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GLOBAL MARKET FOR THE NEWEST IT SERVICES: CURRENT TRENDS AND MATURITY ASSESSMENT

The article examines current information technologies that have influenced the development of the world economy and ways of doing business. The method of work is the systematization of new technologies in the IT industry, which will directly impact the global economy and lead to a rethinking of approaches to strategic management and management. business, as well as an assessment of the global market for new IT services with observations of low trends and their influx into economic development. New technologies of the world IT industry have been identified and systematized, including: dark technologies, "Internet of speeches", great data, robo-consultants, cybersecurity technologies, block-chain technology, 3D technology, technologies of unmanned vehicles and drones. It is shown that systematized new IT technologies are important for the formation of an economical strategy for the region, as well as a business strategy for increasing competitive advantages in both the domestic and world markets.

***Keywords**: global market for IT services, information technologies, IT industry, digitalization of the economy, dark technologies, big data technologies.*

***JEL classification:** L86, L96, M15.*

ГЛОБАЛЬНИЙ РИНОК НОВІТНІХ ІТ-ПОСЛУГ: СУЧАСНІ ТРЕНДИ ТА ОЦІНКА ЗРІЛОСТІ

У статті розглядаються сучасні інформаційні технології, які увійшли в наше життя і вплинули на розвиток світової економіки, національних економічних систем, способи ведення бізнесу, спосіб життя переважної частини населення світу. Підкреслюється, що для кожної з перерахованих технологій, як і для інших інновацій, характерний певний рівень «зрілості», який має на увазі, що у своєму розвитку ІТ-технології проходять ряд етапів: виникнення інновації, наростання ажіотажу і формування «піка надмірних очікувань», порятунок від ілюзій, подолання нестачі продуктивності». Метою роботи є систематизація новітніх технологій ІТ-індустрії, які безпосередньо впливають на глобальну економіку і ведуть до переосмислення підходів у стратегічному управлінні, веденні бізнесу, до перегляду та подальшого переформатування бізнес-процесів, а також оцінка глобального ринку новітніх ІТ-послуг з виділенням низки трендів та їх впливу на економічний розвиток. Використана методологія системного аналізу, методи структурного, логічного та порівняльного аналізу. Аргументовано, що інноваційна діяльність у сфері ІТ-індустрії стає ареною конкурентної боротьби багатьох тисяч компаній по всьому світу – як великих корпорацій, так і зовсім невеликих стартапів. Виявлено та систематизовано новітні технології світової ІТ-індустрії, серед яких: хмарні технології, «інтернет речей», великі дані, роботи-консультанти, технології забезпечення кібербезпеки, технологія блокчейн, 3D-друк, технології безпілотних транспортних засобів та дронів. Окремо звернено увагу на оцінці «зрілості» зазначених технологій. Визначено, що виявлені та систематизовані новітні ІТ-технології є вкрай важливими для формування економічної стратегії країни, а також бізнес-стратегій, для ефективної діяльності кожного підприємства, нарощування конкурентних переваг як на внутрішньому, так і світовому ринках. Зроблено висновок про те, що Четверта промислова революція, на порозі якої стоїть зараз світ, вплине на всю структуру світової економіки, і займати значні позиції в ній, обстоюючи свої національні інтереси, неможливо без освоєння вже існуючих нових ІТ-технологій, а також їх розробки та впровадження.

***Ключові слова:** глобальний ринок ІТ-послуг, інформаційні технології, ІТ-індустрія, цифровізація економіки, хмарні технологіїї, технології великих даних.*

Statement of the problem. Modern information technologies have entered our lives and have had a huge impact on the development of the global economy, national economic systems, ways of doing business, and the lifestyle of the vast majority of the world's population. Currently, there is an unprecedented acceleration of scientific

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and technological transformations, a growing flow of digital changes penetrating all areas of the global economy (banking, retail, energy, transport, education, healthcare, etc.), which gives billions of people access to digital employment, education, medicine, entertainment, shopping, etc.

Current financial problems for both corporations and ordinary users are forcing everyone to save on IT solutions, and the increased activity of cybercriminals is forcing even those who previously did not pay attention to data protection to strengthen security measures. At the same time, the IT industry is developing quite dynamically, as evidenced by the creation and rapid development of the latest IT technologies, which have a noticeable impact on the global economy. These technologies include cloud technologies, the Internet of Things, Big Data technologies, robot consultants, cybersecurity technologies, blockchain, 3D printing, drone technologies, etc. [17].

