

ASSESSMENT OF THE DIGITAL GAP IN DEVELOPING COUNTRIES

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Abstract. The article assesses the prospects for the development of entrepreneurial activity in the EU and Ukraine in the conditions of digitalization of the economy. A methodical approach for the analysis of the development of entrepreneurial activity in the EU countries and Ukraine in the context of the digitalization of the economy has been formed, which consists of three stages. Attention is drawn to the fact that the WDCR, NRI, GII indices combine mainly institutional, economic and technological indicators that reflect the development of regulatory and legal research base, use of ICT in business, information security. The EGDI index has a more social orientation and reflects socio-economic integration - it is designed to assess the level of development of the information society. An analysis of the dynamics of changes in entrepreneurial activity in EU countries and Ukraine in the conditions of digitalization of the economy was carried out. It was established that despite the lower level of development of digitalization in Ukraine compared to the EU countries, the development trends both in the EU as a whole and in Ukraine clearly coincide. The impact of the digital component on the development of entrepreneurial activity in EU countries and Ukraine was modeled using correlation-regression analysis. It was noted that the level of digitalization does not affect the speed of the legislative body's reaction to eliminate the deterioration of the conditions of business activity, and the establishment of index indicators only according to the adopted normative legal acts does not take into account the effectiveness of the implementation of legislative changes in the field of business activity. It was concluded that among the three variables, the e-government development index has the greatest influence on the development of entrepreneurial activity. Belgium, Croatia, Italy, Slovakia, Luxembourg, the Netherlands, and Hungary have the greatest direct relationship between the development of entrepreneurial activity, the digital government development index, and digital competitiveness.

Keywords: European integration, correlation-regression model, international indices of digital competitiveness, development of entrepreneurship, digitalization of the economy, legal environment, law and business.

AUTHOR CONTRIBUTIONS

I. Matyushenko. O. Khanova A.Rudych, L. Grygorova-Berenda have conceived the study and have been responsible for the design and data analysis. S. Hlibko has analyzed the legislation and its

impact on the indicators of business development.

DISCLOSURE STATEMENT

The authors do not have any competing financial, professional, or personal interests from other parties.

INTRODUCTION

In the post-industrial phase of the global economy, digitalisation is accelerating and becoming a socio-economic trend. The prospects for the transition to the digital economy model provide countries with many opportunities, including strengthening competitiveness by achieving digital transformation of existing economic systems, compensating for resource shortages and improving living standards. However, the differences in the potentials of national economies lead to their uneven development and transformation, resulting in a phenomenon called the digital gap. This, in turn, is complemented by the negative effects of globalisation and internationalisation and impedes the transition of national economies to a model of 'sustainable development'. As a result, the global economy is facing such aspects as radically different rates of development of national economies of developing countries. All this determines the relevance and significance of the chosen topic.

LITERATURE REVIEW

Our study is based on scientific publications by national researchers, including O. Vyshnevskiy, V. Gamaliy, O. Holoborodko, L. Horodenko, A. Yerina, O. Yershova, L. Melnyk, H. Nazarova, and K. Sichkarenko, Sotnyk I., Yudina T. The problem of the 'digital divide' has been studied by foreign scholars, among them, first of all, Negroponte N., Lane N., Ana Paula Cusolito, Daniel Lederman, Christina Wood.

METHODOLOGY

The following research methods were used to study the processes of digitalisation on a global and regional scale, as well as in individual national economies of developing countries, and to identify the problem of the digital gap within this group of countries: analytical modelling; graphical method; statistical method; systematic approach; tabular method; analysis method; deduction method; trend analysis; correlation analysis; index method (calculation of the dissimilarity index). The comparison of countries, their analysis and systematisation were based on the main indices that characterise certain aspects of digitalisation, among which we consider it appropriate to highlight: the Global Innovation Index, the Global Cybersecurity Index, the Global Digital Competitiveness Index, and the Network Readiness Index.

RESULTS

1. Digitalisation as a modern trend in global economic development

The concept of "digitalisation" was first introduced in the book "Being Digital" by Nicholas Negroponte (1995), an American mathematician and director of the Massachusetts Institute of Technology's Media Lab. 'The transition from atoms to bits is inevitable and unstoppable. Why now? Because change is also exponential - small differences yesterday can have suddenly shocking consequences tomorrow.' [1, p. 4]. However, his personal interpretation was more about information technology than an innovative model of economic development.

In 1994, Canadian economist Don Tapscott gave the following interpretation of the "digital economy" in his book "The Digital Economy: Promise and Peril in the Age of Networked Intelligence": it is an economy based on the use of information and communication technologies (ICT). In our opinion, the most meaningful and informative definition is provided in the article 'Advancing the Digital Economy into the 21st Century' (1991) by Neil Lane, Assistant to the President of the United States for Science and Technology. 'The digital economy is the convergence of computer and communication technologies on the Internet and the flow of information and technologies that stimulate the development of e-commerce and large-scale changes in organisational structure' [2].

Let's consider the most important and most tangible positive and negative effects of digitalisation on the national economy and its individual sectors. As already mentioned, digitalisation processes and the new economic model (digital economy) directly affect the paradigm shift in science and education, the involvement

of innovations in production processes, and the functioning of the banking sector, which, in turn, coordinates the achievement of the Sustainable Development Goals. The pace of digitalisation primarily determines the dynamics of changes in the following goals: Goal 4 (Quality Education), Goal 8 (Decent Work and Economic Growth), Goal 9 (Innovation and Infrastructure), Goal 11 (Sustainable Cities and Communities Development), and, of course, Goal 17, “Partnership for Sustainable Development.”

