https://doi.org/10.64211/oidaijsd190717

Socioeconomic Determinants of Labor Productivity, Strategic Planning and Digital Transition in Global Economies Based on Multiple Linear Regression (Social and Medical Sphere)

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OIDA International Journal of Sustainable Development, Ontario International Development Agency, Canada.
ISSN 1923-6654 (print) ISSN 1923-6662 (online) www.oidaijsd.com
Also available at https://www.ssrn.com/index.cfm/en/oida-intl-journal-sustainable-dev/

Abstract: The article examines the issue of increasing the efficiency of the economy and society in the context of adaptation to the digital environment. The impact of digital technologies on labor productivity, competitiveness, and social processes in the social and medical spheres is analyzed. The aim of the work is to identify the features of the adaptation of the world economy and to substantiate the directions of integration of digital tools into public life at the global level. To study the relationship between labor productivity, employment share, and gross value added (GVA) in digital sectors in a sample of 36 countries, a comprehensive methodological approach based on multiple linear regression was used. The results of the regression analysis show that the model explains 41.4% of the variation in labor productivity in the digital economy, and also confirm the statistically significant impact of employment on its growth. It was established that an increase in the number of employees in the field of information and communication technologies is a key factor in digital transformation. The study has practical value, as it suggests ways to improve government decisions in the field of digital employment and create conditions for equal access of people to modern technologies. The scientific novelty of the work lies in identifying the connection between digital adaptation and economic outcomes, in particular through the emphasis on the role of human capital in increasing labor productivity. A comprehensive approach to assessing digital transformation is proposed, which takes into account both quantitative and qualitative aspects, including technological integration and social inclusion, which contribute to the formation of new strategies for sustainable development of countries in the face of global economic challenges.

Keywords: digital transformation, labor productivity, gross value added, human capital, social inclusion, sustainable development, strategic planning, medical field, social field.

Introduction

The current stage of economic and social development is marked by comprehensive digitalization, which transforms both production processes and social relations. This leads to the emergence of new ways of economic interaction, changes in the principles of business organization, as well as rethinking consumption and management models. Over the past ten years, scientific and technological progress has significantly accelerated, especially in the field of information and communication technologies, which has led to a rapid growth in data volumes, the penetration of digital solutions into most sectors of the world economy and a profound transformation of social institutions [1]. An important area of research involves identifying discrepancies in the processes of digital adaptation and strategic planning, which manifest themselves in varying levels of digital technology adoption across different sectors of the economy, the presence of constraints in the social sphere, and uncertainty regarding approaches

to assessing the scale of digital transformation. In view of this, the analysis of the digital adaptation of the economy and society is aimed not only at identifying existing trends, but also at creating a theoretical and analytical framework for the development of effective digital development policies capable of responding to contemporary challenges and stimulating structural changes in national economies towards their digital transformation [2, 3].

Consequently, the relevance of this study is determined by the need for a thorough reassessment of the role of digital technologies and strategic planning as a key factor in enhancing the economy's competitiveness in the long term, optimising management processes, and ensuring conditions for comprehensive innovative development. The development of these processes in the social and medical spheres is of particular importance.

Literature Review

The active development of the digital economy has given rise to a significant number of scientific studies aimed at understanding its essence, internal structure and impact on socio-economic processes. Thus, in the works of Phan and Dinh [4] and Rust Russo [5], the digital economy is considered as a system of social relations aimed at increasing the efficiency of reproductive processes and stimulating the development of states. At the same time, the authors focus on the social component of digital transformations, but do not reveal in detail the mechanisms of interaction between institutional entities and the effectiveness of such changes.

Another approach is presented in the studies of Javaid et al. [6], where the digital economy is interpreted as a new model of human relations, formed on the basis of information and communication technologies and associated with the concept of the fourth industrial revolution. This approach combines technological and social dimensions, but does not pay due attention to the systemic analysis of risks, in particular digital inequality, cyber threats or problems of personal data protection.

In the works of Al-Zoubi [7] and Fox and Griffy-Brown [8], the digital economy is interpreted as a transformation of universal technologies in the field of ICT, which extends not only to the economy, but also to the social sphere. This approach emphasizes the scale of the impact of digital tools, but leaves open the question of assessing the effectiveness of these changes in the context of state development.

Chen and Xing [9] focus on the role of digital transformation in the creation of innovative products based on advanced technologies. Although the authors convincingly demonstrate the innovative potential of digitalization, their works do not sufficiently highlight the mechanisms of implementing such solutions in the real sector of the economy and the barriers to their dissemination. Similarly, Makedon et al. [10] and Prokopenko et al. [11] limit the understanding of the digital economy to the sphere of production and distribution of electronic goods and services. This approach is useful for applied analysis, but does not fully reflect the complexity of digital transformations, especially at the level of public administration and the formation of a digital society.

Researcher Dahmer [12] focuses on the key technological components of the digital economy, including the Internet of Things, cloud computing, artificial intelligence, big data, 3D printing, blockchain and digital design. This list outlines the technological basis of transformations, but the social consequences of the implementation of these technologies, in particular changes in the requirements for employee competencies, digital mobility and security, remain insufficiently studied. At the same time, Westerman et al. [13] draw attention to the investment attractiveness of the digital economy, emphasizing the high profitability of digital projects, which is important for the formation of public policy, but requires taking into account potential macroeconomic risks.

Of particular note are the approaches of Von Solms and Van Niekerk [14] and Suhendra et al. [15], who consider digitalization as an element of a virtual environment that complements reality. They distinguish two directions: the economy built on IT and the use of digital technologies in production processes. Despite the relevance of these approaches, they do not take into account the complexity of adaptation processes in conditions of institutional inertia and social resistance to change. In turn, Suntsova [16] defines the digital economy as a new management system based on IT, which forms the modern economic order. Despite the integrity of such a vision, it is not sufficiently supported by empirical data on its implementation.

Thus, the analysis of scientific approaches indicates a significant diversity of interpretations of the digital economy - from technologically oriented to socio-economic. At the same time, there is a lack of comprehensive studies that would systematically reveal the relationship between digital changes and structural transformations of society. The issues of inclusiveness of digital adaptation, assessment of its long-term consequences, ensuring social justice and adaptation to crisis conditions remain insufficiently studied. These aspects form the basis for further scientific research.

