The Importance of Infocommunication Infrastructure for Sustainable Development, Principles and Methods of its Provision

Tatyana Kuzovkova [a], Olga Sharavova [b] and Maria Sharavova [c]
Moscow Technical University of Communication and Informatics, Moscow, 123423 Moscow, Russia
t.a.kuzovkova@mtuci.ru, o.i.sharavova@mtuci.ru, m.m.sharavova@mtuci.ru

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Abstract: The transition to a new technological order, digital transformation, and the aggravation of economic, social, and environmental problems have necessitated the development of new principles and methods for ensuring sustainable development at the global, national, and corporate levels. The task is to analyze and systematize successful tools for ensuring the sustainable development of information and communication companies that have system-forming and catalytic importance for the economy and society. Setting the task requires a systematic approach to establishing sustainable development requirements for the infocommunication infrastructure, revealing common goals and components of sustainable development, as well as the formation of tools to achieve these goals. The scientific substantiation of the role and objectives of the development of the infocommunication infrastructure and the proposed system of principles and methods for achieving sustainable development goals, systematically built by an infocommunication company, can be used as a tool by other sectors of the economy and the social sphere.

1 INTRODUCTION

The transition to a new technological order and the transformation of all systems (economic, social, environmental, political and ideological), the increasing role of information and intellectual resources, digital technologies and platforms, the formation of business ecosystems, the aggravation of economic, social and environmental problems of the turbulent state of many countries of the world have actualized the need for a radical revision of all systems and principles of the world order to solve the tasks of creating an information society and an intellectual world.

The digital transformation of business and the network organization of the platform infrastructure of the digital economy determine the convergence of industries, the blurring of business boundaries, the growth of scale and efficiency synergies of digital companies (Kuzovkova et al., 2023). Digital platforms make it possible to form large ecosystems that obey not the theory of intra-company costs by R. Coase, but the laws of network efficiency and information technology, and business models take into account customer demand and the impact of production on humans, ecology and the general planetary state of the Earth (Kuzovkova et al., 2021).

The next decade is characterized by the approach of the intellectual world at an accelerated pace, in which the leading role belongs to the network infrastructure, which will connect billions of people and things and transfer yottabytes of data, with the help of an increase in total computing power by 10 times, and AI by 500 times. So at the Intelligent World 2030 Forum, hosted by Huawei, David Wang noted, “10 years ago, we decided to connect all corners of the world to build a better and more interconnected world in the Internet age. Now our concept and mission is to make digital technologies accessible to any category of consumers in order to create a fully interconnected intellectual world”.

According to ITU, changes in the development of infocommunication infrastructure by 2030 relate to the following main parameters: ultra-dense networks with ultra low latency, decentralized network structure, the impact of the development of artificial

[a] https://orcid.org/0000-0002-0883-0469
[b] https://orcid.org/0000-0002-5910-829X
[c] https://orcid.org/0000-0002-9898-5121

intelligence technologies, quantum computers in related industries (nanosets, nanomachines, molecular networks), which will have a fundamental impact on consumer value and the nature of products: telepresencee, teleportation, personal networks, digital doubles, holographic models (Platunina et al., 2023). The evolution of product transformation consists in preserving the material form of both goods and services with a predominance of the information intellectual component, leading to the fusion of the material form of the product merges with the immaterial service, and ICT, AI make the product intelligent, convenient, safe, comfortable.

The high rates of digital development of society, public administration, economy and regional structure, the interests of ensuring national security and global sustainable development dictate the need for appropriate development of information and communication infrastructure.

2 SUSTAINABLE DEVELOPMENT REQUIREMENTS FOR ICT INFRASTRUCTURE

The high rates of development of the intellectual world, the penetration of digital technologies into the processes of production, management and consumption of goods and services dictate high requirements for the technical capabilities of communication networks in terms of speed, bandwidth and quality (Kuzovkova et al., 2019). The technological solution to most problems of sustainable economic development is possible due to the development of digital networks of fixed, mobile, satellite communications, and the Internet of Things.