The achievements of the digital era are fundamentally transforming the business sector. Gradually, with the development of appropriate digital platforms and communication technologies, doctors, psychologists, teachers, tutors, financial professionals and lawyers are switching to remote work (yet only partially) [3, p. 85]. This trend is controversial in nature; on the one hand, it opens up new opportunities: barriers to the labour market are being reduced and the monopoly power of some groups of specialists is weakening. Internet technologies reduce entry and exit barriers to international labour markets related to geographic location, which increases competition and reduces the monopoly power of scarce specialists [3, p. 89]. “The digital” economy is changing the rigid working hours typical of the industrial form of production, making it possible to use the human capital of employees more flexibly. A positive outcome of the digitalisation process is an increase in labour efficiency and self-development among employees [3, p. 90]

On the other hand, there are also negative consequences associated with digital processes in the labour sector. The fact is that today it is extremely important to develop mechanisms for periodic review of the legal framework and, if necessary, update it. A transparent regulatory framework should be in place to govern the taxation of freelancers (self-employed workers). In addition, with the rapid development of electronic payments and digital currencies, a certain segment of workers is moving into the grey sector of the economy, receiving salaries in BitCoin.

Thus, any transformations and innovations should be preceded by legislative regulation. The report prepared for the OECD joint conference also points to serious threats and problems that may accompany the positive effect of this process: “...digital technologies can be disruptive, which in the future will negatively affect productivity, employment and well-being of workers and increase disparities in their accessibility and use, leading to a new digital gap and growing inequality” [4].

“Digital inequality” or its synonymous concept of “digital polarisation” is a consequence of other inequalities and, at the same time, deepens other, historically earlier inequalities - gender discrimination, inequality in social status, etc. At the current stage of global economic development, the slower the pace of digitalisation in a country and the more uneven the spread of ICTs, the more the issue of inequality in access to social, economic, educational, cultural and other opportunities becomes acute.

Polar views have been expressed on the issue of the digital gap: from recognising this problem as one of the global threats to states and societies in the information age to labelling it as far-fetched, contributing to the further enrichment of computer and telecommunications corporations [3, p.105]. However, a large number of experts agree that for underdeveloped countries, the first priority is to build housing, roads, industrial infrastructure, reform the economy and social relations. In other words, before embarking on the “superstructure” (“digital” economy), it is necessary to address the primary issues of ensuring a decent life for the population.

According to the World Bank, inequality is growing, especially in richer countries, but increasingly in developing countries as well. The fact is that in the absence of accountable institutions, public investment in the development of digital technologies increases the influence of elites, which can lead to the subordination of policy to the interests of the establishment and strengthening of state control [3, p.106].

Among the risks arising from the above is that online platforms and digital tools are being used to suppress freedom of expression and deny other human rights and fundamental freedoms. The spread of disinformation and the growth of cybercrime are aimed at undermining the resilience of critical infrastructure and putting at risk strategic public and private capital assets.

All of this leads us to the following conclusion: every process in the economy cannot take place without a trace and with only positive consequences. Every strategy designed to strengthen the digital competitiveness of the national economy must be based on the unique characteristics of this economy, pursue goals that will be effective for it and that the government can incorporate into the work of.

To confirm the hypothesis that digitalisation is indeed a global trend in economic development, we conducted a trend analysis. According to its results, the total global GDP for the period from 2009 to 2022 is relatively stable, and in the future (2023-2026) it is likely to grow. The annual increase in global GDP is 2.18 billion US dollars, as can be seen from the equation in Fig. 1.

Thus, we can state that digitalisation is a truly modern trend in economic development, which is typical not only for individual national economies of the most developed countries, but also for the entire world. In addition, this process

is currently only at the early stages of its development, since, as noted above, the number of Internet users is growing steadily, and some of the consequences of this process will only become apparent after a certain period of time.

2. “Digital Gap” as a prerequisite for competitiveness in the global development environment

According to 2022 data, about 63% of the world's population has access to the Internet, which is 4.95 billion people (2.3 times more than in early 2012) [6]. Nevertheless, we cannot ignore the fact that more than 2 billion people do not have access to the Internet, and most of them are from developing countries, not to mention 390 million people who are not covered by mobile broadband.

Fig. 2 below shows the percentage of Internet users by region and level of national economic development. It shows that developed countries, primarily Europe and America, are significantly ahead: 90% of people there use the Internet [7]. The worst indicator, almost twice as low as the global one, is in the least developed countries - 27%, undoubtedly most of them are countries on the African continent [7]. However, this group is also showing improvement: from 2019 to 2021, the value increased from 20 to 27% of users of the total population.

Today, the accelerated pace of digitalisation of a single national economy can reduce the level of resource consumption and increase competitiveness by hundreds of times. Global experience confirms this judgement: for example, in the late 1960s, Singapore had to import even basic construction materials such as sand and fresh water from neighbouring Malaysia. In 2000, the country was already working on electronic government planning. In 2021, the Institute for Management Development (IMD) of the Swiss Business School in collaboration with the Singapore University of Technology and Design published The Smart City Index, where Singapore topped the ranking of 118 cities [8].