The purpose of the study is to analyze the process of digital adaptation of the world economy and to substantiate the directions of integration of digital technologies into public life in an unstable global environment.

Materials and Methods

The paper uses a synthetic methodology that combines quantitative and qualitative methods to study the impact of digitalization on economic and social transformations. The main quantitative tool was multivariate linear regression, which was used to model the relationship between labor productivity in digital industries, the share of employment in them, and gross value added.

The study is based on statistical materials from international organizations. The work analyzes data from 36 countries that differ in the level of development of digital technologies. The following indicators were included in the analysis: the share of employed people in digital sectors (as a percentage of total employment), gross value added (as a percentage of GDP), and labor productivity, which was defined as the ratio of GVA to the number of employed people. The model parameters were estimated using the multiple regression method. To verify its correctness, residuals were tested for normality of distribution using the Shapiro-Wilk criterion.

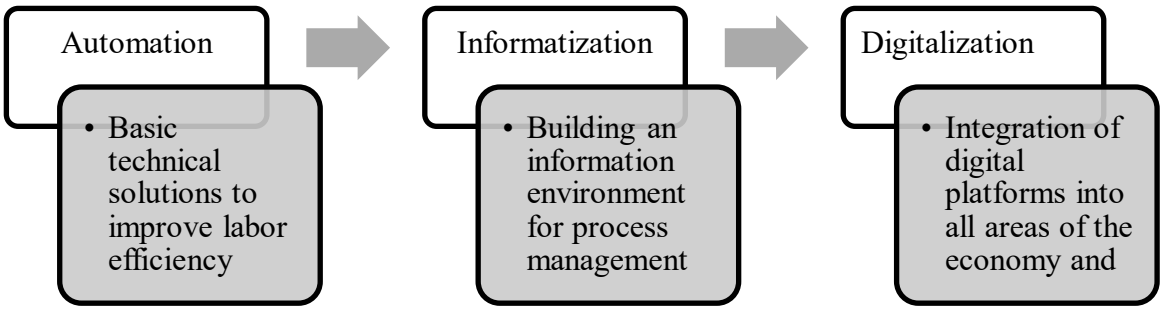
Results

The impact of digital technologies on the formation of adaptive processes in the state economy and society

Deep structural changes in the economy shape the ability of society and the economic system to adapt to digital transformations, which are not just technological innovations, but key factors of socio-economic development. The active implementation of digital technologies contributes not only to increasing labor productivity, but also to increasing the competitiveness of enterprises, reducing production costs, the emergence of new forms of employment and the gradual reduction of poverty and social inequality. Automation, informatization and digitalization in modern conditions are not separate stages, but are interconnected components of a single process of digital adaptation of the economy and society (Figure 1).

Digital adaptation of the economy within this process is based on a set of factors that can be combined into three main groups. First of all, these are the basic prerequisites that form the basis of the digital environment – a kind of "pillars" of the digital economy: traditional (non-digitalized) factors, in particular the institutional environment, infrastructure and level of education; directly digital components, such as access to the Internet, the availability of IT specialists and regulatory support; as well as the digital sector of the economy itself, which covers industries related to the creation and use of digital products and services.

Figure 1: Stages of digital adaptation of the economy and society in the context of modern transformations



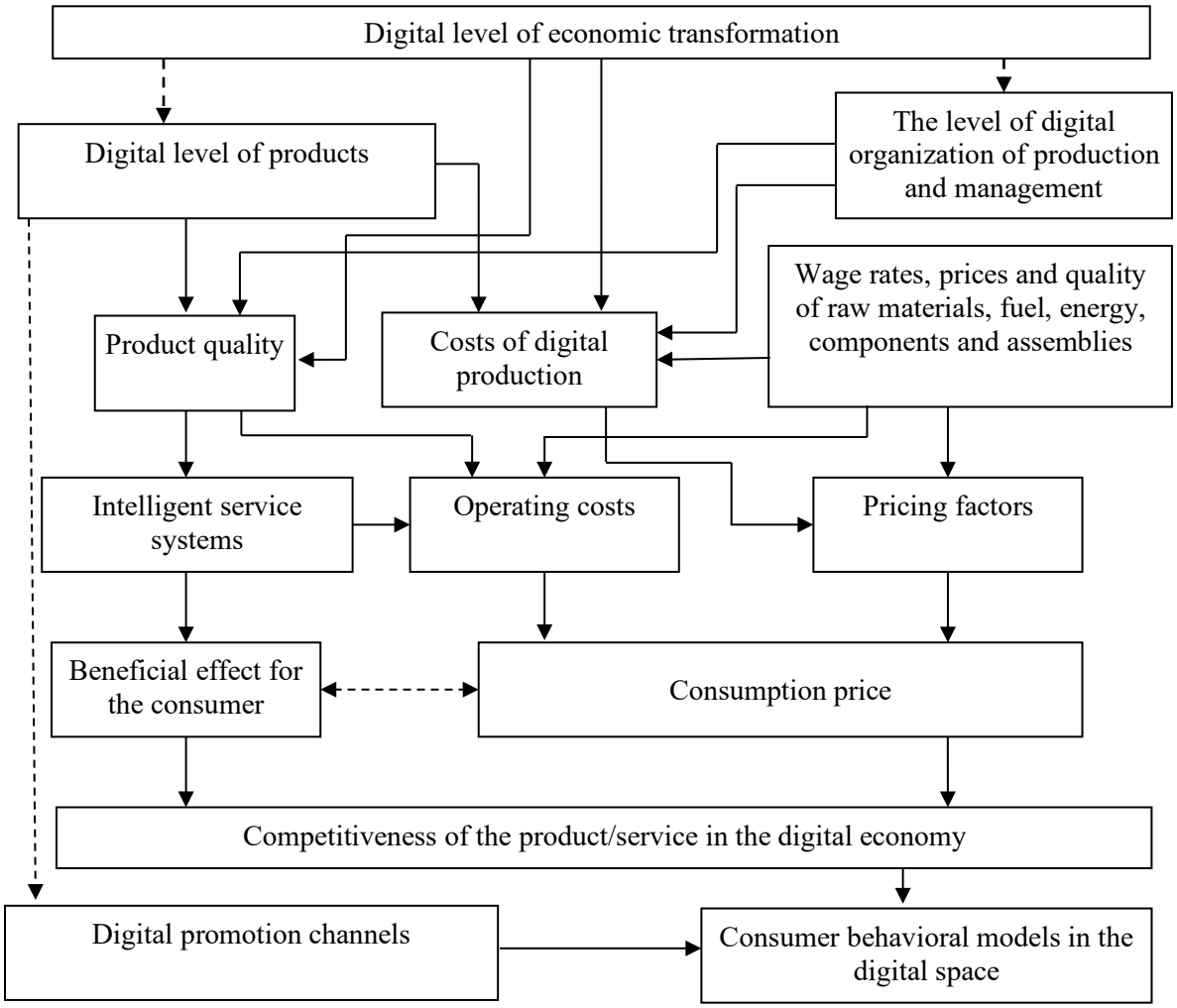
Source: based on Malynovska et al. [17]