Effective development of regional markets and industries in the digital economy is possible only if there are developed platforms, technologies, institutional and infrastructural environment. The development of communication networks that meet the needs of the digital economy and society in the collection, transmission and use of data must meet the technological requirements of digital technologies and the implementation of platform solutions (Sharavova, Sharavova, 2021). The complex of requirements for technological and organizational parameters of the infocommunication infrastructure is presented in Fig. 1.

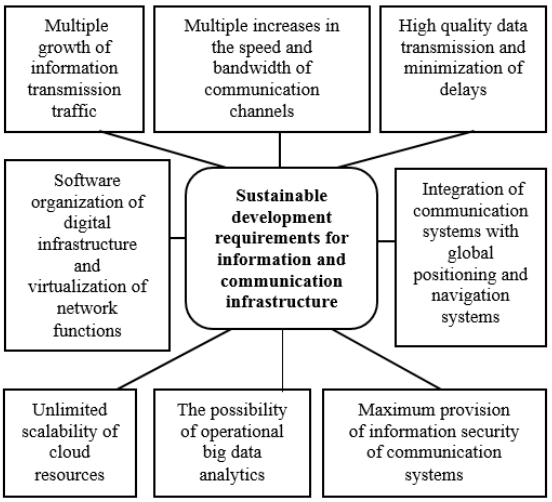

Figure 1: Sustainable development requirements for information and communication infrastructure.

Ensuring the sustainable development of the economy and society is impossible without creating a new generation of communication networks with many times higher bandwidth, speed, reliability and quality of information transmission, with full access to information resources for businesses and the public (Salutina et al., 2021). The importance of creating communication networks of new generations is determined by the essence of the concept of digital transformation, which consists in deep and comprehensive changes in industrial and social processes associated with the total replacement of analog technical systems with digital ones with the widespread use of digital technologies (Kuzovkova et al., 2022).

Scientists name technological innovations in the field of ICT infrastructure and intelligent devices, the latest technologies of mobile, satellite and quantum communications, cloud services, the Internet of Things, etc. as key drivers of digital development, building an intelligent world, platform business models and ecosystems (Cao et al., 2019). Calculations show that the construction of the digital economy is accompanied by a twentyfold increase in the volume of global data transmission – from 9 TB to 180 TB, an increase in the volume of data use in mobile networks by 30 times (up to 2 GB per day) (Kuzovkova et al., 2023).

In Fig. 2 presents the tasks of developing ICT infrastructure in the context of creating a digital economy and information society.

With the digitalization of the economy and society, the introduction of the industrial Internet, the load on the ICT infrastructure increases by several orders of

magnitude, which provides for the digital transformation of the communication systems themselves and the transition to the software implementation of network functions. To create a technological basis for sustainable development, technical solutions are needed for secure high-speed transmission, processing and storage of large amounts of data, as well as organizational solutions to ensure information security and accessibility of all organizations and households.

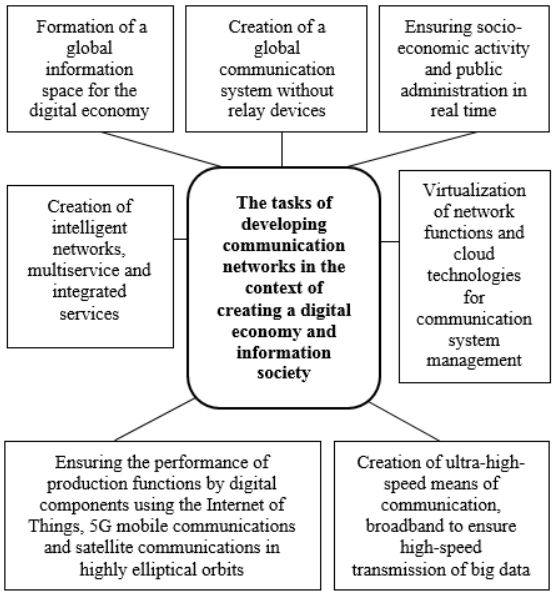

Figure 2: The tasks of developing information and communication infrastructure in the context of creating a digital economy and information society.

