IRSTI 06.54.31 https://doi.org/10.26577/FJSS.2023.v9.i2.010

DIGITAL ECONOMY AS A FACTOR OF SUSTAINABLE DEVELOPMENT GOALS PROGRESSION IN KAZAKHSTAN

G. Dauliyeva[1], Mehmet Islamoglu[2] , A. Yeraliyeva[1*]

[1]Al-Farabi Kazakh National University, Almaty, Kazakhstan
[2] Karabuk University, Karabuk, Turkey
*e-mail: aru_eralieva@mail.ru

Received: October 10, 2023
1st Revision: November 3, 2023
Accepted: December 4, 2023

Abstract. Currently, there has been a growing global concern regarding sustainable development, environmental impact, economic inequality, and social inequality among countries and various demographic segments. The international community, including the United Nations and other political and economic alliances, is actively engaged in endeavors to advance the Sustainable Development Goals, aimed at solving these issues at the global and national level. Kazakhstan has also taken a number of measures and initiatives to achieve the abovementioned goals for a secure, equal, and progressive shared future.

This study aims to examine the role of the digital economy as a tool for the effective implementation of designated goals. It shows the correlation between Sustainability and Global competitiveness and analyzes current trends and key elements of the digital economy in Kazakhstan that contribute to the realization of sustainable development objectives. The study has been carried out using qualitative content analysis and an extensive examination of existing literature.

The article concludes by offering recommendations to enhance the effectiveness of the digital economy in Kazakhstan as a driver of Sustainable Development Goals achievement.

Key words: sustainable development, digital economy, digitalization, SDG.

Introduction

Kazakhstan is positioning itself as a social state with the highest values placed on the individual, their life, rights and freedoms. Over the years of independence, the country has made significant progress towards developing its own model of social well-being for society. Kazakhstan has taken several measures and initiatives to achieve the Sustainable Development Goals (SDGs) that aim to create a secure, equal, and progressive future. The country is confidently adopting new technologies to ensure the well-being of society, boost employment growth, improve the competitiveness of education, and enhance healthcare efficiency.

The term “sustainable development”, which refers to development considering the requirements of both present and future generations, became widespread in 1987 after the release of the report on Environment and Development prepared by UN World Commission. The concept has undergone changes, and at the present stage, it appears that sustainable development is a balanced system of economic growth that takes into account socio-economic benchmarks, articulated in the 17 SDGs developed by the UN, and is influenced by digital transformation (United Nations, 2015).

The opinions of researchers on the influence of the digital economy exhibits a paradox: while acknowledging its positive impact on the advancement of sustainable development, and simultaneously it is considered as a threat to certain components of development (Clark S., MacLachlan M., 2022; Shilova E.V., Dyakov A.R, 2018). Thus, the relevance of the study is associated with determining the patterns and effects of this phenomenon within the context of fostering sustainable development in the global economy.

This article endeavors to elucidate the potential risks and opportunities associated with the digital economy within the framework of sustainable development in Kazakhstan. Additionally, it aims to

evaluate the influence of the digital economy on the attainment of the SDGs.

Literature review

The literature review in this article synthesizes information from various sources covering topics such as sustainable development, digitalization, environmental impact, circular economy, data privacy, ethical considerations, and collaborative partnerships. Key references include global initiatives like "2030 Agenda for Sustainable Development" by United Nations, the European Union's "Directive on waste electrical and electronic equipment," The International Institute for Sustainable Development (IISD) and the International Energy Agency (IEA).

The analysis of challenges, opportunities, and ethical considerations is rooted in a critical evaluation of empirical studies, reports, and expert opinions from reputable sources such as the World Bank, the United Nations, Institute of Management Development, Deloitte, and various indices like Sustainable Society Index, IMD World Competitiveness, and IMD World Digital Competitiveness.

Methodology

To examine the complex correlation of the sustainable development and the digital economy, the methodology utilized in this article integrates qualitative content analysis and an extensive examination of existing literature.