It is the combination of these components that determines the system's ability to undergo a qualitative digital transformation and indicates its readiness to respond to modern challenges [18]. In addition, researchers highlight the crucial importance of integrating digital tools into the practice of economic and social institutions - from public administration and the business environment to the everyday life of citizens. This includes the emergence of a digital public sector, where administrative services are provided online; a digital business based on automation, data analytics and e-commerce; and a digital consumer-citizen who has the necessary digital skills and uses digital ecosystems. The third aspect is the new dependence of socio-economic outcomes on digitalization, which is manifested in shifts in the dynamics of economic growth, restructuring of the labor market, increased employment in high-tech sectors, improved quality of public services and increased well-being of the population [19]. One of the fundamental trends that has

driven the current changes is the globalization of digital solutions, which, thanks to the high mobility of innovations, have spread throughout the world (Figure 2).

Another characteristic feature of the current stage of digital adaptation is the increasing role of scientific and technological progress, which directly affects the pace of economic development and stimulates the emergence of new business models, digital platforms and ways of organizing work. In this context, the accumulation and processing of large amounts of information contribute to the digital transformation of economic activity [20].

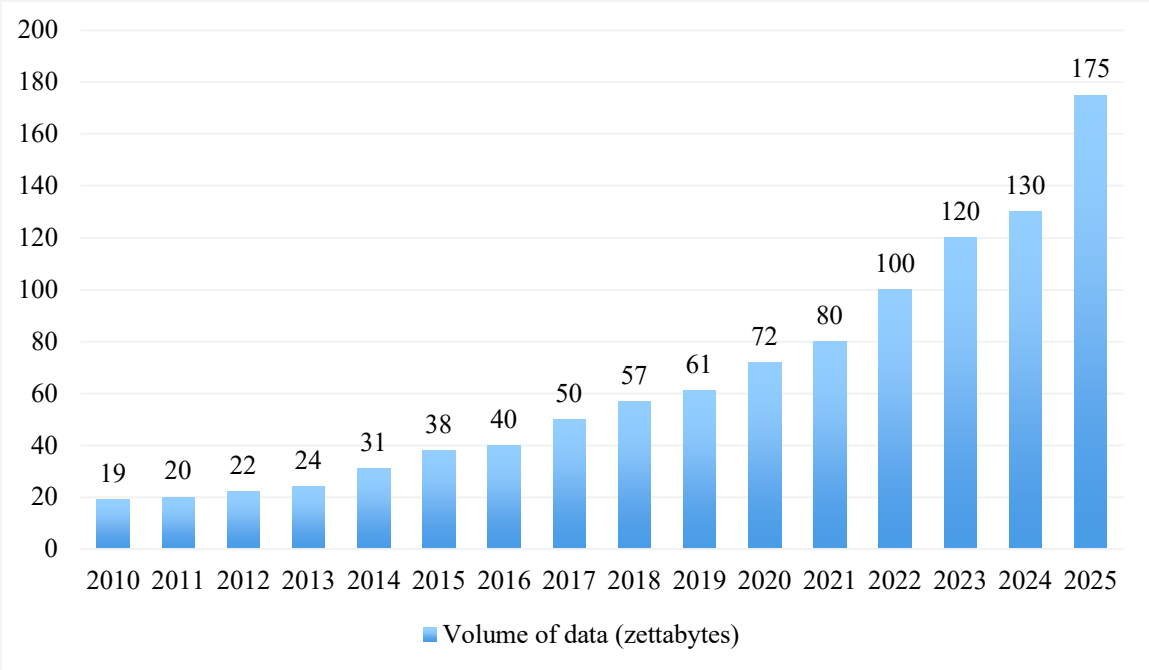
Figure 2: Level model of digital penetration in the changing economy and structure of production and consumption and strategic planning



Source: own development of the author

The expansion of information processing activities, as well as the active involvement of citizens in the creation and distribution of digital content, has led to a rapid, practically exponential growth in the volume of data in the world. In particular, according to the CELIOS rating [21], by the end of 2025 the total volume of digital data on a global scale will reach 175 zettabytes (Figure 3).

Figure 3: Global digital data growth dynamics as an indicator of digital adaptation of the world economy (2010-2025, zettabytes)



Source: based on CELIOS [21]

Of particular importance is the targeted management of data, which is gradually becoming one of the key resources of the digital economy. At the same time, cloud technologies are developing rapidly, providing flexible access to computing power, and the role of high-speed data transmission as a necessary condition for the effective functioning of digital services is also growing. In this context, the implementation of Internet of Things (IoT) technology, which forms a holistic digital environment for device interaction, is becoming increasingly relevant [22].

At the same time, it is obvious that within the framework of general technological development, individual digital solutions have a significantly higher transformational potential compared to others. In view of this, in 2022, European Commission experts proposed an approach to classifying leading digital trends based on three key indicators: levels of implementation (on a scale from 0 to 5), innovativeness (determined by the number of patents and scientific developments), and levels of public interest (measured by the frequency of search queries) [23].