Digitalisation has an indirect impact on increasing the importance of competitiveness, as it can spread to absolutely all sectors of the national economy, not limited to service activities, if managed properly.

We conducted a correlation analysis to identify the dependence between the indicators of global competitiveness and global digital competitiveness indices. The calculation was carried out on the basis of 63 countries, including developed and developing countries by the level of economic development, Fig. 3.

As a result of the calculations, the value of the Pearson's coefficient was 0.953 units and the covariance coefficient was 287.7 units. It follows that the interdependence between the analysed indices has a very high positive correlation value. Almost all the values are located along a straight line, which also has an upward trend. Therefore, we can state that in the modern world, with all its inherent processes, digitalisation is a basic factor in the development and competitiveness of any national economy.

3. Territorial differentiation in the level of digitalisation of developing countries

The level of digitalisation of national economies within the group of “developing countries” is very different, but a pattern can be observed within a particular region. The scientific literature has repeatedly raised and discussed the topics of the “rich North” and the “poor South”. The level of development of digitalisation processes also shows territorial differentiation, and the most striking difference between regions is the level of digital inclusion of the population.

In terms of digital inclusion, the Institute of Museum and Library Services defines it as the ability of individuals or groups to take advantage of the World Wide Web and confidently use technology to improve their daily lives [11]. As we can see in Fig. 4, the regional distribution of the Roland Berger Digital Inclusion Index (RB DII) for 2020 is quite predictable: Europe (78), North America (77), and Asia-Pacific (64) have the highest scores [12].

The outsider regions in terms of digital inclusion are “Latin America and the Caribbean” and “Sub-Saharan Africa”. As far as we can understand, it is the latter region that includes the least economically developed countries, where the agrarian nature of national economies dominates, and where digitalisation opportunities - the use of artificial intelligence technologies, the Internet of Things, robotics - are slowly developing.

The distribution of Internet users by region was mentioned above, and as we can see, the quality and speed of Internet connection varies depending on the location of the country and its capabilities. As can be seen in Figure 5 above, all regions have a higher proportion of people with 4G connections compared to the global average of 81%. The leaders in this parameter among the regions with developing countries are Europe and Central Asia (95%), the Middle East and North Africa (86%), and Latin America and the Caribbean (85%) [13].

While all countries on the African continent recognise the importance of digitalisation, digitalisation is uneven across the continent. It depends on the existing infrastructure base, the amount of investment in it, the value of human capital, and the strategies of national governments. In addition, as mentioned above, the digital gap between countries in the region largely depends on broadband access and investment in infrastructure. For a stronger argument, we should separate African countries with Global Innovation Index scores into the groups of “North Africa”, “the Gulf of Guinea”, and “other countries of the mainland”. We believe it is appropriate to single out South Africa as the strongest national economy on the continent and the pole of South Africa's development, Table 1.

As can be seen from Fig. 6, the Digital Readiness Index in Latin America and the Caribbean varies in most countries in the range [10,12-13,88]. The average value for the region under study is 11.49 out of a maximum of 25.

The most developed regions of Latin America are the North and East, which is strongly influenced by the position of Chile and Brazil as growth centres. One of the main macroeconomic indicators, the country's GDP, is also an important factor affecting the digitalisation capabilities of national economies. If, for example, Chile's GDP reaches \$317.1 billion in 2021, and Bolivia's \$40.41 billion, it is logical that the former can afford much more in terms of investing in the development of digital infrastructure, introducing innovations, increasing the level of digital competence of the population, etc. Digital transformation can be a powerful tool for overcoming productivity stagnation. In Brazil, the

contribution of the ICT industry to GDP growth in 2020 was only 40% of its value in the United States, half of its value in China, and two-thirds in the euro area [14, p.14].

The Asia-Pacific region as a whole is a leader in all indices in terms of the pace of digitalisation: Among the 38 member states of the region, 14 are classified as “small island developing states” (Fiji, Micronesia, Kiribati, Maldives, Marshall Islands, Nauru, Papua New Guinea, Samoa, Tonga, Tuvalu, Vanuatu, etc.) and 11 as “least developed countries” (Afghanistan, Bangladesh, Cambodia, Laos, Myanmar, Nepal, etc.).

It is one of the most contrasting regions in the world, home to economies that are at the forefront of digital economy and society development, as well as world leaders in high-speed internet access. Southeast Asia has one of the highest rates of internet usage in the world, with an average of 3.6 hours spent on mobile internet every day [31]. Users in Thailand spend about 4.2 hours per day on the network, which is higher than in the United States (2 hours per day) [16; 17]. At the same time, as of 2019, 53.4% of households in the region have Internet access [18, p.5].

Thus, the level of ICT use also differs significantly between the economies of the region, with indicators of Internet use and access ranging from 99.7% in the Republic of Korea to 1.7% in Laos [18, p. 19]. However, we would like to emphasise once again that in terms of digital inclusion, the Asia-Pacific region is at the bottom of the top three with a score of 68, followed by North America (77) and Europe (78) [12]. Having analysed the region as a whole, we can note that the pace of countries has significant differences even in terms of access to the Internet, not to mention the availability of appropriate infrastructure for the development of digital opportunities.

Thus, each region of the world has a leading country whose digitalisation rates and performance in the relevant indices give it the right to be called the “pole of the region's development”. Table 2 above shows these countries: Chile, the Republic of Korea, South Africa, the UAE, and India.

