to use AI in their daily operations.

Table 2. AI (Artificial Intelligence) and ML (Machine Learning) development in 2022-2024 (global indicators)

Indicator	2022	2023	2024)
Global AI Market Size, billion \$	\$136.6 billion	\$184.0 billion	\$226.4 billion
Investing in AI startups, billion \$	\$91 billion	\$102 billion	\$110+ billion
Number of companies that have implemented AI	35%	43%	55%
Open-source AI models	400+	1,000+	1,800+
Machine learning market, billion \$	\$21.2 billion	\$29.4 billion	\$37.5 billion
The growth of AI and ML specialists, %	+18%	+22%	+28%
AI projects in cloud environments, % of total	52%	64%	73%

Source: Compiled by the author based on research.

Thus, from 2022 to 2024, there is a stable and significant growth of key indicators in the field of artificial intelligence and machine learning. The global AI market size has grown from \$136.6 billion to \$226.4 billion, and investments in AI startups have increased from \$91 billion to over \$110 billion, indicating growing interest and trust from investors. The share of companies that have implemented AI has grown from 35% to 55%, indicating active dissemination of technologies in the business environment. The number of open-source AI models has more than quadrupled - from 400 to 1,800, which contributes to wider access to innovation. The machine learning market is also showing steady growth, and the number of specialists in this field is increasing, reflecting the growing demand for qualified personnel. The increase in the share of AI projects in cloud environments from 52% to 73% indicates a transition to a more flexible and scalable IT infrastructure. All these trends confirm the dynamic development of AI technologies and their key role in the digital transformation of modern society

AI and machine learning have thus become an integral part of the strategic development of companies in the context of digitalization. They not only increase competitiveness, but also lay the foundation for sustainable growth, innovation, and personalized customer interactions in the future.

With the accelerated digital transformation of business and society, the vulnerability of digital infrastructure is also growing. Modern companies, especially in the IT sector, are faced with the need to protect customer data, intellectual property, management systems and communications from increasingly sophisticated cyber threats. With the growing number of attacks, including phishing, malware, DDoS attacks and data leaks, cybersecurity is becoming the number one priority worldwide.

One of the key trends in recent years has been the increase in investment in comprehensive information security solutions. This includes:

- Intrusion Detection Systems (IDS/IPS),
- Multi-factor authentication (MFA) tools,
- data encryption technology at all stages of storage and transmission,
- Endpoint Protection,
- automated access rights management (IAM).

Artificial intelligence and machine learning solutions are also being actively implemented, capable of predicting threats and automatically responding to incidents. This is especially relevant in the context of a large number of diverse data sources and continuous cyberattacks targeting vulnerabilities in software and networks.

Increased attention to the protection of personal data has been facilitated by the introduction of international standards and regulations, such as:

- **GDPR**(General Data Protection Regulation in the EU),
- **NIS2**(EU Directive on the Security of Networks and Information Technology),
- **ISO/IEC 27001**– international standard for information security.

Companies operating in global markets must adapt their IT systems to these requirements to avoid fines and loss of reputation. The features of cybersecurity development for 2022–2024 are presented in Table 3.

Table 3. Cybersecurity development for 2022–2024.

Indicator	2022	2023	2024
Global Cybersecurity Spending, \$ Billion	159	184	214
Average number of cyber attacks per company per year	270	320	380
Cybercrime Costs, \$Trillion	7	8.4	9.5
Percentage of companies using multi-factor authentication (MFA)	53%	64%	74%
AI-Based Cybersecurity Solutions Market, \$ Billion	14.9	19.3	24.2

Source: Compiled by the author based on research.

Thus, from 2022 to 2024, there is a steady growth in key indicators in the field of cybersecurity. Global spending on information security increased from \$159 billion to \$214 billion, indicating the growing importance of this area for business and government. At the same time, the average number of cyberattacks per company per year increased from 270 to 380, which emphasizes the growing threats and the need to strengthen security measures. The damage from cybercrime reached \$9.5 trillion, demonstrating the scale of the negative impact on the global economy. A positive trend is the increase in the share of companies using multi-factor authentication (MFA) - from 53% to 74%, indicating an increase in the level of security. The market for artificial intelligence-based solutions in the field of cybersecurity is also actively developing, increasing from \$14.9 billion to \$24.2 billion. These data emphasize the importance of investing in innovative technologies to counter modern cyber threats.