The research methodology also reflects a comprehensive approach that amalgamates insights from international agreements, regulatory frameworks, academic research, industry practices, and expert opinions. This multi-dimensional perspective allows for a thorough exploration of the interconnection of abovementioned spheres, providing insights into challenges, opportunities, and the path forward.

Results & Discussions

Analysts and think tanks around the world are highlighting the tangible positive contribution of digital technologies to attaining SDGs. Many research works have also proved the influence of the digital economy progression on ecological systems in the 1990-2010s (Stephen S. Cohen & J. Bradford DeLong, 2016).

For example, S. Cohen and B. Delong note the presence of digitalization in all aspects of human endeavor and propose paying attention to the effect of the digital economy to the environment (Stephen S. Cohen & J. Bradford DeLong, 2016). Deloitte report analyzes the impact of technology on achieving sustainable development goals through more than 500 case studies (Deloitte, 2018). Berkhout and Hertin examined the digital technology influence on the environment, and identified both positive and negative impacts (Berkhout, F., Hertin, J., 2006). Giles and Smith write in their study about the simplification of environmental impact studies, which leads to unsuccessful technological prospects. Miller and Wilsdon propose the concept of a "sustainable digital economy," noting the possibility of solving environmental problems through the utilization of the digital economy (Miller P, Wilsdon J., 2001).

All research articles in this subject area is very important, as they provide the necessary information to determine the pathways for the advancement of the digital economy, formulate strategic goals and policies, in order to obtain the maximum positive effect from digitalization within the framework of sustainable development and minimize its adverse effects on the environment.

Let us define what we mean by the term digital economy in this work by studying the opinions of various authors and researchers on this topic.

As per the World Bank, the digital economy encompasses a network of economic, social, and cultural interactions based on the utilization of digital technologies, information and communication technologies (ICT).

The report "What is the Digital Economy?" prepared by Deloitte gives the following definition: the digital economy is a form of economic activity that arises from billions of examples of networked interaction between people, businesses, devices, data and processes. The basis of the digital economy is hyper connectivity, that is, the growing interconnectedness of people, organizations and machines, formed thanks to the Internet, Internet of Things, mobile technologies (Deloitte, 2018).

The state program "Digital Kazakhstan" also defines the digital economy as a set of social relations, which uses the digital technologies, infrastructure and electronic services. It also uses the platforms and technologies to analyze big data and forecasting in order to optimize production, consumption and increase the level of socio-economic development of the society (Digital Kazakhstan, 2017).

Summarizing the above approaches to defining the digital economy, we may infer that the digital economy constitutes of social interactions based on the use of emerging digital technologies and related

products and services. It characterizes the current stage of evolutionary development of the socio-economic and production model of society, aimed at increasing competitiveness of the economy and enhancing the quality of life of society.

As per the report, which relies on input from academics, non-governmental organizations and over 500 cases, the effective deployment of these technologies with a focus on positive societal outcomes is projected to enhance advancements toward the SDGs by 22 percent. Additionally, it is expected to alleviate negative trends by an average of 23 percent.

The formation of a digital economy is a pivotal factor that effects the level of competitive standing of country leaders, which is paid special attention to in the state program "Digital Kazakhstan", and in the publications of scientists (Idrisov G. I., Mau V. A., Bozhechkova A. V., 2017). Countries the forefront of technological advancement in the development of digital technologies and the use of its tools generally have an increased level of competitiveness and sustainable development. Table 1 substantiates it by presenting the comparison of the indicators of countries leading in the global competitiveness rating, as well as world ratings of sustainable development digitalization level. The latter, we recall, combines environmental, social indicators and indicators of effective leadership.

Table 1 – Comparison of rankings related to global competitiveness, digitalization and sustainable development

№	Global Competitiveness rankings 2023	IMD Global Digital Competitiveness rankings 2022	Global Sustainability rankings 2017
1	Denmark	Denmark	Finland
2	Ireland	Sweden	Netherlands
3	Switzerland	USA	Portugal
4	Singapore	Singapore	Denmark
5	Netherlands	Switzerland	Estonia
6	Taiwan	Netherlands	Lithuania
7	Hong Kong	Finland	Slovenia
8	Sweden	Korean Republic	Spain
9	USA	Hong Kong	Belgium
10	UAE	Canada	Germany
	Kazakhstan 37th place from 64	**Kazakhstan 36th place from 63**	**Kazakhstan 56th place from 154**
Source: IMD World Competitiveness, IMD World Digital Competitiveness, Sustainable Society Index			

Concerning developing countries and those with emerging markets, as advised in expert recommendations and the indices showed in the competitiveness, digitalization and sustainable development ratings, their priority tasks involve the holistic enhancement of industrial, financial, management, digital, social, and environmental infrastructure.