Each of the listed technologies, as well as other innovations, is characterized by a certain level of «maturity», which implies that in their development IT technologies go through a number of stages: the emergence of innovation, the growth of excitement and the formation of a «peak of excessive expectations», getting rid of illusions, overcoming shortcomings and, finally, the onset of maturity or the technology reaching a «plateau of productivity». The analysis of maturity cycles of IT technologies, annually published in the report of the largest research and consulting company in the global IT services market Gartner Inc, is important for decision-making by government bodies and the business community.

Analysis of recent research and publications. The methodological foundations of the study of the digitalization process are laid in many works of modern authors. For example, Tapscott, B.D., Babu, R., & Tapscott, D. [14] characterize the prospects and dangers of the digital economy in the era of network intelligence. Lane N. [10] analyzes the features of the development of the digital economy in the 21st century. Kling R., Lamb R. [9] give their understanding of the digital economy in terms of IT technologies and organizational changes.

However, regardless of the large number of publications devoted to the process of digitalization of the economy, the systematization of the latest technologies in the IT industry has been little studied, and this requires additional research.

Purpose of the article. The aim of the work is to systematize the latest technologies in the IT industry that have a direct impact on the global economy and lead to a rethinking of approaches to strategic management and business management, to a revision and subsequent reformatting of business processes, as well as an assessment of the global IT services market with the identification of a number of trends and their impact on economic development.

Presentation of the main research material. Innovative activity in the IT industry is becoming an arena for competitive struggle between many thousands of companies around the world – both large corporations and very small start-ups (table. 1).

Table 1

Digital adoption rates in organizations by country in 2020 (as a percentage of total organizations)

Country	Artificial Intelligence Technologies	Internet of Things	Cloud Services	Big Data Analysis
United Kingdom	4	-	53	25
Germany	7	-	33	17
Denmark	11	24	67	23
Ireland	23	-	51	22
Italy	8	23	59	7
Finland	12	40	75	19
France	6	10	27	20
Czech Republic	6	44	29	9
Sweden	9	20	70	13
Estonia	6	16	56	8

Source: [4]

Storing and processing data in the so-called «cloud» - numerous servers distributed over the network, the number and structure of which are not visible to the client and which, from the client's point of view, represent a single virtual server, has proven to be very cost-effective. In this case, clients do not bear the costs of purchasing and operating servers, hiring highly paid IT personnel, or data security [3]. Many global companies have already transferred their IT infrastructure and business processes to the cloud, and businesses continue to transfer their data to virtualized storage facilities such as Dropbox, Google Drive, Facebook, Microsoft OneDrive, iCloud, etc. This makes it possible to access data from any computer or device with Internet access, organize collaborative work with data, optimize costs for secure data storage, and ultimately reduce company costs. Small businesses use cheap and free «cloud» products from Microsoft Azure, Amazon web services, and Google Cloud Platform. Due to optimization, companies achieve the desired effect without serious investments. Only security slows down the complete transfer of data to the external environment – the risks for large businesses from placing data on financial planning, personnel and business resources in the cloud are too great [1].

Therefore, non-critical services or duplicate functions are transferred to the cloud, for example, services are rented in a private data processing center for fault tolerance. This is typical for both financial structures and government agencies [11].

Gartner's forecast for global cloud spending over the next five years shows that global cloud spending by

companies will be more than $1.5 trillion [5]. It can be argued that since the advent of the digital era, cloud computing technology has become one of the most significant technologies in the global IT industry.

The transition of business to cloud technologies is the most important trend in the development of the IT industry. Cloud technologies provide new jobs for IT specialists of various profiles who are able to regulate and maintain «clouds». Cloud computing is not just an interesting service, but a firmly established, useful technology that brings benefits to both business and ordinary users, capable of bringing great changes to both business, public administration, and the way of life of a person [7].

According to the Gartner technology maturity cycle, cloud technologies overcame the "peak of hype" in 2017 and are now at the stage of getting rid of shortcomings and moving to mature technology [6].

The most sustainable and significant new IT technology is the Internet of Things (IoT), the emergence of which became possible due to the development of cloud technologies, the spread of wireless networks, the development of machine-to-machine (M2M) interaction and other technologies.