Among the most developed technological areas, characterized by both wide practical application and significant investments, it is advisable to highlight the following: enhanced digital connectivity, which includes fifth and sixth generation mobile networks (5G/6G), as well as satellite Internet; applied artificial intelligence, including machine learning, natural language processing, computer vision and robotic systems; as well as cloud and edge computing, the importance of which is growing due to the rapid increase in the number of Internet of Things devices and the need for operational processing of distributed data directly at the places of their generation (Table 1).

Table 1: Analysis of global technology trends (forecast for 2024)

Technology sector	Degree of integration (1–5)	Innovation indicator	Level of social attention	Financing amount ($ billion)
Advanced network solutions	5	0,70	0,40	185
Practical implementation of AI	5	0,95	0,50	200
Cloud and edge computing	4	0,25	0,10	160
Web3 ecosystem	2	0,10	0,65	130
Digital trust and identification systems	3	0,08	0,12	45
Immersive technologies (VR/AR/Metaverse)	2	0,25	0,18	40
Industrial optimization of ML processes	2	0,30	0,06	8
Next-generation software	2	0,05	0,05	3
Quantum computing and systems	1	0,05	0,03	5

Source: based on Makedon et al. [24]; van Dijck et al. [25]

The Web3 phenomenon deserves special attention, which, despite its lower level of technological maturity and investment volumes, is characterized by extremely high public interest. This indicates significant expectations regarding its possible impact on the formation of a new architecture of the Internet space.

Each of the above areas of digital transformation, although not covering the entire spectrum of modern technological trends, is an important component of the broader concept of the digital economy and contributes to the formation of new models of production, exchange and consumption.

The digitalisation of the healthcare and social sectors is not merely a shift from paper records to computer programmes. It is a large-scale overhaul of the system, which faces significant resistance, technical limitations and security risks. Whilst on paper ‘everything works at the click of a button’, reality presents a number of complex challenges.

In the medical sector, technology is aimed at improving diagnostic accuracy, increasing access to treatment and optimising doctors’ workflows.

1. Telemedicine and remote monitoring: Online consultations have removed geographical barriers. Thanks to IoT devices (Internet of Things) – from ‘smart’ watches to implanted pacemakers – doctors can monitor a patient’s vital signs (blood pressure, heart rate, blood sugar levels) in real time without the need for hospitalisation.

2. Artificial Intelligence (AI) and Machine Learning: AI helps analyse large data sets (Big Data). For example, neural networks recognise abnormalities in CT, MRI and X-ray images with an accuracy that sometimes exceeds that of humans, detecting cancer in its early stages.
3. Electronic Health Records (EHR/EMR): The introduction of integrated information systems (in Ukraine, this is eHealth) allows the entire medical history, prescriptions and referrals to be stored in a single digital profile, accessible to relevant specialists in just a few clicks/
4. Digital technologies in the social sector
5. The social sector uses digital tools to deliver targeted assistance, reduce bureaucracy and support vulnerable groups.
6. Unified information systems: The creation of databases (for example, the Unified Information System for the Social Sector in Ukraine) enables the automated allocation of subsidies, payments to internally displaced persons, pensions and support for people with disabilities without the need to collect dozens of paper certificates.
7. Digital services and public services: Integrating social services into mobile apps (such as 'Dia') simplifies citizens' interactions with the state – from registering a child's birth (eMalyatko) to applying for unemployment benefits or booking a social taxi.
8. Assistive technologies and inclusion: Smart homes for the elderly, exoskeletons, microprocessor-controlled prosthetics, and mobile apps with artificial intelligence for people with visual or hearing impairments (which read text aloud or translate sign language) restore people's independence and integrate them into society.

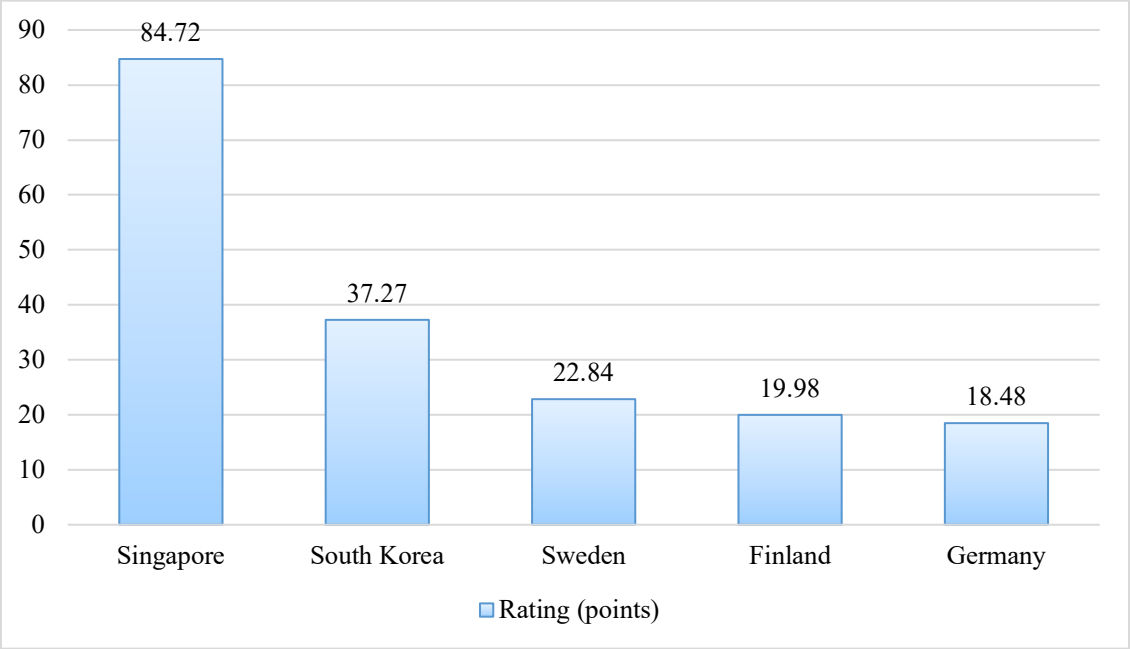
Analysis of the digital competitive environment through the prism of the global economy and public interests

Technological leadership in the development, implementation and scaling of digital innovations for the countries of the world is becoming not only a factor in strengthening their competitiveness, but also a basis for claims to leading positions in the new configuration of the world economy, where digital advantage is gradually becoming the main criterion for economic power and influence of the model of social development. This is most clearly manifested in the strategic rivalry between the USA and China, for which consolidating leadership in the global digital ecosystem has become one of the key priorities of state policy. In modern conditions, the digital sovereignty of the state is of particular importance, which determines its ability to independently formulate policy in the digital sphere, control technological resources, manage data and maintain an appropriate level of information security [26].