These countries were selected based on the principle of monitoring their success in implementing the achievements of the digital era, preparing digital infrastructure, the level of cyber security, etc. For this purpose, the following global indices were considered: The Global Innovation Index, the Network Readiness Index, the Global Digital Competitiveness Index, and the Global Cybersecurity Index. A more detailed analysis of each leading developing country and the main goals of their national digital strategies are presented below.

4. Specifics of the digitalisation process in leading developing countries

The leaders of the following regions are analysed: “Latin America and the Caribbean”, “Southeast Asia, East Asia and Oceania”, “Sub-Saharan Africa”, “Central and East Asia”, and “South Asia”. The European region was not considered, as most developing countries are either members of the EU or have a high level of cooperation and collaboration with this economic and political grouping. In this regard, strategies and development plans are being drawn up within the grouping in the area of digitalisation, including transformations and changes that are systemic and intensive. Thus, the pace of digitalisation is controlled not only by individual governments, but also by European institutions, which accelerates digitalisation in the region tenfold compared to the African continent or Latin America.

Chile is part of the group of “newly industrialised countries” in Latin America, along with Mexico, Brazil, and Argentina. In 2019, the country's digital readiness index reached 14.86 out of 25, the highest among Latin American and Caribbean countries [15]. Thus, the country can be classified as being at the medium or “accelerated” stage of digital readiness. The Internet penetration rate in Chile reached 92% of the total population in early 2022 [19]. This satisfactory performance in terms of increasing the level of digital inclusion has allowed Chile to take further steps towards strengthening its digital attractiveness and has sown confidence in digital technologies. In 2019, the assessment of e-commerce security (73.1%) and trust in online privacy (59.6%) were higher than the average in Latin America and the Caribbean (63.1% and 54.9%) and the Organisation for Economic Co-operation and Development (OECD) (58.3% and 45.6%) [20, p. 280]. However, in 2021, the percentage of Internet users in Chile was 84% of the total population, which is 7% less than the OECD average [21].

The Digital Agenda “Chile Digital para Todas” is the main document that contains the strategy and recommendations for the country's digital transformation. It sees technology as a means of reducing inequality, opening up new and better opportunities for development and promoting human rights. “Chile Digital para Todas” is based on six objectives: respect for human rights related to the Internet and information and communication technologies (ICTs); achieving ubiquitous connectivity; using ICTs to improve quality of life; promoting the expansion of the digital economy; using digital technologies for quality education; and policies to support the digital transformation that have a sectoral approach.

As Table 3 shows, Chile is a leader in “the Latin America and Caribbean region” in terms of advanced digitalisation indices.

The Republic of Korea is the leader in the Asia-Pacific region in terms of the pace of digitalisation of the national economy. As of 2022, Korea is among the top 10 leaders in the Global Innovation Index with a value of 57.8 [14], Table 4. The level of cybersecurity in Korea is one of the highest in the world, with a country index of 98.52 units, with maximum values of 20.00 units for the components “legal measure”, “capacity building”, and “cooperative measures” [23]. According to the value of the network readiness index, the Republic of Korea (75.95 units) is almost on the same level as the leader of the European continent - Germany (76.11 units) [22]. Korea is also a leader in terms of the share of ICT goods and services in total international trade - 24.2%. [24].

- The Republic of Korea's strategy is based on 3 pillars:
- - creating effective data ecosystems;
- - strengthening digital trust;
- - strengthening the link between digital and green technologies.

The percentage of Internet users in 2020 exceeded the OECD average and stood at 97% [25]. Therefore, today, the Republic prioritises intensive changes in terms of the digitalisation of the national economy. Given such a high level of connectivity, the country must work to not only meet all the needs of its population in this area, but also exceed their expectations. Korea focuses on supporting risk management and improving the regulatory framework for cybersecurity in critical infrastructure, as well as ensuring the confidentiality of data flows. This is the reason for such a high score on the global cybersecurity index. This includes the creation of adequate personal statistics, the secure use of intelligent government platforms, and the use of new technologies such as artificial intelligence to improve the efficiency of public services, innovation, and job creation.

The Republic of Korea is the leader in terms of the share of the population working full-time as researchers in science, technology and innovation. This indicator reached 0.69%, ahead of Singapore - 0.66% and Norway - 0.59% [26, p.20].

The Republic of South Africa (RSA). is the most developed national economy on the African continent. South Africa maintains a good reputation for online rights and freedoms, being recognised as the best-performing country on the continent by the Inclusive Internet Index in 2020 [27, p.1]. The Republic of South Africa is the second largest economy in Africa and a growing digital market with accelerating penetration of smartphones, fixed broadband subscriptions and electronic transactions [28, p.8]. Despite the fact that in 2021, 94.4% of the country's population was covered by 4G broadband coverage, the number of Internet users in the country remains quite low at 68.6%. Therefore, unfortunately, access and infrastructure efforts may remain insignificant without proper steps to bridge the digital gap and significantly improve digital literacy skills [27]. In 2022, RSA was ranked 2nd in the Sub-Saharan Africa region and 14th among upper-middle-income countries. The country was ranked 68th in the world with a value of 48.90 in the Network Readiness Index [22]. The strongest component was the technology category (52nd in the world), Table 5.