The Internet of Things technologies are based on a communication system between physical objects, for example, between household appliances connected to the Internet. In this case, a person is excluded from the communication system, which makes communication automated and more reliable. With the development of IoT technologies, the concept is gradually being implemented.

The Internet of Things was at the "peak of excitement" in 2020 and has now entered the stage of getting rid of illusions. This technology will reach maturity in 5-10 years. According to Ericsson forecasts, by 2026, more than 29 billion various technical devices will be connected to the Internet (in 2016 - 16 billion), of which 18 billion will be related to the IoT [7].

Consolidation of smart devices into a single infrastructure creates the basis for such technologies as «smart home» and «smart city». Intelligent «smart home» systems have long ceased to be a novelty in the high-tech market for everyday life. However, this concept has not yet been implemented on a mass scale. The complexity of installation and integration of different elements, lack of understanding of how all this will work over time and how reliable such a smart home is have an effect. In addition, the implementation of turnkey smart home technology costs tens of thousands of dollars, and each configuration is unique, and only a few can afford this pleasure. There is no mass, boxed product that can be unpacked and installed independently in a matter of minutes. However, interest in this market is constantly growing, including from large companies. Apple and Google have declared their desire to be present in this market, in particular, devices for HomeKit from Apple have already begun to appear, which can be controlled from a single application on your iPhone / iPad. But there are few such devices yet, the smart home market is only in its initial stages of formation, it is highly fragmented and there is no mass demand from buyers. According to analysts at Gartner, in the technology maturity cycle, smart home technology is only approaching the «peak of excitement» [6].

The development of IT technologies for smart cities is complex. It is safe to say that these are almost always large projects covering a wide range of information technology aspects. A smart city can be defined as a digital city, a knowledge city, a cyber city or an eco city, depending on the goals of urban planning. Smart cities constantly monitor critical infrastructure facilities to optimally allocate resources and ensure security. They are constantly increasing the number of services provided to the population, ensuring a sustainable environment that promotes the well-being and health of citizens. The basis of these services is the IT infrastructure. Currently, this concept has already been implemented in more than 2,000 cities around the world. It seems that from a technological point of view, everything is ready for a breakthrough in this area [13].

The purpose of Big Data technology is to obtain knowledge based on the analysis of large amounts of data. Data and analytics are what allows businesses to receive marketing solutions and confidently move forward. Solutions based on Big Data are excellent tools for analyzing the preferences of the target audience, changes in the nature of sales (their seasonality, peaks, etc.). But the most profitable solution, especially for small and medium-sized businesses, is still not the implementation of complex solutions, but the purchase of ready-made results of the analysis of customer preferences, changes in behavior, demand, etc. This is exactly what is produced using Big Data technologies. And here, accordingly, we can observe a powerful increase in demand for the creation and development of SaaS solutions that provide medium and small businesses with ready-made results of such analytics.

Big Data technologies appeared in search engines when Google and Yahoo, being startups, tried to «grind» the Internet. For them, the task was quite simple: it was necessary to process gigantic arrays of data on cheap servers, and this task was solved. Then Big Data technologies moved into the online trading segment, where they also proved themselves well - for example, giant stores began to use them in recommendation systems. In many ways, it was Big Data technologies that allowed this business to flourish. There is a penetration of Big Data technologies into the activities of mobile operators, as well as into the organization and conduct of election campaigns [12].

When talking about big data, it is necessary to focus on its accumulation, systematization and analysis. In order to become suitable for effective analysis, data needs to be reengineered and reformatted. Only 30% of data is directly related to analysis and model building. Such indicators make some experts and analysts skeptical about this technology.

Gartner estimates that 70% of the efforts in working with data are spent on their initial processing, cleaning, loading and preparation [6].

The potential effect of using this technology is very large, but the high complexity of analyzing the accumulated arrays is a major expense item for companies. Many companies collect, store and analyze huge amounts of information. With the development of technology and

globalization, such data is becoming more diverse: it is obtained from surveys, social media, business transactions and many other sources, and it can be both structured (statistics) and unstructured - audio and video files, financial transactions, documents. The volume and growth rate of this data are so large that traditional analytics tools, including conventional information technologies, can no longer cope with them. Often, big data remains unclaimed and does not get a chance to reveal its full potential. In order for this potential to be revealed, and big data to work for the benefit of the organization, algorithms and an analytical approach are needed. However, the fact that technology continues to develop does not mean that companies «better wait». After all, data, firstly, accumulates and constantly increases in volume, secondly, sometimes loses relevance, and thirdly, it can be used right now.

