




# Digitalization as a Sustainability Factor

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**Abstract:** One of the most promising tools at the micro-level is the application of digitalization as a factor of sustainable development. The modern economy is based on continuous improvement: new management models, products and systems are being improved, upgraded and invented. Such development in recent years is directly linked to the concept of "digitalization". Digitalization is one of the most promising tools for achieving Sustainable Development Goals at the micro-level, so the theoretical and practical justification of the impact of digitalization on sustainable development is becoming increasingly relevant. The paper focuses on determining the level of development of digitalization and its impact on various aspects of social and economic life. In the conclusion, the problems that impede ensuring sustainability and security of socio-economic systems, as well as relevant measures to be taken by the state, are listed

## 1 INTRODUCTION

Over the past decade, there has been great global interest in environmental impacts and economic and social inequalities between certain populations and countries. Under the auspices of the UN, international economic, and political unions, work is carried out to promote Sustainable Development Goals aimed at addressing these issues at the regional and global levels. To qualitatively implement several goals, it is necessary to develop tools for sustainable development, to search for new ways to address global challenges at individual actors (regions, cities, and companies) and countries.


The digital revolution unfolding on a global scale increasingly plunges us into a new reality (Dynkin and Telegina, 2020). The variety of technological innovations changing our lives has increased manifold over the past decade and in a wide range of human activities (Fituni and Abramova, 2020).


Digitalization has triggered a new wave of innovation that will profoundly impact society, changing the relationship between citizens, businesses, and governments. It may also lead to a transformation of the structure of the economy and


society. Analysis of sustainable development and digitalization shapes the conclusion that the rapid spread of digitalization is disrupting established patterns of economic relations, creating both challenges and opportunities for sustainable business, nations, and the world as a whole. For the first time in 2018, the number of people using the internet is greater than half the world's population (Rezyume zasedaniya OON, 2020)

Depending on how more and more people are embracing digital technologies, data is becoming a critical resource for development. Technology has a significant impact on people's livelihoods, resource allocation, and modes of communication. In other words, progress in sustainable development often depends on digital progress. Countries' ability to access digital data increasingly determines the effectiveness of advanced technologies in supporting the achievement of the Sustainable Development Goals (Tseeli ustojchivogo razvitiya OON, 2020)

Over the past ten years, there has been a continued increase in international interest in the prospects and challenges of digital transformation of business, society and public administration. The latest data sources, especially BigData, which are generated by

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digital technologies, are attracting increased interest from statistical national institutes. They complement official statistics and are used to analyze in more depth the progress towards strategic goals. Continuous statistical information will make it possible to identify trends and establish correlations between indicators and their groups.

This data type allows for more detailed production planning and reduces the potential for errors in management decision-making. Thus, the assessment of digitalization at the global level provides an overview of the scope and extent of the phenomenon and is the first step in identifying the quantitative relationships between sustainable development and digital transformation.

Economic organizations and political associations assess digitalization at the international level. The study aims to try to determine the extent of digitalization and its impact on different aspects of social and economic life. The Organization for Economic Cooperation and Development (OECD) GoingDigital project is the most extensive study of the digitalization process in data collection. The project's main goal is to create tools for assessing various processes in the development of the digital economy to develop policy recommendations for economic transformation and reform. The OECD notes the need for uniform and consistent policies for all countries to become digital economies (Going Digital, 2020).

## 2 RESEARCH METHODOLOGY

The paper contains the results on the impact of digitalization on sustainable development identified in the framework of published scientific publications indexed in the Russian Science Citation Index, analytical reports of the National Research University Higher School of Economics and the Russian Union of Industrialists and Entrepreneurs, as well as regulatory documents on the subject. The methods of the performed research contain theoretical and empirical parts, methods of description and supported by graphical methods of data illustration. Statistical analysis: the study of series of dynamics, calculation of average values and variation indices, generalized indices.