The high domestic cost of broadband internet connectivity is a major obstacle. To this end, the institutional arrangements for managing the information, communication and technology (ICT) environment must be better structured to ensure South Africa does not fall victim to the “digital gap”. Compared to the best international standards, South Africa's ICT infrastructure is abysmal, and as a result, an efficient information infrastructure that fosters economic growth and greater integration requires stronger broadband and telecommunications networks and lower prices. However, RSA, aware of the importance of digital adaptation of its national economy to the international space, does not neglect to formulate a development strategy.

“South Africa Connect” - the national strategy provides a vivid vision of South Africa in the National Development Plan as a country with “a seamless information infrastructure by 2030 that will underpin a dynamic information society and knowledge economy that is more inclusive, equitable and prosperous” [29, p.5]. As envisaged in the National Development Plan, the core of this will be “a widespread communication system that is universally available throughout the country at a price and quality that is appropriate for communication between citizens, businesses and other public sectors and provides access to the creation and consumption of a wide range of converged applications and services necessary for effective economic and social participation” [29, p.5].

The United Arab Emirates is the most successful national economy in the Middle East, where 99.0% (9.28 million people) of the 9.37 million population as of the beginning of 2022 use the Internet [47]. Mobile phones, regardless of manufacturer, are owned by 97.2% of the population, Table 6. In 2022, according to the Global Innovation Index, the UAE ranks 3rd in the “Central and East Asia region” and 30th among upper-middle-income countries [14]. The government's main goals for encouraging innovation in the country are as follows: implementing a plan for sustainable investment in human capital and moving economic development away from the oil sector.

INSEAD, a leading business school and research institute in France, has named the country the most innovative country in the Middle East, citing its reliable technological infrastructure and high-quality education system. For example, The Dubai Creative Economy Strategy aims to transform the emirate of Dubai into an international destination for creativity and the creative economy by 2025. In addition, it is planned to double the contribution of creative industries to Dubai's GDP from 2.6% in 2020 to 5% by 2025 [30]. In addition, the emirate annually hosts innovative events, conferences, and competitions, such as the UAE Hackathon, the Disruptive Innovator Awards, the Mohammed Bin Rashid Al Maktoum Business Innovation Award, etc.

The country also had a very high value in the Global Cybersecurity Index - 98.06 units in 2020, which allowed the country to take 5th place out of 182 in the ranking of countries [23]. This figure is due to the country's geopolitical position and its international importance in the energy, oil and gas, and aviation industries, which contributes to the rapid growth of the cybersecurity market. To protect the UAE's critical data information infrastructure and improve national cybersecurity, the government has introduced the UAE Information Assurance Regulations, which is a set of guidelines for government agencies in critical sectors [31]. The United Arab Emirates is stepping up its cybersecurity efforts, forming the UAE Cybersecurity Council in early 2022 and recently announcing the adoption of cybersecurity standards for government agencies by unveiling a budget for the next five years.

According to the Global Digital Competitiveness Index, the UAE ranks 13th out of 63 countries in the world in 2022, with a score of 91.42 [9]. The country's competitive advantage in the digital sphere is the active implementation of advanced scientific and technological achievements.

The UAE is one of the largest data centres in the Middle East, with up to USD 1 billion of additional investment projected by 2026. In 2019, Microsoft Azure launched two cloud regions in Dubai and Abu Dhabi, and in 2021, Amazon Web Services announced plans for a new data centre region in the UAE [32].

The UAE was the first country in the Arab region and the fourth in the world after Switzerland, China and the UK to launch a 5G network. Both Du and Etisalat, the UAE's leading telecom companies, launched limited 5G networks in 2019 [32]. However, in June 2021, Etisalat unveiled a 6G project, which is estimated to be around 100 times faster than 5G. The company has announced its intention to invest in the implementation of 6G by conducting research and developing international standards, which are the main building blocks for the 6G ecosystem.

The country's achievement and competitive advantage is also artificial intelligence (AI). By 2030, this technological milestone is expected to account for almost 14% of the national GDP (USD 96 billion), and the annual growth of artificial intelligence's contribution to the UAE economy will increase by 33.5% between 2018 and 2030 [32]. In this area, the UAE has developed the UAE Government's 2071 Centennial Plans and the UAE Artificial Intelligence Strategy 2031, which outline a strategy for improving efficiency in the sectors of transport, healthcare, space, renewable energy, water, technology, education, environment, and traffic. The UAE has already begun to integrate AI into such sectors as education, healthcare, space, transport, and aviation. The Mohamed bin Zayed University of Artificial Intelligence in Abu Dhabi was established to train highly qualified personnel. Moreover, the share of graduates of national universities in the country in specialities related to artificial intelligence (statistics, mathematics, ICT technologies and engineering) is 22%, which is higher than in the United States (16%) and Australia (18%) as representatives of developed countries [26].

The Republic of India is one of the largest and fastest-growing markets for digital consumers in Asia, with 658 million internet users as of January 2022 [33]. With a total population of 1.4 billion people, the Internet penetration rate for the same period was 47.0% [33]. The total share of the population covered by 4G is 99%, Table 7.

India's Unique Identity Authority, a government agency, announced in December 2021 that 1.3 billion people have been registered in the Aadhaar system, of which 60% are under 40 years old [34]. Thus, this system is the largest biometric ID system and IT project in the world, which contains fingerprints, iris, photos, and personal information about citizens of the country.