According to Gartner analysis, big data overcame the «peak of hype» in 2019 and is now at the stage of getting rid of illusions [6].

In business, it is quite difficult to guarantee trust, which is why society has so far needed a huge number of intermediaries to serve as guarantors of trust. In cyberspace, trust is based on two requirements: proving that you are who you say you are (authentication) and proving that you have the necessary permission to perform an action (authorization). These are the requirements that are best implemented using blockchain technology.

Blockchain is a distributed database that contains an ever-growing list of data records (transactions). This public data registry is distinguished by a high level of protection against falsification and revision, as well as a complete lack of reference to a specific geographic location. It is completely decentralized and autonomous, so transactions are verified by the participants in the system themselves, which simplifies many procedures and gets rid of intermediaries. Blockchain can be used for any kind of asset registry, inventory and exchange, including all areas of finance, economics and money; physical assets; intangible assets (votes, ideas, reputation, intentions, health data and other valuable information). Many banks are now looking closely at blockchain, as they understand that with the help of the new technology they will significantly reduce or even completely get rid of many expense items.

Analytical company Grand View Research has published a research report, according to which by 2024 the volume of the global blockchain market will amount to almost $ 8 billion. The starting point for determining the indicators was 2015, when the market volume amounted to $ 509 million. According to the company's analysts, the main drivers of growth in the blockchain industry will be the spread of the «Internet of Things» and smart contracts, as well as the increasing need for secure online payments. Factors holding back the development of the market include unresolved technical issues and the cautious position of regulatory authorities [2].

There is an opinion that the potential effect of using such technology is similar in significance to the emergence of the Internet itself. And many experts and scientists call blockchain a new driver of global business transformation. In our opinion, the primary areas of application of the innovative ideology of blockchain will be the financial sector and banks, telecommunications and transport, industry and agriculture. In the longer term, many other areas will be covered, including public administration and the system of international exchange of goods and services.

In addition, blockchain technology demonstrates high investment potential. Over the past few years, even very large companies such as NASDAQ, American Express, MasterCard and Visa have begun to participate in investment rounds of bitcoin and blockchain startups.

According to the Gartner technology maturity cycle, today blockchain is at the very «peak of excitement» [6].

The financial advice market is currently seeing a rise in the number of companies providing robotic advice (robo-advisors). Investors will still need help managing their assets, but this task does not necessarily require other people. As in many other professions, they can easily be replaced by robots.

Robo-advisors are websites that select a portfolio of possible investments for clients based on the investor’s answers in a questionnaire. In this case, there are two advantages: the client does not need to go anywhere or meet with anyone, and the service itself is much cheaper.

The first robo-advisors appeared in 2008, the year of the financial crisis. Their innovation was to balance investors' assets in target funds and provide investors with a modern, online interface. Before 2008, asset management software was sold only to financial advisers, who used it to automate their work. With the advent of robo-advisors, this product has become available to consumers without intermediaries.

Currently, financial robot companies are growing very rapidly. They are already present not only in the US, but also in Europe, Canada and even in India. Everything is changing and improving very quickly in this sector.

The global investment management market is now valued at more than $70 trillion. At the end of 2021, $53 billion was under the management of digital assistants, and according to forecasts from Business Insider, by 2027, robots will control $8 trillion, which will amount to 10% of the global asset market [8].

According to Gartner reports, robo-advisory technologies reached «peak hype» in 2020 and are now moving past the disillusionment stage [6].

The development of cloud technologies and the introduction of Big Data technologies force us to pay more and more attention to cybersecurity. The market for information security products has been showing steady growth for several years. Security technologies are a very relevant investment trend. A large number of financial transactions have left traditional banks for various payment systems, and this process will be even more active in the future. Payments are made remotely, increasingly via mobile devices. That is why correct identification and protection of the payer are becoming extremely important.

Cybercrime today is an organized and well-equipped business that is constantly evolving. Attackers not only develop new territories, develop specific business schemes targeting their victims, but also actively increase the intensity of attacks. But only a few small and medium-sized

businesses have a full-fledged strategy for protecting digital data. Often, organizations do not see the real vulnerabilities of their infrastructure.