Table 2 – Comparison of rankings related to global competitiveness, digitalization and sustainable development in emerging market countries

Country	Global Competitiveness rankings 2023	IMD Global Digital Competitiveness rankings 2022	Global Sustainability rankings 2017
China	21	17	59
Russia	-	-	53
India	40	44	78
Mexico	56	55	86
Turkey	47	54	75
Kazakhstan	37	36	56
South Africa	61	58	68
Brazil	60	52	92
Ukraine	-	-	46
Source: IMD World Competitiveness, IMD World Digital Competitiveness, Sustainable Society Index			

You can clearly track the correlation between digital competitiveness and sustainability based on global ratings using the example of Kazakhstan.

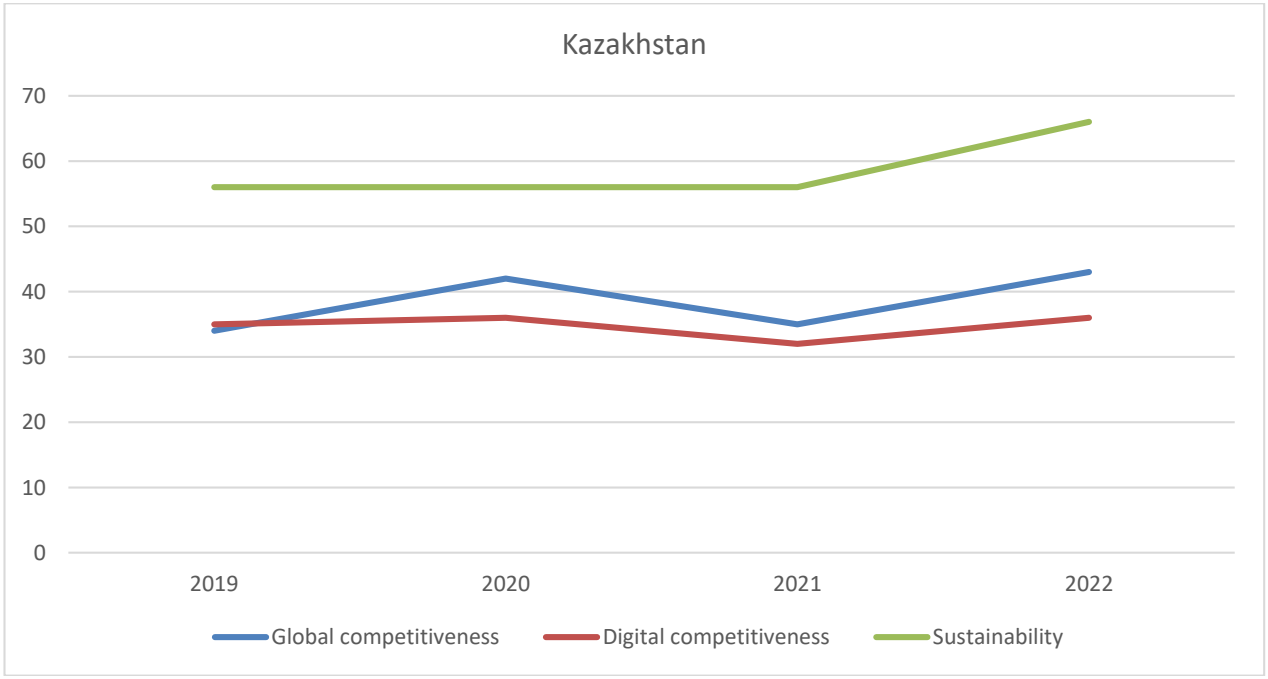

Figure 1 – Correlation between Sustainability and Global Competitiveness

Source: own study based on international indices

Digitalization helps to become better, faster, more transparent and more transparent in all processes. This concerns the growth of the economy in the country, the labor market, and the convenience of citizens. Today, innovation, applied research, and their commercialization are one of the important drivers of economic development, stimulating increased productivity and developing completely new jobs for the population. Building the next generation of ICT infrastructure will lead to smart, sustainable cities and communities around the world. Increasing access to modern ICTs will support the local innovation needed to accelerate domestic economic growth, achieve decent work, and reduce inequality.