Thus, the concept of building and developing narrowband wireless communication networks of the Internet of Things defines not only the needs of the national economy in services provided in 5G/IMT-2020 networks, but also technological solutions, scenarios for building network architecture, requirements for networks, information security and the use of radio frequency bands by operators (Kuzovkova et al., 2023). The potential of the new generation of 5G wireless communications is not only to increase the power and speed of information transmission, but also to integrate businesses by creating new digital products and management models based on the partnership of telecom operators, digital product developers, manufacturers of technological equipment and industry consumers.

In the process of creating an information space, the ICT sector plays a dual role: a transport and network environment (information infrastructure) and an infocommunication resource (factor) for the production of goods and services. Being the most important element of industrial and social infrastructure, the ICT sector serves as a system-forming factor in ensuring sustainable development rates on a national and global scale, with a special catalytic effect on all spheres of the economy and society.

The increasing system-forming and catalytic role of infocommunication infrastructure dictates the need to improve methods and technologies for managing sustainable development, taking into account scientific and technological progress (STP), the impact of many factors and conditions of functioning of economic entities, a sound strategy for harmonious development and improvement of balanced regional production.

3 THE ESSENCE AND COMPONENTS OF SUSTAINABLE DEVELOPMENT

The concept of sustainable development is a new theory of the last decade. More than 100 countries around the world have Councils and national programs for sustainable development. The term “sustainable development” appeared in 1980, when the World Conservation Strategy was adopted, in 1987, the report “Our Common Future” of the World Commission on Environment and Development gave the most popular definition of this term: “development that meets the needs of the current generation without compromising the opportunities of future generations to satisfy their own needs”. In 2000, the Millennium Summit was held in New York, at which the UN countries adopted eight development goals by 2015, in 2015, 193 UN countries adopted the resolution “Transforming our world in the field of sustainable development for the period up to 2030”, including 17 Sustainable Development Goals (SDGs) (Fig. 3).

The modern understanding of the concept of sustainable development has emerged as a result of combining three points of view: environmental, social and economic. From an ecological point of view, sustainable development should ensure the integrity of biological and physical natural systems, the viability of ecosystems, on which the global stability of the entire biosphere depends. Degradation of natural resources, environmental pollution and loss of biological diversity reduce the ability of ecological systems to regenerate themselves. Hence, the greatest

use of the term began to be associated with ecology and environmental problems.

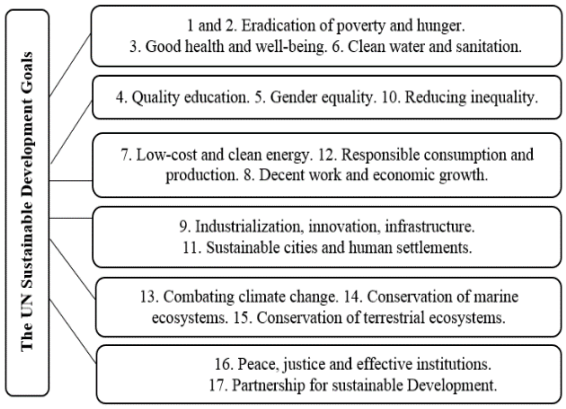

Figure 3: The UN Sustainable Development Goals until 2030.

However, in the literal sense, the phrase “sustainable development” means “constant growth”, without implying a state of balance with nature. In our opinion, it is necessary to pay more attention to the natural environment, it is necessary to strive to ensure stable socio-economic development that does not destroy its natural basis. Improving the quality of life of people should be ensured within the limits of the economic capacity of the biosphere, exceeding which leads to the destruction of the natural biotic mechanism of environmental regulation and its global changes.