The growth in the number and volume of losses from cybercrimes, unfortunately, is steadily growing, which requires significant costs for security. If in 2020, cybercriminals caused damage in the amount of 400 billion US dollars, then by 2027, the total business losses may already amount to 2 trillion US dollars. This forces companies to constantly increase their cybersecurity costs. For comparison, the cybersecurity market in 2015 was only 3.5 billion US dollars. According to experts, its volume will exceed 100 billion US dollars already in 2027. Another technology that can “rewrite the rules of the game” in the entire industrial sector is 3D printing. Large companies around the world are increasingly paying attention to the benefits that 3D printers can bring to production. So far, this type of creation of parts and structures is ineffective on an industrial scale. Firstly, it is still too expensive a process, and secondly, it is too long. However, manufacturers are already resorting to this technology to create either exclusive products or prototypes of future devices. In the future, when 3D printing becomes widespread and therefore more accessible, companies will be able to independently produce spare parts and small components for their products instead of purchasing them from third parties, often abroad. Thus, according to Bosch Rexroth (a division of the German Bosch for the production of gears and control systems), in 5-10 years up to 40% of the production equipment used by the company will be printed [16].

How much of an impact 3D printing will have on the industrial sector is still anyone’s guess: after all, the explosive spread of 3D printers could destroy entire supply chains. In 2016, the 3D printer sales market was almost $8 billion and experts predict it will grow to $30.2 billion by 2027 [12].

3D printing technology has almost passed the stage of getting rid of illusions and is approaching the stage of getting rid of shortcomings [6].

Unmanned vehicle and aerial vehicle (drone) technologies have revolutionized business models and created new operating conditions in industries ranging from agriculture to the film industry. In the very near future, customers across a wide range of industries will see the first impact of unmanned aerial vehicles (UAVs) in areas ranging from product delivery to insurer interactions. Unmanned aerial vehicle (UAV) solutions are most relevant for industries that require both mobility and high-quality information. In particular, companies that manage assets located over vast territories have long faced problems and challenges that can be solved using unmanned aerial vehicle (UAV) technologies. Integrating these devices into daily operations will help create significant benefits in major capital projects, infrastructure management, and agriculture. Insurance and mining companies will be able to find opportunities to improve the efficiency of their processes as they reach new levels of data quality and availability. And of course, the transportation industry will be able to completely change its concept of last-mile delivery. PwC estimates that the total addressable market for implementing solutions using autonomous vehicles exceeds $127 billion [13].

Of course, like any other market, the drone industry is influenced by various factors, including the safety of drone operation, the privacy of large volumes of data received, the availability of insurance coverage, etc. According to Gartner's technology maturity cycle, drone technology is currently in the hype stage and will soon reach maturity [6].

Conclusions. In 2025, according to estimates by the analytical agency Gartner, commercial companies around the world will spend about 3-5 trillion US dollars on IT. [6]. The current year, according to analysts, can be considered the "year of no return", when IT will finally become the main tool for increasing business competitiveness, will help significantly reduce capital and operating costs, and will allow it to quickly and clearly respond to market demands. Business must adapt to modern realities without delay, or it will be forced to leave the market.

Business migration to the cloud is accelerating at an explosive pace. Over the past four years, corporate giants from the Global 2000 have created entire departments to prepare for migration to the cloud, thereby forming a trend for other market participants. These teams have mastered the methodology, tools, and practices of DevOps to accelerate cloud migration. Companies have completed retraining engineers and hired cloud architects, consultants, and developers.

Cybersecurity plays an important role in maintaining business stability in modern conditions. Today, no one is immune from data loss or hacking of IT infrastructure: neither a large bank nor a pizzeria. According to estimates by Grand Thorton, the total damage to companies from cyberattacks in 2016 amounted to USD 280 billion (0.4% of global GDP) [15].

Information and communication technologies are the brain, circulatory and nervous systems of the economy. The Internet is a global transport artery for the dissemination of information, the development of electronic services and digital money, for communication between counterparties and remote distribution, a link between many industries and the economy as a whole. The fourth industrial revolution, on the threshold of which the world is now standing, will have a fundamental impact on the entire structure of the world economy, and it is impossible to occupy significant positions in it, defending one's national interests, without mastering the existing latest IT technologies, as well as their development and implementation.

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