Luiz Eduardo Rielli, a Brazilian expert specializing on sustainable development and corporate sustainability, highlights that the digitalization of the economy with the swift growth of new technologies and models on a global scale holds a significant factor in the realization of the SDGs. In addition, the specialist in his work draws attention to the importance and perspectives of using blockchain for sustainable development purposes.

The work also noted that digitalization will help achieve the seventh sustainable development goal. This goal entails guaranteeing access to affordable, sustainable, modern, reliable energy for everyone. New renewable energy sources, electric mobility, the use of sensors in all electrical systems and other opportunities that the digital economy can provide (Luiz Eduardo Rielli, 2021).

Another point that scientists pay attention to is that the advancement in sustainability cannot be achieved without communications on global level and the exchange of knowledge. In this perspective, digital technologies and the Internet are perceived as opportunities to overcome development constraints.

The concept of Internet Universality was developed by UNESCO through an extensive program of research, analysis and consultation with Member States and the Internet stakeholder community. It recognizes that the Internet is much more than infrastructure and applications. The Internet is a network

of economic and social transactions and connections with enormous potential to promote rights, empower individuals and communities, and promote sustainable development (Unesco, 2015).

According to the Institute for Sustainable Development, the digital economy can foster sustainable development through various ways:

- the complete or partial substitution of physical work and services with virtual/digital equivalents;
- the dematerializing of human activity/interaction;
- mitigating the direct environmental impact of production, enhancing energy and material efficiency, increasing the use of renewable energy, reducing the use of materials, which can be toxic. Up to 30 percent of energy savings worldwide are possible through better monitoring and management of electrical networks (UN Sustainable development group, 2023).

A World Bank study found that increasing Internet and broadband penetration affects the productivity of the entire economy. Every 10% growth of Internet users can increase economic growth by 1% (Chen Geng, 2020). This correlation is even higher in countries with lower/moderate income levels. Investments in ICT reduce regional income gaps by expanding economic opportunity, as digital technologies can provide previously unavailable information and service products, such as market prices for agricultural products.

The key tools of digital transformation that influence sustainable development include the following:

• Big Data, end-to-end technologies, artificial intelligence (AI) and neuro-technologies, quantum and additive technologies, Internet of things, new manufacturing technologies, industrial Internet, robotics, cloud technologies, cybersecurity.

• Paperless and unmanned technologies, mobile and biometric technologies, nano- and biotechnologies, optical technologies, cyber-physical systems.

• Platform and supercomputer technologies, predictive analytics, mathematical design, BIM technology design, etc.

In evaluating the influence of the digital economy on the attainment of SDGs, they should be divided according to the principle of a triune concept. According to this conceptual framework, SDGs arouse in the result of the integration of the following main perspectives: economic, social, environmental.

The economic aspect means the efficient use of limited natural resources and the utilization of nature-friendly, energy/material-saving technologies. This entails the development of environmentally sustainable products that are not only harmless for people and the environment, but also involve the minimization of resource consumption, recycling and proper appropriate of production waste (Grigoryeva A., Pirogova O., 2015).

The social aspect of sustainability is centered on person/individual and focused on the self-development and self-improvement. An individual should create conducive working environments, requiring the "soul comfort" that means a supportive team, stimulation of the work process, along with the availability of material resources necessary to create a product. Such work conditions motivate employees to enhance their skills, consequently improving their labor productivity.