## 3 RESEARCH RESULTS

The research explores both the negative aspects of digitalization and its positive consequences. The benefits include innovation incentives, improved efficiency and quality of services, and sustainable, vigorous growth of the wealth of societies and economies. From the experts' point of view, the negative aspects of digitalization are job cuts, lack of digital skills and education, and security and privacy (Going Digital, 2019). Consequently, the digitalization assessment in the GoingDigital project is not the final goal of the work but only a tool for the next steps. The purpose of the study is not to rank countries or to develop composite indicators - the Organisation for Economic Co-operation and Development plans to collect data and provide analysts and policymakers with basic indicators and link them to relevant policy instruments. The first phase of the project, aimed at identifying global digitalization trends, forming a methodology, and collecting information, ended with the publication of the guidebook "Digital Transition: Shaping Policy, Improving Lives and Measuring Digital Transformation".

The European Commission offers a different approach to the study of digitalization trends, whose experts have developed the International Digital Economy and Society Index (I-DESI). The index shows an overall assessment of where the EU stands in its progress towards the digital economy compared to non-EU economies. As I-DESI is a compilation of data on 24 indicators and is calculated for 45 countries, the release of the final bulletin has a time lag of 2 years. Consequently, the data published in 2018 reflects digital development as of 2016 (International Digital Economy and Society Index, 2018).

The I-DESI compares the average non-EU member states with 17 countries using a similar methodology to the DESI index. "The Digital Economy and Society Index" is a composite index published since 2014 by the European Commission that measures the progress of EU countries in the digital economy and society. It assesses the development of digitalization of various socio-economic spheres and connects a set of relevant indicators of the current European digital policy framework only among the EU member states. Both indices measure performance in five dimensions:

- degree of network development (I1) - broadband infrastructure deployment and quality: Internet, 4G and mobile broadband coverage, connectivity costs. The average score of EU

- member states in 2016 in this dimension was 62.9. Only six states that were not part of the European Union scored higher;
- human capital (I2) - the skills needed to exploit the opportunities offered by the digital society. For example, I-DESI compares the number of graduates in ICT or the Internet, the employment rate in knowledge-intensive industries. The average score in 2016 across the EU was 58. Of the seventeen countries, nine non-EU countries earned higher scores, with the EU as a whole performing better than the United States;
- citizens' use of Internet services (I3) - this area compares various activities that take place online: extent of use of social networks, use of online content, number of online transactions performed (banking transactions, shopping), and devices. In 2016, the average score of EU member states on this dimension was 59.7, higher than the average for the 17 non-EU countries. Seven non-EU states, including Japan, South Korea and the United States, exceeded this figure;

- integration in the business of digital technologies (I4) - evaluation of digitalization of business and development of online sales (e-commerce). In 2016, nine of the 17 non-EU countries scored higher than the EU average. The least developed indicator among the EU member states is the use of social media for business communication. However, in terms of the degree of uptake of inter-corporate Internet and technology, the figure for the EU exceeds other countries;
- development of digital public services (I5) - assesses the degree of development of digital medicine (eHealth) and e-Government (e-Government). In 2016, nine non-EU countries scored higher than the EU average (International Digital Economy and Society Index, 2018).

Figure 1 summarizes the 2016 International Digital Economic and Society Index, with values for 17 leading economies applied for comparison with EU member states.