The Internet of Things (IoT) market is also rapidly developing – an ecosystem of devices connected into a network for data exchange and process management in real time. Today, IoT is already used in the following areas:

- **Industry (IIoT):** equipment monitoring, predictive maintenance, automation of production processes;
- **Smart cities:** control of lighting, transport, waste disposal, security system;
- **Healthcare:** wearable devices that monitor the patient's condition, remote diagnostics;
- **Transport:** fleet management, navigation, autonomous transport systems.

Every year, the infrastructure for working with IoT devices becomes more mature, including cloud platforms, gateways, real-time analytics, and support for 5G networks (Table 4). This opens up broad opportunities for the development of IT companies offering solutions in the areas of automation, analytics, and security.

Table 4. IoT development for 2022–2024.

Indicator	2022	2023	2024
Number of connected IoT devices in the world, billion	13.1	15.1	17.2
Industrial IoT devices (IIoT), billion	3.2	3.9	4.5
Global IoT Market Revenue, \$ Billion	478	544	621
Investments in IoT security, \$ billion	6.8	8.2	10.1

Source: Compiled by the author based on research.

The analysis of the presented data shows stable and significant growth of the global Internet of Things market in the period from 2022 to 2024. The number of connected IoT devices in the world increases from 13.1 to 17.2 billion, with the growth of industrial IoT devices (IIoT) being particularly noticeable – from 3.2 to 4.5 billion. The growth of global IoT market revenues from \$478 billion in 2022 to \$621 billion in 2024 confirms the growing commercial importance of this technology. At the same time, investments in IoT security are growing – from \$6.8 billion to \$10.1 billion, which indicates the importance of strengthening the protection of IoT infrastructure in the face of an increasing number of connected devices and growing cyber threats.

Thus, the Internet of Things market demonstrates stable and dynamic growth, covering more and more areas of application – from industry to healthcare and smart cities. The increase in the number of connected devices and market volumes is accompanied by the development of infrastructure and increased attention to cybersecurity issues, which creates favorable conditions for the further implementation of innovative IoT solutions and the expansion of IT companies' capabilities in this area.

One of the most significant innovations of recent years has been 5G technology – the fifth generation of mobile networks. The deployment of 5G networks radically changes the approach to data transmission, providing high speed and minimal delay (latency). These qualities are key to supporting various modern and promising technologies, such as cloud services, the Internet of Things (IoT), autonomous vehicles, as well as for the development of smart cities and the industrial Internet.

One of the main advantages of 5G is the ability to transmit large amounts of data with minimal latency, which is critical for real-time applications. For example, autonomous cars must instantly receive and process data from sensors and maps to drive safely. In turn, cloud computing and virtual reality require high bandwidth and a stable connection to provide a high-quality user experience.

The deployment of 5G networks also creates the foundation for new business models and services. Companies are able to implement innovative solutions in the field of remote medicine, industrial automation, telecommunications and multimedia. For example, the emergence of ultra-fast and reliable Internet will allow the development of distance learning using augmented and virtual reality, which will significantly improve the quality of education.

The key point is that 5G improves the reliability of digital communications. The technology provides support for the simultaneous connection of many devices, which is extremely important in the era of the Internet of Things, where sensors, smart devices and wearables are used everywhere. This opens up new opportunities for collecting and analyzing data, which ultimately improves the efficiency of business processes and the quality of services provided.

Thus, 5G technologies not only provide a qualitatively new level of speed and stability of communication, but also become a catalyst for the transformation of various sectors of the economy and social sphere.

In modern business, the desire to improve efficiency and reduce costs is actively realized through the implementation of robotics and process automation, known as RPA (Robotic Process Automation). RPA technologies allow the creation of software "robots" that perform routine and repetitive operations that previously required human participation. This frees employees from monotonous work and gives them the opportunity to focus on more creative and strategically important tasks.

Automating business processes with RPA significantly reduces operational costs by reducing human errors and increasing the speed of task execution. For example, automated robots can process invoices, fill out forms, perform data checks, and other routine operations. Such solutions allow companies to improve service quality, speed up response times, and increase overall productivity.

In addition, RPA promotes the flexibility of business processes. Automated systems easily adapt to changing requirements and can be integrated with various corporate information systems without requiring deep technical modifications. This is especially important in a dynamically changing market, where timely adaptation plays a key role in competitiveness. The use of robotics and automation is becoming an integral part of the digital transformation of enterprises, allowing them to maintain competitive advantages and manage resources more efficiently.

Another important trend in the field of information technology is the significant growth in the popularity of open source software. Such software is distinguished by the availability of source codes, which provides users and developers with the opportunity not only to use programs for free, but also to modify, adapt and improve them to suit their needs.