However, full independence in the digital environment remains difficult to achieve due to the global nature of technologies, international digital platforms and the close interconnection of global information systems. Despite this, the concept of digital sovereignty is increasingly seen as an important tool for regulating economic and technological changes in the digital era.

The latest statistical estimates for 2024 confirm that the United States and China continue to hold leading positions in the digital economy in terms of volume, scale of infrastructure and institutional influence on the global technological system. According to the IMD World Competitiveness Center [27], these two countries collectively control about 88% of the market capitalization of the 70 largest digital platforms in the world, which indicates a high concentration of innovative and financial potential in a limited group of countries. At the same time, the United States retains its primacy in the value of the digital sector, which in 2024 exceeds $ 18.4 trillion. USA, while China demonstrates stable growth, reaching the level of 8.2 trillion USD, which allows it to confidently hold the second position in the global digital ranking (Figure 4).

Figure 4: Comparative characteristics of the size of digital markets by rating points, 2024



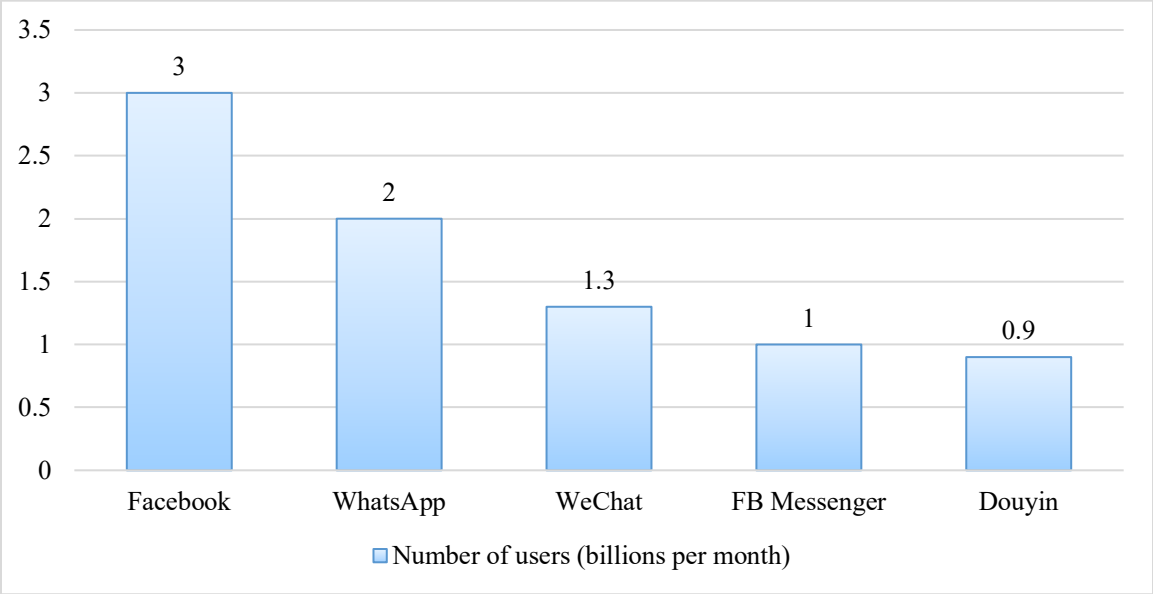
Source: based on World Bank [28]

The growing gap between the digital economies of the US and China and the rest of the world is particularly telling. For example, Germany, which traditionally ranks third, reached a digital economy of $3.1 trillion in 2024, indicating significant growth in this sector. The group of countries with digital sectors exceeding $1 trillion also includes Japan ($1.6 trillion), the United Kingdom ($1.4 trillion) and France ($1.1 trillion), indicating a significant concentration of digital potential mainly in economically developed countries [28]. At the same time, according to Statista [29], in 2024 China finally established itself as the largest domestic digital market in the world. Such results were made possible by an active state policy in the field of digital infrastructure development. Significant investments were made in the development of 5G networks, the introduction of Internet of Things technologies and the upgrade of fiber-optic communication systems. In recent years, China has consistently created its own digital ecosystem – from the production of microelectronics to the development of digital platforms for end users. This allowed the country not only to increase the scale of the digital sector, but also to achieve a high level of technological independence in strategically important areas.

According to Huawei Technologies and IDC [30], most of the world's leading digital platforms are concentrated in the US and China: four platforms belong to companies from each of these countries, and another was developed by Chinese specialists. This situation demonstrates the dominance of the two countries in the development of the global digital environment.

This configuration largely determines the nature of economic adaptation in the 21st century (Figure 5).

Figure 5: The most popular digital platforms in the world by number of visits, 2024

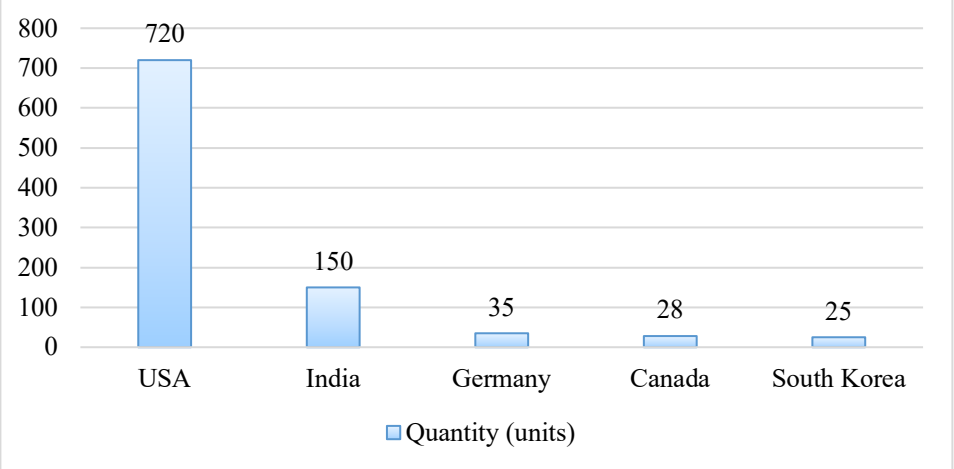


Source: based on data from Huawei Technologies and IDC [30]

Global processes of digital adaptation depend to a large extent on the innovative activity of the private sector, which, in the presence of a developed financial system and a favorable institutional environment, ensures high rates of digital development. A vivid example of this is the US economy, where the digital sphere is one of the key drivers of growth: in 2023, the volume of venture financing of technology projects amounted to 153.1 billion USD. Although this figure is lower than the record level of 2021, it still indicates a consistently high interest of investors in innovative business models.