Among all the digital indices, India shows the highest results in the Global Cybersecurity Index (97.5 out of 100) and the Global Innovation Index (36.6) [14; 23]. At the current stage of development, India is undergoing significant transformations, ranging from space technologies and smart cities to healthcare and telecommunications, thanks to innovative solutions.

Digital payments and financial technology are now an important part of the lives of many of the country's 1.35 billion people, with 52% of the population using some form of financial technology. With around 750 million smartphone users in India, India has already made significant strides in digital transformation, creating a powerful environment for many digital companies and the population as a whole [35]. Advanced digital technologies, such as artificial intelligence, could account for up to 40% of total revenues in the sector by 2025, and exports could grow significantly from the current \$150 billion [36].

According to the National Association of Software and Services Companies (NASSCOM), India's technology industry recorded its highest growth rate ever, reaching \$227 billion in revenue in 2021. The sector accounted for 8% of India's GDP [37].

We analysed the leader among developing countries, the Republic of Korea, and the countries described above - the UAE, RSA, Chile, and India - for similarities in national economies. The analysis is based on the components of the Global Digital Competitiveness Index as of 2022, Tables 8-11.

According to the results of the study, as can be seen in Table 12 above, it was recorded that the national economies of the Republic of Korea and the UAE are most similar (13.1%). This value can be argued by the fact that the digital development strategies of both national economies are aimed at leading the implementation of 6G, digital dominance not only within their region but throughout the international space.

The economy of the United Arab Emirates performs better in the knowledge and technology components of the index, which were considered in the analysis. However, the "Asian tiger" is not inferior in the "future readiness" component, which includes adaptive attitudes, business agility and IT integration, with a score of 98.12, as opposed to 77.4 in the "knowledge" component.

The UAE is followed by the Republic of South Africa, the economies of the Republic of Korea and South Africa are 11.6% similar, and India is 9.4% similar. The lowest similarity in the analysis was recorded in the indicators of the "Asian tiger" and the leader of Latin America, Chile. This can be explained by the difference in the vectors of strategic development, in the values of the index components, and in the pace of digitalisation in these countries and in the priorities of governments. As already noted, the Republic of Korea claims to be a global leader, while Chile is satisfied with the status of a leading country in the "Latin America and Caribbean region".

A correlation analysis was conducted to identify the relationship between indices describing the macroeconomic state of the national economies of the above-mentioned countries and indices measuring the pace of digitalisation. These indices include the following: the number of Internet users (% of the population) (denoted by the number 1), research and development expenditures (% of GDP) (2), the number of fixed broadband subscribers per 100 people (3), exports of ICT services (4), GDP per capita (5), the country's population (6), and the level of patent applications among residents (7).

Based on the results of the correlation analysis, we can conclude that although each of the above-mentioned leading regions has its own specific features of digitalisation of the national economy, they are united by common consequences (Figs. 7-10)

Thus, there is a positive and mostly strong relationship between the variables ‘population’, ‘number of Internet users’ and ‘patent applications among residents’. This suggests that the larger the population in a country, the greater the number of potential Internet users and, as a result, the more people who can have basic digital training and be involved in digitalisation processes.

A strong positive relationship was also observed between the variables ‘exports of ICT services’ and “GDP per capita”: if exports increase, the second variable increases accordingly. In most cases, a positive relationship dominates, with only its strength varying (strong, medium, and weak), but a strong negative relationship cannot be excluded.

Thus, there is a strong negative correlation between the changes in ‘research and development expenditures’ and ‘patent applications among residents’ since research expenditures are allocated from the amount of GDP (the sum of expenditures on the production of goods and services within the country by both residents and non-residents), i.e. these are national expenditures, and the number of patent applications is counted exclusively among residents.

As can be seen from the figure, the Republic of Korea is the No. 1 leader in all the indices among the countries studied, followed by the leader of the Middle East region. Further, India demonstrates a decent level of values, as the country pays considerable attention to the innovation sector and the security of the digital field of its economy, which increases its level of digital competitiveness. As shown in Fig. 11, Chile is fighting for the right to represent its region and economy, particularly in certain indices. However, as noted in the analysis of RSA's digital strategy, this African country is often underestimated, guided by stereotypes about the continent's economic and technological “backwardness”. Despite such prejudices, the country's cybersecurity is ahead of Chile's, and in 2020, South Africa surpassed even India in terms of digital inclusion according to Roland Berger's Digital Inclusion Index.

5. Prospects for bridging the digital gap in developing countries

In 2021, there were 46 countries in the world that belonged to the group of ‘least economically developed countries’, of which 33 were countries on the African continent, 9 were in Asia, 1 in the Caribbean, and 3 in the Pacific [38]. In 2020, the least developed countries were home to 1.06 billion people who were highly vulnerable and had low levels of human development.

Due to differences in human, infrastructural and technological capacities, the accelerated transition to total digitalisation of national economies after the COVID-19 outbreak has become a formidable challenge for the world's least developed countries (LDCs). However, while for lower-middle/upper-middle income countries, such international digital transformations have become an impetus for building their own digital competitiveness, the national economies of the 3rd world countries have been left far behind, acquiring the status of ‘outsiders’.

As shown in Fig. 12, in 2021, the group of least developed countries had significantly lower values than other developed countries in terms of the network readiness index. Thus, the last 131st place in the ranking of countries is occupied by Chad with a score of 20.21, although Rwanda, which is also included in the list of low-income countries, has a value of 39.48 [22]. Thus, the least developed countries, dominated by African countries, acquire values in the range (20.12 - 39.62).