In order to achieve the goals of sustainable development, it is necessary to take into account the long-term environmental consequences of economic decisions regarding environmental management and anthropogenic impact on the environment and develop environmental, health and environmental measures. In addition, considering sustainable development, taking into account possible changes in the civilizational attitude, requires regions and countries of the world to preserve their abilities for self-healing and dynamic adaptation to changes. Therefore, “natural” systems and habitats must be considered broadly, taking into account the digital environment created by man, smart cities, and the information society.

The beginning of the XXI century, characterized by an unprecedented growth of cities and settlement systems, the needs of mankind, was accompanied by the application of the principles of sustainable development, especially in the field of urban planning and territorial planning, ensuring safety and favorable living conditions for humans, limiting the negative impact of economic activity on the environment, protection and rational use of natural resources in the interests of present and future generations. At the Russian Forum on Sustainable Development in 2021, it was noted that the three-pronged concept of sustainable development should be complemented by other aspects that take into account the processes of digital development of the economy and society, global relations in economics, politics, and the natural environment.

4 PRACTICAL TOOLS FOR ACHIEVING THE SUSTAINABLE DEVELOPMENT GOALS

Rostelecom is the largest infocommunication company providing digital services and solutions in all market segments. Over the past six years, it has gone from a fixed-line operator to a digital ecosystem with the inclusion of a Tele-2 mobile operator, business expansion in all directions, participation in the implementation of the national Digital Economy program and the implementation of technological and IT projects. Rostelecom Group of Companies includes 65 regional branches and more than 200 subsidiaries. Taking into account the scale of business development and the radical restructuring of the management system, it is advisable to consider the actual practice of implementing the Sustainable Development Goals.

As a participant in the global Sustainable Development Program of the UN SDGs, Rostelecom creates a sustainable digital environment for all spheres of life: the population, business, and the state. According to the independent European rating agency RAEX-Europe, Rostelecom took 41st place in the ESG ranking (out of 160 Russian companies).

The key principles of Rostelecom's sustainable development activities are the integration of sustainable development goals into the company's management and their consideration in the development of projects in the plane of caring for the future of society, openness and honesty to customers, partners, investors and the state, building positive and mutually beneficial relations between the company and employees. Rostelecom focused on 10 main SDGs out of the whole set of UN SDGs and identified two priority levels (Table 1).

Table 1: Priority UN Sustainable Development Goals for Rostelecom.

Sustainable Development Goals	The content of the solution
The first level of priority	
4. Quality education	Ensuring inclusive and equitable quality education and promoting lifelong learning opportunities for all
8. Decent work and economic growth	Promoting sustained inclusive and sustainable economic growth, full and productive employment and decent work for all
9. Industrialization, innovation and infrastructure	Building resilient infrastructure, promoting inclusive and sustainable industrialization and innovation
10. Reducing inequality	Reducing inequality within and between countries
11. Sustainable cities and human settlements	Ensuring the openness, safety and environmental sustainability of cities and human settlements
The second level of priority	
12. Responsible consumption and production	Responsible consumption and production
13. Fighting climate change	Fighting climate change
15. Conservation of terrestrial ecosystems	Conservation of terrestrial ecosystems
16. Peace, justice and effective institutions	Promoting a peaceful and open society for sustainable development, ensuring access to justice for all and creating effective accountable and participatory institutions at all levels
17. Partnership for sustainable Development	Strengthening the means of implementation and strengthening the work of the Global Partnership for Sustainable Development

The company's work on sustainable development is characterized by a systematic approach to solving a variety of tasks and using tools:
1) state tasks: participation in projects for building the digital economy of Russia, implementation of the social program “Digital Equality”;
2) production: development of innovative services for customers, maintaining the highest possible level of transparency in conditions of high turbulence;
3) social, human resources: protection of employees and creation of comfortable working conditions, training and career guidance for young people, social and volunteer projects, charity;
4) Environmental: the development of technologies to solve environmental problems.