In 2024, the United States retained its global leadership in the number of "unicorns" – private companies with a market valuation of more than 1 billion USD. This reflects the effective interaction of the domestic market, flexible financial instruments and entrepreneurial culture, which together form a powerful ecosystem of innovative development (Figure 6) [21].

Figure 6: Geographical distribution of unicorn companies in 2024 as an indicator of digital business activit



Source: based on CELIOS data [21

American leadership is also clearly visible in the industry of processing and storing large amounts of data. The three leaders – AWS, Microsoft Azure and Google Cloud – together hold more than 60% of the global cloud computing

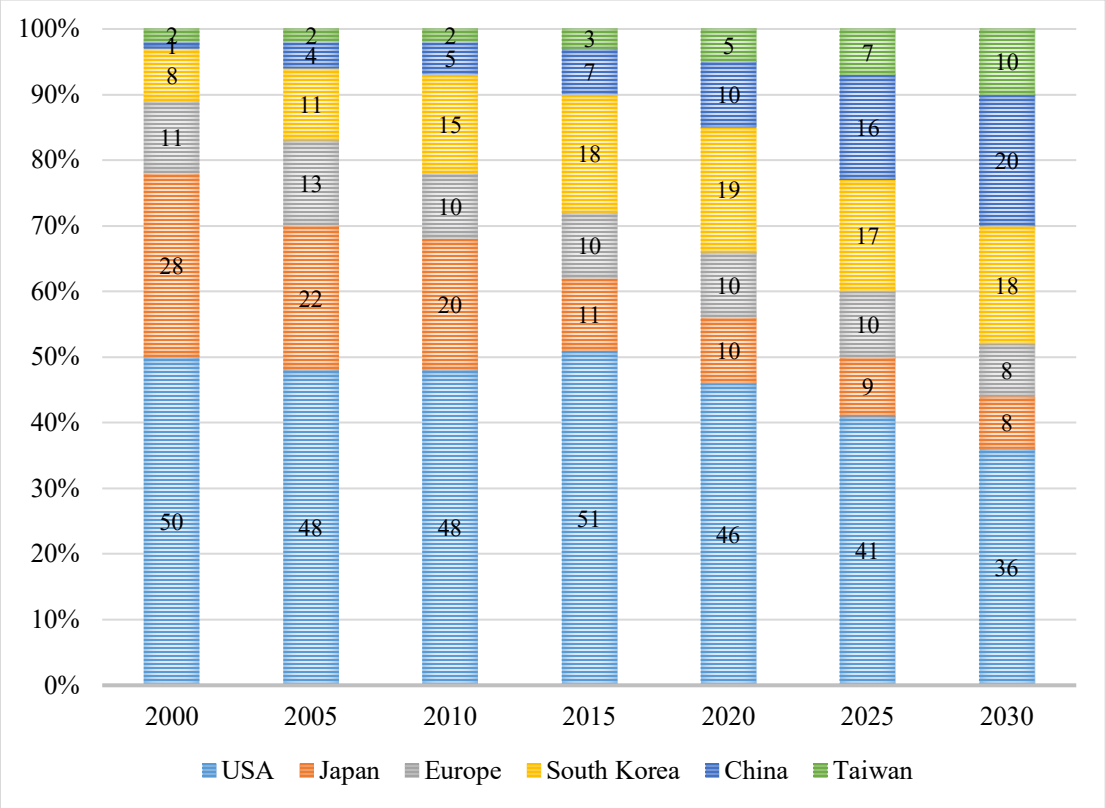
market. For comparison, the share of key Chinese players (Alibaba Cloud and Tencent Cloud) in the first quarter of 2024 was only about 8%.

The high level of digitalization is supported by a developed infrastructure:

– broadband Internet is available to more than 99% of the population.
– 4G coverage covers virtually the entire territory of the country.
– the implementation of 5G networks has already crossed the 70% mark.

The effectiveness of digital transformation is also reflected in public administration. According to the World Bank [28], the USA ranks 7th in terms of the level of implementation of e-government (94.6%) and 9th in terms of transparency of public data (82.4%). At the same time, the semiconductor industry remains a strategic asset and guarantor of the country's technological sovereignty, forming the basis of digital exports and ensuring America's competitiveness on the global stage (Figure 7).

Figure 7: Dynamics of shares of the global microchip design market by place of registration of companies' headquarters in 2020-2030 (forecast) in the context of digital competition



Source: based on World Bank data [28]

Despite its strong performance, US industry faces increasing competitive pressure from China and South Korea. The share of US manufacturing capacity in global volume has fallen from 37% in 1990 to 12% in 2022. According to forecasts, by 2030 the US share in the field of microchip design may decrease to 36%, while China (excluding Taiwan) is able to increase its share to 23%, and South Korea to 19%.

Although the United States continues to maintain a leading position in many segments of the digital economy, some areas show a gradual loss of competitive advantage. In particular, we are talking about next-generation telecommunications technologies (5G and 6G), where leading positions are gradually passing to companies from China, South Korea and the European Union, which are actively supported by government programs.

Thus, the spread of digital technologies and the social transformations associated with it are shaping new conditions for international competition. In the modern world, the level of technological development, control over digital

platforms, and advantages in the field of digital infrastructure are crucial for the economic influence of states. These changes affect not only the economy, but also the social sphere, raising the issue of digital independence, data security, and increasing social inequality [31]. The main characteristics of digital competition and their impact on the global economy and society are presented in Table 2.