According to the International Telecommunication Union, about 27% of people in LDCs used the Internet in 2021, compared to 90% in developed countries. And where connectivity exists in LDCs, it is typically offered with relatively low bandwidth and relatively high prices [39]. Therefore, compared to European internet users, where 80% purchase online, in many LDCs this share is less than 10%.

To create more opportunities for LDCs, it is important to go beyond the connectivity aspect. The first step is to provide LDCs with financial, technical and other resources, and to adapt national legislation to the requirements of the “digital age”. Although many LDCs have made significant progress in adopting legislation since 2015, the share of LDCs with data protection and privacy and consumer protection laws is still low (48% and 41% respectively) [39].

The “Sustainable Development Goal 17” established by the United Nations is known to be aimed at improving the well-being of the world's population. In the digital aspect, Goal 9c (Group 9, “Industry, Innovation and Infrastructure”) refers to the need to “significantly increase access to information and communications technologies and strive to achieve universal and broad-based access to the Internet in LDCs by 2020”. Although 2020 was the deadline, only Bangladesh and Bhutan, out of 46 countries, have achieved the universality and accessibility aspects of the target. For the rest of the countries, the lack of literacy and digital skills among the population remains an obstacle.....

We believe it is necessary to justify the benefits and positive consequences of improving the level of digitalisation of the LDCs. Firstly, broadband can provide an opportunity to overcome development challenges that cannot be adequately addressed by basic mobile technologies. The shortage of highly qualified personnel can be addressed through video conferencing and online educational content.

Moreover, as the agriculture sector accounted for 20% of GDP in 2020, the use of digital technologies in this sector is particularly relevant. In agriculture, advanced technological advances such as drones, sensors, and blockchain are increasingly being used to improve efficiency. Secondly, in developed and developing countries, the pandemic has accelerated the use of remote consultations and smartphones for contact tracing, digital testing, and vaccination certificates. As the virus continues to mutate and spread, it is likely that the level of online access to key services will increase. Third, broadband has a greater economic impact than basic mobile technology. While in 2014, according to a Deloitte study, a 10% increase in 3G penetration increased GDP per capita growth by 0.15% in developing countries, and by 2023, these values could potentially be higher [40].

Today, the South and Southeast Asian region is experiencing rapid digital growth. However, in order to bridge the “digital gap”, several areas need to be improved: the state of digital infrastructure; the development of a new consumer;

the level of information security; and effective digital policy [40]. To achieve these goals, the most effective way is to establish international cooperation and coordination of efforts, for example, Go Digital ASEAN [41].

To accelerate the pace of digitalisation in the African continent, the African Union created the 'Digital Transformation Strategy for Africa (2020-2030)'. For the 55 member states of this intergovernmental organisation, the strategy was based on the following principles: "solidarity and cooperation", "inclusiveness", "transformativeness", "inclusion", "national origin", "new thinking" and "security".

The Strategy states that "the African Continental Free Trade Area will be a market of 1.2 billion consumers, reaching 1.7 billion by 2030, with a total GDP of USD 2.5 trillion. This is equivalent to USD 6.4 trillion in value. It is equivalent to USD 6.4 trillion if measured in purchasing power parity" [42, p.24].

One of the strategic goals for 2030 is to coordinate gains in the digital and health sectors: strengthening health research, innovation, ICT for health, technological capabilities and developing evidence-based solutions to Africa's health challenges. The digital health system is expected to contribute to the achievement of Sustainable Development Goal 3 ("Good Health") to ensure good health and well-being for all African citizens of all ages [42]. Open access to broadband communication technologies will be aimed at better quality and more patient-centred care, especially in rural and remote areas.

As the demand for digital skills grows and the "digital gap" between countries persists, differences in access and connectivity will only increase existing disparities between national economies in developing countries and regions. Such inequalities in these countries and regions may hinder the ability of younger generations to participate meaningfully in the digital economy. Despite their interest in digital technologies, they are not able to fully exploit the many opportunities that the "digital age" brings [22].

As can be seen in Fig. 13, developing countries face the following challenges on their way to building a digital economy: low levels of digital inclusion; lack of critical infrastructure and resources; digital illiteracy; lack of effective digital policies; poor information security and lack of fibre-optic or cable broadband connections in Africa, which makes Internet access extremely expensive and therefore inaccessible to most groups of people.

More detailed solutions to each of these problems are presented in Fig. 13. above, but we believe that the priority is to develop long-term strategic documents on various aspects of digitalisation: cybersecurity, digital inclusion, providing the population and institutions with critical digital infrastructure, and eliminating digital illiteracy. It is not experiments in the economy that are important, but the introduction of digital innovations with the simultaneous adaptation of the regulatory framework and monitoring of the consequences of such innovations. For this purpose, it is appropriate to create institutions for coordinating policy and digital strategy with trained, highly qualified specialists, perhaps not even national, but from partner countries that have a higher level of digitalisation. We need to understand that the cornerstone of digital illiteracy is the lack of knowledge and digital skills among the population, especially among pupils and students. Regional initiatives to increase the digital participation of vulnerable populations, such as Go Digital ASEAN, are an effective way to address the problem.

However, the effectiveness of any action will only be possible if the strategy is strictly adhered to, inter-ministerial coordination of innovations and cooperation between all state institutions takes place.