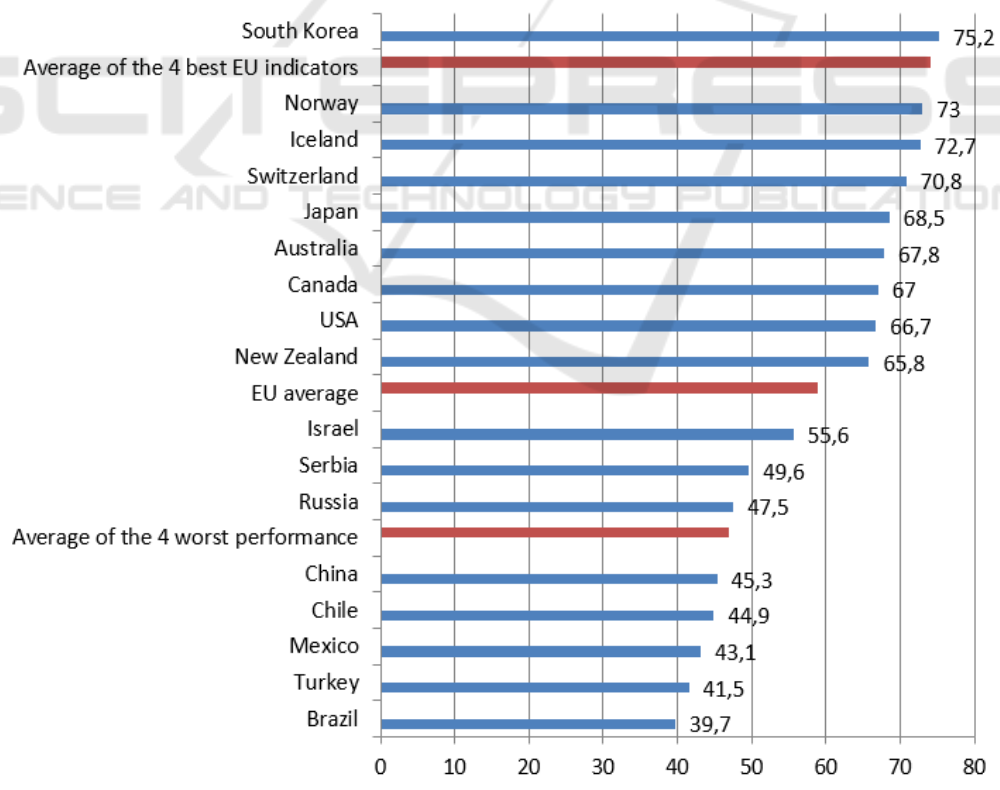


Figure 1: Value of the "International Digital Economy and Society Index" in 2016.

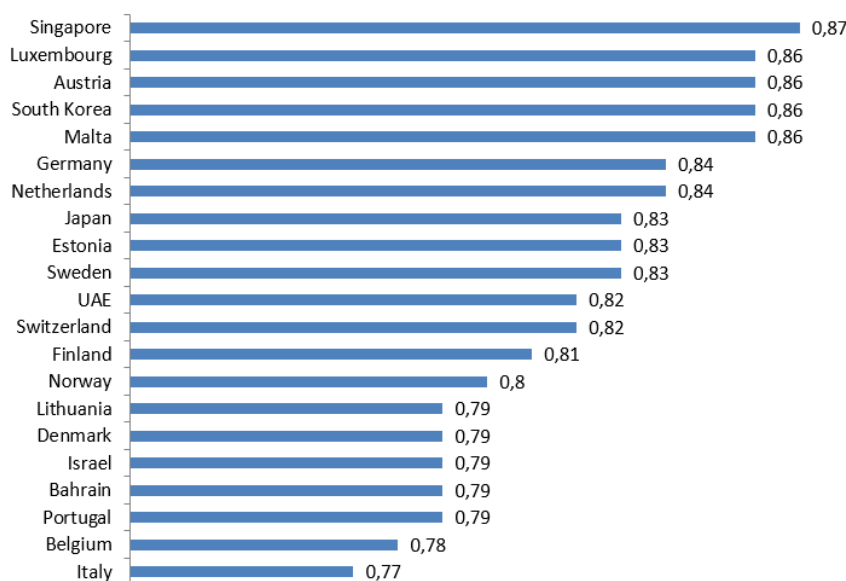


Figure 2: "Digital Adoption Index" (top 40 countries) for 2016.

The data for the EU is represented by three indicators: the average of the top 4 countries, the average of all 28 countries, and the average of the 4 lagging countries. All of the countries that lead the index are fully harnessing the power of the digital economy to drive inclusive economic growth, boost productivity in traditional industries, expand and diversify trade, and create new markets and services. The data presented indicates that as of 2016, the leader in digitalization development was South Korea, with an index score of 75.2.