Table 2: Results of digital rivalry and its impact on the global economy and public interests

Rivalry factor	Technological leadership	Impact on global platforms	Infrastructure advantage	Socio-economic impact
Innovation dynamics	Dominance in the development of advanced technologies	Control over key digital ecosystems	Developed network infrastructure	Increased economic inequality
Digital autonomy	Creation of own technological standards	Restriction of access to global platforms	Autonomous communication and data systems	Growing issues of digital sovereignty
Concentration of resources	Financing of venture capital and exchange mechanisms	Monopolization of digital markets	Large-scale investments in 5G and IoT	Formation of a bipolar economic order
Competitiveness	Transition to next-generation technologies (6G)	Distribution of influence between several players	Localization of microchip production	Changing models of economic dominance
Security and regulation	Data protection and cybersecurity	Regulation of transnational platforms	Standardization of digital infrastructure	Balance between privacy and public distribution

Source: author's own development

Thus, the development of digital technologies is changing the modern system of the world economy and forming new principles of international interaction. The competitiveness of the state depends more on its ability to create and control digital platforms, technological infrastructure and information resources. At the same time, the dominance of a limited number of global technological leaders contributes to the deepening of global inequality, other countries with a lower level of development have fewer opportunities to access modern digital solutions [32]. In addition, the desire of the state to ensure its own digital autonomy increasingly reports on the global nature of technological networks and international digital integration, which requires updating approaches to regulating economic and social processes in the digital environment.

Analysis of transformations in the digital economy and their impact on social behavior

The modern digital economy has ceased to be just a tool for business; it has become a fundamental factor transforming socio-economic paradigms. This is manifested in a fundamental change in approaches to professional activity, consumption models and management decision-making strategies.

The key measure of the success of the digital transition is labor productivity in areas based on ICT, as well as in the media production and digital content generation sectors. It is this indicator that makes it possible to objectively assess:

– the level of efficiency of high-tech production.
– the flexibility and viability of organizational structures.
– the ability of national economic systems to adapt to the challenges of the global digital space.

As of 2024, forecasting and modeling the development of the digital segment is based on an expanded system of statistical metrics. In particular, such parameters as the number of specialists involved in the digital sector, the dynamics of gross value added (GVA), and average labor efficiency indicators are analyzed. A comparative analysis of these indicators across different countries allows us to identify not only the level of technological progress, but also the depth of institutional changes that directly adjust the economic behavior of entities (Table 3).

Table 3: Ranking of countries by the development of digital technologies and labor productivity in digital sectors of the economy in 2024

Country	Number of employed, %, by the end of the year	GROSS DOMESTIC PRODUCT, %.	Labor productivity	Place in the ranking
Australia	3,4	0,9	4,2	14
Austria	2,7	0,7	4,1	16
Belgium	2,4	0,6	4,0	18
Brazil	1,3	0,4	3,4	26
United Kingdom	3,7	1,3	5,2	7
Hungary	4,1	0,8	6,2	3
Germany	3,2	0,9	5,3	6
Greece	1,4	0,5	3,3	28
Denmark	3,0	1,5	4,3	13
India	1,0	0,2	6,0	5
Ireland	4,0	1,2	6,8	1
Iceland	3,6	2,1	4,5	11
Spain	2,4	0,8	3,6	22
Italy	2,6	0,5	3,8	20

Canada	3,2	1,2	4,0	17
Latvia	3,5	0,6	5,0	8
Lithuania	2,2	0,5	3,9	19
Luxembourg	4,2	0,7	7,0	2
Mexico	2,3	0,3	3,3	27
Netherlands	3,0	0,7	4,8	10
New Zealand	2,8	1,3	3,7	21
Norway	2,6	1,4	3,5	24
Poland	2,4	0,7	3,8	23
Portugal	1,8	0,5	3,4	25
South Korea	3,8	1,9	10,0	4
Slovakia	3,2	0,6	4,6	12
Slovenia	3,2	0,9	4,4	15
USA	3,0	1,3	5,8	5
Turkey	1,1	0,3	3,0	29
Finland	4,2	1,1	6,0	9
France	2,8	0,9	4,8	11
Czech Republic	3,4	0,6	5,8	6
Switzerland	5,0	0,8	6,8	3
Sweden	3,5	1,4	6,0	2

Estonia	4,8	1,1	5,6	7
Japan	3,3	0,9	6,2	4

Source: based on data from the Digital Cooperation Organization [33]

Based on the data in Table 4, authors use a multiple linear regression econometric model to estimate the strength of the impact of the number of people employed in the digital sectors of the economy and gross value added (GVA) on labor productivity in the digital sectors of countries around the world.

$$Yi = \beta_0 + \beta_1 \times X_{1i} + \beta_2 \times X_{2i} + \varepsilon_i \quad (1)$$

where:

Y_i – labor productivity in the digital sector,

X_1 is the share of people employed in the digital economy (%),

X_2 is the share of gross value added (%),

β_0 is a constant (free term),

$\beta_{(1),\ \beta 2}$ are regression coefficients,

ε_i is a random error.

Table 4: Results of model estimation

Parameter	Estimation (β)	Standard error	t-statistic	P-value	Confidence interval (95%)
const	1.9585	0.636	3.079	0.004	[0.664, 3.253]
Employment	0.8909	0.235	3.791	0.001	[0.413, 1.369]
ValueAdded	0.2893	0.515	0.562	0.578	[-0.758, 1.337]

Source: calculated by the authors

The modeling results show that the constructed model explains 41.4% of the variation in labor productivity due to changes in the share of employment and the volume of gross value added, which is confirmed by the coefficient of determination ($R^2 = 0.414$). The high statistical reliability of the model is confirmed by the value of the F-statistic (11.67; $p < 0.001$), which indicates its suitability for analyzing digital economy processes.

In particular, the employment coefficient ($\beta_1 = 0.8909$; $p = 0.001$) turned out to be statistically significant at the 1% level, which means: an increase in the share of employed in digital sectors by 1% is associated with an increase in labor productivity by 0.89 units, provided that GDP remains unchanged. The results obtained further confirm that in the digital economy, it is precisely human potential that is of decisive importance, acting as the basic driver of development.