From an environmental view, sustainability means ensuring the cohesion in biological and physical natural systems. The stability of the entire biosphere hinges on their viability and adaptability to the external changes. The deterioration of natural resources, environmental pollution and decline in biological diversity reduce the capacity of ecosystems to self-renovation (Magomadova H., 2012).

Each country develops its own sustainable development strategy depending on its national characteristics, its inherent problems, and development prospects. In particular, in Kazakhstan, this issue is addressed by SDGs Coordination Council.

Kazakhstan has nationalized the global SDG indicators and today the monitoring system includes 280 indicators, of which 205 are global and 75 are national indicators (egov, 2023).

The Ministry of Digital Development, Innovation and Aerospace Industry of Kazakhstan (MDDIAI) is involved in the advancement of the digital economy in Kazakhstan. In 2017, the state program "Digital Kazakhstan" was approved, which is designed to improve the pace of progression of the Kazakh economy and enhance the well-being of people, the program has introduced a set of initiatives to work in five key spheres:

Digitalization of economic sectors – involves leveraging online opportunities and innovational digital technologies for both large enterprises and small and medium-sized businesses. Digital technologies within this field contribute to the attainment of several SDGs at once.

ICT solutions make farming more data-driven and efficient, and can help farmers increase yields and reduce energy consumption. Digital transformations of supply chains and transportation help solve

another pressing problem in agriculture – the abundance of food losses and food waste. The goal of the second SDG is to attain food security, improved nutrition, eradicate hunger and promote sustainable agricultural development, which is fully supported through the implementation of digital technologies in the agricultural sector of the economy.

New and evolving digital technologies are facilitating smart water management and sanitation.

Technology creates new jobs, enables sustainable work and trade, and generally stimulates socio-economic development.

Advanced technologies will be needed to reduce global emissions, create smart cities and urban areas, electrify transport and construct resilient economies and societies.

Another example is the field of education. Here, the main manifestation of digitalization is the development of online education from school and university to advanced training for workers. This breaking down of geographical barriers marks a true revolution in coverage and access to quality education. As a result, digitalization becomes the key to solving the fourth SDG – ensuring inclusive education and equal access to quality educational content.

***Transition to a digital state*.** This direction of the digital economy contributes to the realization of SDG16: Peace, strong institutions and justice. This goal aims to foster peaceful and inclusive societies for sustainable development, by guaranteeing access to justice for everyone and building effective, participatory and accountable institutions at all levels.

The digital state is open, transparent and convenient opportunities for citizens and businesses, available online and at any time. E-government services help improve interaction between citizens and the government and boost the efficiency of government service delivery.

***Implementation of the Digital Silk Road*.** The Digital Silk Road will provide high-speed and secure Internet access and high-quality mobile coverage throughout the country.

Digital connections play a critical role in improving lives, opening unprecedented prospects for knowledge, employment and finance for billions of people globally," said International Telecommunication Union (ITU) Secretary-General Houlin Zhao (2020). "ICT remains a key driver of socio-economic development, bridging the digital divide and contributing to an inclusive digital economy," said ITU Telecommunication Development Bureau Director Brahima Sanou (2020).

Access to the Internet and mobile communications make it possible to access online education,

health, financial and government services. SDG9 aims establish robust infrastructure, promote inclusive industrialization and promote innovation. This goal fully reflects the essence of this way of the digital economy development in Kazakhstan.

***Development of human capital* –** the development of new competencies and digital literacy will be possible thanks to innovations in education.

According to ITU statistics, 250 million fewer women than men were connected to the Internet in 2017. Globally, 62% of men use the Internet, but only 57% of women (International Telecommunication Union, 2018). While the digital gender gap is narrowing in all global regions and has largely been eliminated in developed countries, significant gaps remain in LDCs (where 31% of men but only 19% of women use the Internet) and landlocked developing countries (38% of men and 27% women). Unfortunately, there are no initiatives in Kazakhstan to reduce the digital gender gap.

***Creating an innovation ecosystem*.** Such an ecosystem develops technological entrepreneurship and innovation with sustainable connections between business, academia and government. Public-private partnerships are essential to ensuring access to ICTs for all countries, peoples and communities. Partnerships are particularly important to build the physical infrastructure needed to deliver internet services to hard-to-reach areas and currently disadvantaged populations, and to facilitate the investment and innovation, foster inclusion required to achieve the SDGs overall.