At present, two periods of observations are available for most countries: 2014 and 2016, due to time lags in the publication of information by national statistical offices, periods of data collection, and calculation of the "Digital Adoption Index". Data on SCI are published in the World Bank's "World Development Report 2016: The Digital Dividend". As of 2016, Singapore, Luxembourg, and Austria were the leaders in terms of the value of the SCI (Figure 2). South Korea, which topped the EU index (I-DESI) in 2016, has a high index value. The chart shows the top 40 digital economies in the world according to the Digital Adoption Index. Due to the fact that the index consists of three components, it is possible to assess the impact of each and understand what makes a country lag behind. Thus, in the case of Russia, which ranked 54th in 2016, there is a low indicator of digital accessibility for the population and businesses, and in the area of public administration, the indicator is comparable with the leading countries of the Digital Adoption Index. This

picture is typical of most countries in the digital economy stage - all the key changes occur in the public administration sector and then spread to other areas.

#### 4 DISCUSSION OF RESULTS

In general, the highest values of the index are characteristic of the most developed countries in terms of public administration. Thus, digitalization leaders among the EU countries are the states with high values of the "Sustainable Country Development Index (SDG Index)". Sweden, Denmark, and Finland have achieved these positions largely due to digitalization development, as the Sustainable Development Index takes into account infrastructure development, level of education, and level of innovative development, i.e., the aspects of life that depend on digital technologies (sustainability Development Index, 2018).

By measuring the relative adoption of digital technologies, the DAI can help states develop strategies to promote digitalization among different user groups. The proliferation of advanced technologies, such as data analytics, artificial intelligence, and blockchain, is transforming business models and challenging governments to maximize the impact of digital transformation at regional, national, and global levels. The strategy should focus on creating an enabling environment for innovation, developing effective governance mechanisms,

planning for the future, and ensuring institutional flexibility. This requires a flexible legal framework. International best practices demonstrate the need to promote digital innovation in the economy by strengthening the innovation ecosystem, developing balanced incentive and competition policies, providing financing, and creating new competencies in the digital world, subject to adequate provision of national security, privacy, protection of consumer interests and rights to intellectual property results. Countries where leadership invests in advanced technologies in the context of a supportive business environment, a skilled workforce, and a strong culture of innovation can reap digital dividends in the form of faster economic growth, new jobs, and improved services. With the right enabling environment in place, advanced, technology-savvy companies transform operational processes, adopt new business models, and deliver innovative and personalized products and services to customers. Summarizing the trends of digitalization at the global level, it is important to note that the current challenge for the global community is not to create a certain set of indicators that will help assess the degree of digital transformation but to develop a unified methodological approach that can dynamically change depending on the information available at a certain point in time. First, the main trend in the development of digitalization, in terms of all the studied projects, is the existence of an established public policy. Weak governance and strategy, inadequate legal and regulatory frameworks, and insufficient institutional and human capacity result in a lack of impact from digital innovation. In such an economy, investment does not accelerate prosperity, productivity, or reduce economic and social development inequalities. The challenge for governments is to continuously respond to the accelerating pace of change and work effectively with the private sector to enable the adoption and development of advanced technologies. Secondly, experts note the need to revise outdated laws and regulations that impede digital penetration, cross-border business, new business models, and services. The government should create an environment in which there are no regulatory and tax barriers to the development of digitalization. The presence of competition in the digital market is the main incentive for development. Thirdly, experts from international organizations note the importance of providing network access to the entire population and enhancing digital education. Without human capital development, there can be no development of digitalization and the conditions for sustainable

development of countries. Businesses should be guided to adopt advanced technologies, and government should support business growth to create new workers and ensure information security (EABR, 2018). Fourth, there is a need at all levels to improve tools for measuring the impact of the digital economy on business, society, and the state as a whole.

## 5 CONCLUSION

Thus, we can conclude that digitalization is penetrating all spheres of social and economic life, transforming the processes of interaction between economic actors. Advanced technologies bring significant adjustments to companies' business processes, to value creation at all stages and become a competitive advantage. An analysis of global digitalization research practices has shown that all developed countries seek to use digital technologies to achieve the Sustainable Development Goals, invest in increasing accessibility of communications, develop digital skills among the population, and improve the quality of public services.

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