At the same time, the gross value added indicator ($\beta_2 = 0.2893$; $p = 0.578$) did not demonstrate a statistically significant impact. This may indicate that it is not sensitive enough to the reflection of innovation processes and the level of technological efficiency in digital industries.

The analysis conducted confirms the assumption that the growth of employment in the digital sector, especially in the field of information and communication technologies, is a key factor in increasing labor productivity. This result

indicates the feasibility of a targeted policy of investing in training personnel and expanding jobs in this area in order to strengthen the competitive position of the economy.

However, the presence of a statistically significant effect of gross value added can be explained by its generalized nature, which does not allow to fully take into account the qualitative characteristics of digital transformations, in particular the introduction of artificial intelligence or 5G technologies. This is necessary to improve approaches to assessing the economic contribution of digital sectors.

In general, successful digital transformation requires synergy between the development of human capital and the improvement of methods for measuring economic results. In this case, it is important to obtain not only a few indicators, but also qualitative aspects - the level of technological integration and digital inclusion, which form the basis of sustainable economic growth and social development in the context of global digitalization.

Here are the main pain points of digitalisation faced by developers, doctors, social workers and patients.

1. Cybersecurity and the protection of highly sensitive data. Medical records and social profiles contain a person's most private information: from diagnoses and chronic conditions to financial status, declared assets and marital status.

2. The digital divide and inclusion Technology is designed to make life easier, but sometimes it becomes a barrier between a service and the person who needs it most.

3. Bureaucratic and technical burdens on staff. Instead of freeing up time for the patient, digitalisation often takes it away in the early stages. The 'double work' syndrome: Due to transitional periods or mistrust from local management, staff often have to fill in an electronic form and duplicate it in a paper log 'just in case'. System freezes and technical glitches.

4. The problem of data compatibility (interoperability).

5. Resistance to change and staff shortages.

Discussion

The results obtained in the research clearly show the existence of a close and stable connection between the level of involvement of the workforce in the digital economy and labor productivity in sectors based on the use of digital technologies. Similar conclusions are echoed by the position of Brynjolfsson and McAfee [20], who emphasize that the implementation of digital solutions in itself does not guarantee long-term results without the simultaneous increase in human capital.

Within the framework of the study of the mentioned position, there was a practical confirmation: the constructed econometric model showed that employment in the digital sector has a statistically significant impact on the level of labor productivity.

Compared to the study of Chen and Xing [9], which focuses mainly on the innovative potential of the digital economy, this work goes a step further by analyzing the actual manifestations of economic behavior in the real environment. It has been established that digitalization not only enhances innovation processes, but also transforms the organization of labor itself: the importance of flexible forms of employment is increasing, remote work is actively spreading, and platform models of the economy and entire digital ecosystems are being formed.

According to the works of Javaid et al. [6] and Al-Zoubi [7], considerable attention is paid to the social consequences of digitalization, in particular its ability to expand access to services and promote social inclusion. In this study, these provisions have received practical confirmation, since the introduction of digital technologies in the field of public administration and social services contributes to the reduction of administrative barriers, the reduction of regional inequality and the optimization of costs. At the same time, the realization of these benefits is possible only if there are two key conditions: a sufficient level of digital competencies of the population and the readiness of state institutions to modernization.

The study of Westerman et al. [13] and Von Solms and Van Niekerk [14] emphasize the need for significant changes in management practices, but their analysis is mainly limited to the corporate level. In turn, the results of this work extend the aforementioned approach by considering the impact of digital transformations at the macroeconomic and interstate levels. In this context, digital transformation should be interpreted as a tool for strategic adaptation on a global scale, and not only as an intra-organizational process.

A separate area of research has been the study of digital rivalry, which, according to the works of Fox and Griffy-Brown [8] and OECD reports [31], is considered a new form of geo-economic competition. A comparative analysis of the digital models of the United States and China revealed the structural bipolarity of the modern digital space: the first model has a liberal, market-oriented character with the dominance of the private sector, while the second is based on state control and an orientation towards infrastructure leadership. This conclusion complements the results of the study by Makedon et al. [24], which examines the impact of digital infrastructure on the strategic autonomy of states.

The most significant scientific contribution of the work is the proposed integrated approach to assessing the effectiveness of digital transformation. In contrast to fragmentary studies that focus only on technological parameters [12], this study takes into account a comprehensive system of indicators: from macroeconomic indicators to employment, labor productivity, structural flexibility and social inclusion.

In addition, the work makes an important contribution to understanding the transformation of economic behavior under the influence of digital technologies. It is established that the digital economy not only creates new products and markets, but also changes the very logic of economic activity: from linear models to network ones, from centralized structures to platform ones, from physical formats to digital-mobile ones.

In summary, the results obtained confirm general scientific ideas about the role of digitalization in ensuring economic growth, while significantly expanding the empirical base by modeling cross-country differences in digital labor productivity.

Conclusion

The results obtained indicate that digitalization is a key driver of the processes of adaptation of national economic and social systems to the conditions of global development. The study showed that digital transformation is not just about new technologies. In fact, it is about a serious restructuring: the ways of governance, interaction between people and the way public services work are changing. Analysis of ideas and statistics has proven that the greatest potential of the digital economy is concentrated in three areas: the development of very fast networks (5G/6G), the active use of artificial intelligence and the widespread implementation of cloud technologies.

A study of global competition in the digital sphere confirmed that the United States and China remain the leaders. They not only control large market shares and have a powerful infrastructure, but also actually set the rules of the game in the digital space. Because of this, a certain division is formed: developed countries are further strengthening their positions, while less developed ones risk falling behind. The determining factors of influence today are the level of technology, the effectiveness of state institutions, access to finance and the availability of modern infrastructure.

Econometric analysis helped to understand what exactly affects labor productivity in digital industries. The main conclusion is that people, their knowledge and skills play a decisive role. In particular, the share of workers in digital areas significantly increases productivity. However, an indicator such as gross value added did not show a noticeable impact. This means that it is worth relying less on general economic indicators and paying more attention to the quality of innovation, the level of digital skills of the population and the ability of the state to adapt quickly to change.

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