Based on the studies studied, it is possible to assess the level of impact of the digital economy on the SDGs, which can be visualized in Fig.2.

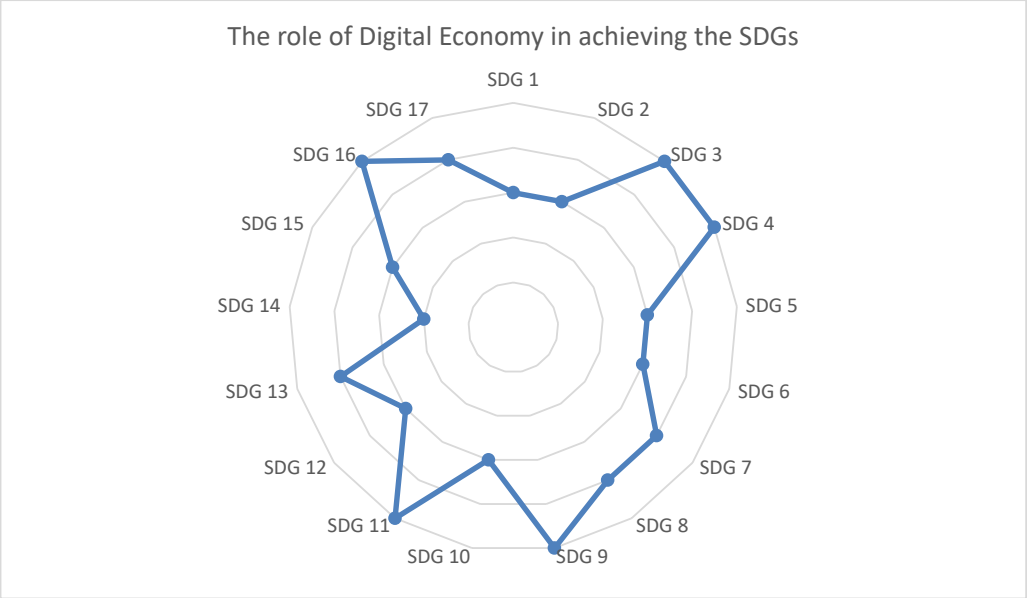

Figure 2 – The role of Digital Economy in achieving the SDGs

Source: own study based on international indices.

Thus, it can be concluded that the following sustainable development goals in Kazakhstan are subject to the least influence from the digital economy: SDG1 Poverty eradication, SDG5 Gender equality, SDG14 and 15 Conservation of sea and land ecosystems. Simultaneously, the digital economy has the greatest impact on SDG3 Health and well-being, SDG4 Quality education, SDG9 Industrialization, innovation and infrastructure, SDG11 Sustainable cities, SDG16 Peace, strong institutions and justice.

Conclusion

Achieving the SDGs over the extended timeframe will be challenging without the intervention of digital technologies. The 17 SDGs proposed by the United Nations provide a path towards a global and inclusive economy. This article highlights the impact of the digital economy on achieving economic, social and environmental sustainability in Kazakhstan. In fact, the digital economy can pave the way for an era of sustainable development – the transformation of societies where technology is key to the planet and humanity well-being. In this context, it is necessary to transform digital services into benefits that enable to launch new business models that can put the world economy on a path of inclusive economic growth; harmonize the transformations associated with the digital economy and sustainable development.

To fully utilize the benefits of digitalization and direct them towards the implementation of the SDGs, it is crucial to ensure the advancement of the digital competencies of the population and the corresponding retraining of the employed.

Simultaneously, an important condition for using the digital economy for the advancement of the SDGs is the creation of an environment that motivates people to invent, produce and export digital products, as also the enhancement of entrepreneurial skills of the people. In this context, it is recommended to develop and support startups in Kazakhstan.