One of the main advantages of Open Source is flexibility. Companies can build their own solutions based on existing platforms and tools, which reduces development time and reduces licensing costs. This is especially important for startups and small businesses that need to quickly bring products to market without large initial investments.

Security is another factor that contributes to the growth of Open Source. With open source code, communities of developers around the world can quickly identify and fix vulnerabilities, ensuring a high level of data and system protection. Unlike closed software, where users are dependent on the vendor, Open Source projects are often supported by active communities, which speeds up response to threats.

In addition, the use of open source software stimulates innovation and collaboration in the IT community. Joint development, knowledge sharing and integration of various solutions create favorable conditions for the emergence of new technologies and approaches. Many large companies, including Google, Microsoft and

IBM, actively support Open Source projects and use them in their activities.

Overall, the growth of the Open Source market is helping to democratize access to technology and is creating new standards for software development, which in the long term has a positive impact on the entire digital economy.

The modern information technology market is characterized by significant diversity and regional features, which are formed under the influence of economic, political and cultural factors. The development of the IT sector in different parts of the world differs in pace, direction and priorities, which determines unique opportunities and challenges for companies and countries.

Thus, the USA and Canada are traditionally world leaders in the field of innovation and technological solutions. The largest corporations and high-tech startups are concentrated here, which set global trends in the development of software, hardware solutions, as well as in the field of artificial intelligence and cloud technologies. Silicon Valley and other technological clusters of North America attract significant investments and talented specialists from all over the world.

In these countries, much attention is paid to supporting the innovation ecosystem through public and private funds, as well as developing educational programs in the IT field. Leading companies are actively introducing advanced technologies into industry, medicine, transport and other areas, contributing to the digital transformation of the economy.

In Europe, the development of the IT market is accompanied by a strong focus on data regulation and the protection of personal information. The implementation of the General Data Protection Regulation (GDPR) was one of the key events that formed new standards for security and privacy in the digital environment. European countries pay great attention to the creation of sustainable and environmentally friendly technologies aimed at reducing the carbon footprint and increasing energy efficiency.

Regional innovation clusters such as Berlin, Paris and London are developing areas such as artificial intelligence, cybersecurity and financial technology (FinTech). European companies are seeking to create integrated solutions that combine technological innovation with social and environmental aspects, reflecting the overall development vector of the region.

The Asian region is one of the most dynamic in the world in terms of IT sector development. China, India, Japan and South Korea are demonstrating rapid growth of technology markets, significant public and private investments in the fields of artificial intelligence, 5G, IoT and robotics.

China is actively developing its own tech giants and striving for technological independence, investing in the development of its own processors, operating systems and cloud computing platforms. In India, the outsourcing and software development market is actively growing, while the government is stimulating the development of the startup ecosystem.

Japan and South Korea are focusing on robotics, smart cities, and automotive technologies, including the development of autonomous vehicles. The high level of research and innovation in these countries contributes to the creation of unique products and services.

In the CIS countries, the development of the IT market is accompanied by an emphasis on the creation and implementation of local technologies, including in the field of cloud computing and software. In recent years, there has been an increase in cloud infrastructure services, which allows enterprises to effectively manage data and scale business processes.

Particular attention is paid to information security and data protection issues, which is associated with the strengthening of legislative requirements and the overall digital transformation of the economy. The IT outsourcing and development sector is developing in the region, and innovative projects in the fields of artificial intelligence and big data analysis are emerging.

Regional differences will persist, but globalization and cooperation between countries will facilitate the exchange of experience, the creation of international partnerships and joint innovative projects. Technological competition stimulates the acceleration of digital market development and the introduction of new business models, which opens up new opportunities for companies and countries around the world.

Thus, the IT market continues to demonstrate high dynamics and innovative activity, being a key driver of the digital transformation of the global economy. The trends of recent years - the development of cloud technologies, artificial intelligence, cybersecurity, IoT and 5G - determine the development strategy of companies and shape the future of the industry. Adaptation to global challenges, constant implementation of innovations and consideration of regional characteristics allow businesses to effectively use the potential of the IT market and create competitive advantages.

1.3. Adaptation of marketing strategies in crisis conditions

Адаптація маркетингових стратегій у кризових умовах

Modern business operates in conditions of high turbulence: wars, economic crises, pandemics and other unpredictable factors change the market environment. In such conditions, traditional marketing strategies lose their effectiveness, and companies are forced to look for new approaches to communicating with consumers.

The relevance of the topic lies in the need for rapid adaptation of marketing campaigns to changing market conditions.