CONCLUSIONS

1. Based on the results of the comparison of global indicators - world GDP and the share of Internet users in the world's total population - the high level of interdependence of indicators was mathematically proved. The results of the analysis confirm that digitalisation is a modern trend of economic development that does not bypass any national economy in the world, regardless of its economic level.

2. A strong positive correlation between the indices of global competitiveness and global digital competitiveness has been revealed. The pace and level of digitalisation of the national economy directly affect its overall state of competitiveness.

3. Prospects for overcoming the "digital gap" in the group of 'developing countries' are highlighted, and the main obstacles to building a digital economy are analysed, with an indication of the experience of countries that have been able to eliminate them. The most common problems faced by LDCs in terms of digitalisation are identified: low level of digital inclusion; lack of critical infrastructure and resources; digital illiteracy; lack of effective digital policy; and poor information security. In the least developed regions of Africa (especially in the western part, primarily in Mauritania), the lack of fibre-optic or cable broadband connections is an urgent problem, making Internet access extremely expensive and, therefore, inaccessible.

A number of actions have been proposed to address these problems and threats. For African countries, the most effective solution to the problem of affordability of Internet connectivity is to build their own critical infrastructure with mission-critical servers and computer systems with fully redundant subsystems. To improve the level of digital inclusion and build the "digital capacity" of LDCs, the authors see the solution in regional initiatives to increase digital participation of vulnerable populations, such as Go Digital ASEAN.

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ОЦІНЮВАННЯ ЦИФРОВОГО РОЗРИВУ В КРАЇНАХ, ЩО РОЗВИВАЮТЬСЯ

Анотація. В статті проведено оцінювання перспектив розвитку підприємницької діяльності країн ЄС і України в умовах цифровізації економіки. Сформовано методичний підхід для аналізу розвитку підприємницької діяльності країн ЄС і України в умовах цифровізації економіки, який складається з трьох етапів. Акцентовано увагу, що індекси WDCR, NRI, GII об'єднують переважно інституційні, економічні та технологічні показники, що відображають розвиненість нормативно-правової та науково-дослідної бази, використання ІКТ у бізнесі, інформаційну безпеку. Індекс EGDІ має більш соціальну спрямованість та відображають соціально-економічну інтеграцію – він призначений для оцінювання рівня розвитку інформаційного суспільства. Проведено аналіз динаміки змін підприємницької діяльності країн ЄС та України в умовах цифровізації економіки. Встановлено, що незважаючи на нижчий рівень розвитку цифровізації в Україні у порівнянні з країнами ЄС, тренди розвитку як в цілому по ЄС, так й України поясністю співпадають. Змодельовано за допомогою кореляційно-регресійного аналізу вплив цифрової складової на розвиток підприємницької діяльності країн ЄС та України. Відмічено, що рівень цифровізації не впливає на швидкість реакції законодавчого органу з метою усунення погіршення умов підприємницької діяльності, а встановлення індикаторів індексів тільки по прийнятим нормативно-правовим актам не враховує ефективності реалізації законодавчих змін в сфері підприємницької діяльності. Зроблено висновок, що серед трьох змінних найбільший вплив розвиток підприємницької діяльності має саме Індекс розвитку електронного уряду. Найбільший прямий взаємозв'язок розвитком підприємницької діяльності, індексом розвитку цифрового уряду та цифровою конкурентоспроможністю мають Бельгія, Хорватія, Італія, Словаччина, Люксембург, Нідерланди, Угорщина.

Ключові слова: євроінтеграція, кореляційно-регресійна модель, міжнародні індекси цифрової конкурентоспроможності, розвиток підприємництва, цифровізація економіки, правове середовище, закони і бізнес.

ASSESSMENT OF THE DIGITAL GAP IN DEVELOPING COUNTRIES

Abstract. The article assesses the prospects for the development of entrepreneurial activity in the EU and Ukraine in the conditions of digitalization of the economy. A methodical approach for the analysis of the development of entrepreneurial activity in the EU countries and Ukraine in the context of the digitalization of the economy has been formed, which consists of three stages. Attention is drawn to the fact that the WDCR, NRI, GII indices combine mainly institutional, economic and technological indicators that reflect the development of regulatory and legal research base, use of ICT in business, information security. The EGDІ index has a more social orientation and reflects socio-economic integration - it is designed to assess the level of development of the information society. An analysis of the dynamics of changes in entrepreneurial activity in EU countries and Ukraine in the conditions of digitalization of the economy was carried out. It was established that despite the lower level of development of digitalization in Ukraine compared to the EU countries, the development trends both in the EU as a whole and in Ukraine clearly coincide. The impact of the digital component

on the development of entrepreneurial activity in EU countries and Ukraine was modeled using correlation-regression analysis. It was noted that the level of digitalization does not affect the speed of the legislative body's reaction to eliminate the deterioration of the conditions of business activity, and the establishment of index indicators only according to the adopted normative legal acts does not take into account the effectiveness of the implementation of legislative changes in the field of business activity. It was concluded that among the three variables, the e-government development index has the greatest influence on the development of entrepreneurial activity. Belgium, Croatia, Italy, Slovakia, Luxembourg, the Netherlands, and Hungary have the greatest direct relationship between the development of entrepreneurial activity, the digital government development index, and digital competitiveness.

Key words: European integration, correlation-regression model, international indices of digital competitiveness, development of entrepreneurship, digitalization of the economy, legal environment, law and business.

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