Modernization of public administration is necessary. The modern structure of public administration is not adapted to coordinate the dynamic, horizontal processes of the digital economy. A fundamentally new management model is required, as well as building a full-fledged dialogue between the authorities and representatives of small/medium-sized innovative businesses for the efficient utilization of the digital economy as a driver of sustainable development within the country.

References

Berkhout, F., Hertin, J., & Gann, D. M. (2006). Learning to adapt: Organisational adaptation to climate change impacts. CLIMATIC CHANGE, 78(1), 135-156. https://doi.org/10.1007/s10584-006-9089-3

Chen Geng, From Digital Dividend to Digital Divide // Capital Whale, 2020. [Electronic resource] URL: http://www.capwhale.com/newsfile/details/20200810/038dfe05c8c84f92

Clark S., Marshall K., MacLachlan M., Morahan N., Hand K. et al. Including digital connection in the United Nations SDGs: A systems thinking approach for achieving the SDGs. Sustainability. 2022;14(3):1883. https://doi.org/10.3390/su14031883

Deloitte. What is Digital Economy? New York: Deloitte. 2018. https://www2.deloitte.com/mt/en/pages/technology/articles/mt-what-is-digital-economy.html

Directive 2012/19/EU of the European Parliament on waste electrical and electronic equipment (WEEE). Directive 2012/19/EU of the European Parliament and of the Council of 4 July 2012 on waste electrical and electronic equipment (WEEE)Text with EEA relevance (europa.eu)

Grigor'eva A.A., Pirogova O.E. Triedinaja koncepcija ustojchivogo razvitija predprijatija // Problemy sovremennoj jekonomiki (Novosibirsk). 2015. №28-1. URL: https://cyberleninka.ru/article/n/triedinaya-kontseptsiya-ustoychivogo-razvitiya-predpriyatiya (data obrashhenija: 20.11.2023).

Idrisov G., Bozhechkova A., Mau V. (2017). V poiskakh novoy modeli rosta [In search of a new growth model]. Voprosy ekonomiki. Issues of Economics, no. 12. pp. 1–19. DOI: https://doi.org/10.32609/0042-8736-2017-12-5-23 (in Russ.)

International Telecommunication Union (ITU). Digital technologies to achieve the UN SDGs. 2018. https://www.itu.int/en/mediacentre/backgrounders/Pages/icts-to-achieve-the-united-nations-sustainable-development-goals.aspx

Luiz Eduardo Rielli. Decentralised energy as a local development driver: implications for governance and decision making. 2021. https://ce3c.ciencias.ulisboa.pt/member/luizeduardorielli

Magomadova Hava Alaudinovna Principy racional'nogo ispol'zovanija prirodnyh resursov. Formirovanie idej ustojchivogo razvitija // IVD. 2012. №2. URL: https://cyberleninka.ru/article/n/printsipy-ratsionalnogo-ispolzovaniya-prirodnyh-resursov-formirovanie-idey-ustoychivogo-razvitiya (data obrashhenija: 20.11.2023).

Miller P, Wilsdon J. Digital futures — an agenda for a sustainable digital economy. Corp Environ Strategy 2001;8(3):275–80.

Shilova V., Dyakov A. On the phenomenon of the 4th Industrial Revolution and its impact on the management and economy. Bulletin of Prikamsky Social Institute. 2018.

Stephen S. Cohen & J. Bradford DeLong. Concrete Economics: The Hamilton Approach to American Economic Policy. 2016.

Sustainable development goals. 2023. https://egov.kz/cms/ru/zur

The International Institute for Sustainable Development. 2022. International Institute for Sustainable Development (iisd.org)

The state program "Digital Kazakhstan". 2017. Цифровой Казахстан (www.gov.kz)

UN Sustainable Development Group report. 2023. https://sdgtransformationcenter.org/reports/sustainable-development-report-2023

Unesco. The Internet Universality ROAM principles are endorsed by UNESCO's 38th General Conference. 2015. Background | UNESCO

United Nations. The 2030 Agenda for Sustainable Development. 2015. THE 17 GOALS | Sustainable Development (un.org)

WTISD 2020: Message from ITU Secretary-General, Houlin Zhao. https://www.itu.int/en/wtisd/2020/Pages/message-zhao.aspx