To measure the factors of assessing sustainability, social responsibility and its position in the ESG rating conducted by the independent European rating agency RAEX-Europe, Rostelecom coordinated its policy according to ESG criteria (Table 2). The ESG factor system includes: Environmental (E) - the impact of the organization on the environment; Social (S) the company's contribution to the welfare and security of society; Governance (G) - management efficiency, transparency of interaction with shareholders, compliance with rules and regulations.

Table 2: Policies and tools for solving accelerated development tasks in priority areas of Rostelecom's activities.

ESG priorities	Policies and tools
Environmental (E)	An effective environmental control and management system. Improving energy efficiency. Waste management. Reducing emissions. Responsible consumption.
Social (S)	Staff training and development. Safe working conditions. Employee support and increased engagement. Charity. Digital services to improve the quality of life.
Governance (G)	High standards of corporate governance. A fair reward. The rights of shareholders.Anti-corruption. High procurement standards.

Shown in the table. 2 The policy and tools for solving ESG tasks in Rostelecom's priority areas of activity confirm the systematic approach and its effectiveness. Thus, the company's environmental policy, in which more than 99% of waste is low-hazard and almost non-hazardous waste (classes IV and V), allowed in 2022 to transfer more than 2 thousand tons of waste for recycling, conduct almost 630 inspections of production facilities to identify and eliminate inconsistencies.

In the field of Social Sphere, Rostelecom not only provides optimal working conditions, but also provides social support to employees based on mechanisms of interaction with staff (collective agreement, corporate pension, housing and voluntary health insurance programs), training and staff development based on the online university platform

with more than 900 courses available. The cost of training employees amounted to 456 million rubles.
Rostelecom PJSC presents an open access report on key indicators, documents and policies in the field of accelerated development “Information ESG”. The company invested 175 million rubles in environmental projects and activities over the year. Rostelecom's well-established environmental management system made it possible to undergo an external audit and receive a new certificate of conformity by 2025.
For a number of years, the company has been a key partner of the state in the implementation of the Digital Economy program, data transmission services have been provided for previously connected socially significant facilities and base stations have been installed to eliminate digital inequality.
By implementing social national projects: the integrated social program “Digital Equality”, “ABC of the Internet”, “GROWTH”, “Explore the Internet-manage it”, and the international program for the development of social entrepreneurship among young businessmen Social Impact Award (SIA), Rostelecom has a significant impact on the social sphere. The creation of the charter “Digital Ethics of Childhood”, conducting a study “Technologies for protecting children on the Internet” with the identification of basic risks for children and the preparation of a manual “A beautiful, dangerous, cybersecurity world” with useful cybersecurity tips for children and parents It promotes the popularization of people's cybersecurity and reduces digital risks.

5 CONCLUSIONS

The disclosure of the general goals and components of sustainable development, the system-forming and catalytic importance of infocommunication infrastructure for the economy and society, the systematization of sustainable development requirements for ICT infrastructure, as well as the analysis of the practical tools of a large infocommunication company to ensure sustainable development goals made it possible to substantiate a package of principles, methods, projects and programs from a systemic perspective, comprehensively ensuring the implementation of the Sustainable Development Goals in the subject-object plan in terms of the scale and depth of impact on economic, social, and environmental problems both within the company and outside at the level of the national economy and society.

Maintaining a balance between environmental, social and corporate components of sustainable development allows you to find the optimal combination of them for a particular business and effectively solve the company's development tasks. Rostelecom's successful experience in implementing practical tools to ensure sustainable business development using clear principles, methods and technologies for training employees and customers, protecting the environment and improving well-being in society can be used in other sectors of the economy and social sphere.

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