

# “Development of digitalization a the local level as one of the key accelerators of SDG localization in the Republic of Belarus”



The review was prepared within the framework of the process “Strengthening the localization of the SDGs at the subnational level of Georgia and Belarus, taking into account the experience and knowledge of Germany” within the framework of the project “Institutional integration of the 2030 Agenda in Belarus and other countries of the Eastern Partnership”. The project was implemented by the Dortmund International Education Center (IBB Dortmund) with the financial support of the Federal Ministry for Economic Cooperation and Development (BMZ) and supported by the German Society for International Cooperation (GIZ).

The review was prepared by Belarusian and German experts and does not reflect the position of the Dortmund International Educational Center (IBB Dortmund).

© IBB-Dortmund, 2023

**Authors:** Dr. Siarhei Tarasiuk, independent expert on sustainable development, Dr. Anna Sidorovich, independent expert on sustainable development, Prof. Dr. Florian Koch, professor of real estate management, expert in urban development and smart cities, BWT, Berlin.

The analytical review “Development of digitalization at the local level as one of the key accelerators of SDG localization in the Republic of Belarus” is devoted to studying the state of digital development at the local level at the beginning of 2023 and approaches to strengthen it.

The review provides an expert analysis of the framework conditions for digital development at the national level and digital development trends abroad and in Belarus. The conclusions and recommendations of the review are based on the opinion of target groups, in particular local residents of the regions, about the level of localization of digitalization and ongoing digital transformations in various key aspects of life. Special attention in the review is paid to the issues of gender impact on the development of digitalization, as well as the issues of participatory development, which is the basis for the successful localization of the SDGs and digital transformations.

The review is intended for a wide audience of specialists involved in digital development.

Reference to the publication: Tarasiuk S.V., Sidorovich A.A., Florian Koch. Analytical review «Development of digitalization at the local level as one of the key accelerators of SDG localization in the Republic of Belarus». 106 p. / [Electronic resource] // - URL: <https://ibb-d.org/>

# TABLE OF CONTENTS

<b>1. INTRODUCTION.....</b>	<b>5</b>
<b>2. KEY TERMINOLOGY OF THE REVIEW.....</b>	<b>8</b>
<b>3. PURPOSE AND METHODOLOGY OF THE REVIEW .....</b>	<b>13</b>
3.1. Purpose of the review.....	13
3.2. Review methodology.....	14
3.3. Task Force Contributed to the Review.....	17
<b>4. DIGITAL DEVELOPMENT AND LOCALIZATION SDGS.....</b>	<b>20</b>
4.1. The main challenges and trends of local development in the context of the localization of the SDGs and their relationship with the development of digitalization.....	20
4.2. The complexity and consistency of the digitalization approach and its significance as an accelerator for achieving the SDGs.....	24
4.3. The main global trends in digital development at the local level.....	28
4.4. Digitalization and sustainable development at the local level: main trends in the European Union and India .....	33
<b>5. TRENDS IN DIGITAL DEVELOPMENT AT THE NATIONAL LEVEL IN THE REPUBLIC OF BELARUS, WHICH FORM THE CONDITIONS FOR THE LOCALIZATION OF DIGITAL DEVELOPMENT .....</b>	<b>37</b>
5.1. Framework conditions for digital development in the Republic of Belarus.....	37
5.2. Legislative aspects of the development of digitalization .....	41
5.3. National and regional digital platforms contributing to local development ..	45
5.4. Key players in digital development in Belarus .....	53
<b>6. STATUS AND TRENDS OF DIGITAL DEVELOPMENT AT THE LOCAL LEVEL.....</b>	<b>56</b>
6.1. Perception of digitalization as a local development accelerator .....	56
6.2. Status and trends in the implementation of digitalization in key areas of life at the local level .....	61
6.2.1. SME development and digitalization.....	61
6.2.2. Employment growth and digitalization.....	65

6.2.3. Ecology, including improvement of the housing and communal services system and digitalization.....	69
6.2.4. Education and digitalization.....	73
6.2.5. Digitalization as a tool for creating e-government and involved participation in local development .....	77
6.2.6. Gender aspects of digitalization .....	80
6.3. Local structures supporting the development of digitalization .....	88
<b>7. GENERALIZATION AND CONCLUSIONS.....</b>	<b>91</b>
<b>8. RECOMMENDATIONS FOR STRENGTHENING DIGITAL DEVELOPMENT AT THE LOCAL LEVEL TO ACCELERATE THE LOCALIZATION OF THE SDGS .....</b>	<b>97</b>
<b>ANNEX 1 - LIST OF ABBREVIATIONS AND TERMS USED.....</b>	<b>101</b>
<b>ANNEX 2 - COMPARATIVE ANALYSIS OF THE POSSIBLE CONTRIBUTION OF DIGITALIZATION TO THE ACHIEVEMENT OF THE GLOBAL SDGS AND AN ASSESSMENT OF THE CONTRIBUTION OF DIGITALIZATION TO LOCAL DEVELOPMENT OBTAINED DURING THE PREPARATION OF THE REVIEW.....</b>	<b>103</b>
<b>APPENDIX 3 - LIST OF LEGAL ACTS AND TECHNICAL LEGAL ACTS IN THE FIELD OF DIGITALIZATION IN THE REPUBLIC OF BELARUS .....</b>	<b>107</b>

# 1. INTRODUCTION

---

In the report “Roadmap for the implementation of the SDGs in the Republic of Belarus”<sup>1</sup>, prepared by the MAPS (“Integration, Acceleration and Policy Support”) mission, which was organized by the UN in cooperation with the Government of the Republic of Belarus and held in the Republic of Belarus from November 27 to December 5, 2017, it is noted that digital transformations and social innovations are one of the four platforms for accelerating the implementation of the SDGs in the Republic of Belarus. “Unleashing the full institutional and societal potential of digital development will enable Belarus to move towards a society and economy based on services, knowledge and innovation, characterized by greater integration into global value chains and a more competitive service sector. Combining digital innovation with social innovation and the adoption of new technologies to improve efficiency and evidence-based, people-centered and privacy-conscious policy making is essential”<sup>1</sup>. The roadmap is not an officially approved document, but its recommendations are widely used in official strategic planning documents, primarily in the National Strategy for Sustainable Development of the Republic of Belarus for the period up to 2035.

“Think globally – act locally” is the main thesis of successful sustainable development. Indeed, in reality, the practical achievement of the SDGs is carried out precisely at the local level, by residents

of villages and cities, entrepreneurs, organizations and enterprises, as well as local authorities. And the introduction of digital technologies in all spheres of life at the local level accelerates and increases the efficiency of all taken actions. For example, the digitalization of utilities, business, social and government services can increase the transparency and efficiency of decisions. Thanks to digitalization, the public is widely informed and actively involved in development processes, the availability and efficiency of the use of internal and external resources are improved, innovative development mechanisms are actively introduced, and participatory and inclusive development is ensured.

Of course, processes at the local level are viewed in close connection with the development of digitalization at the national level, where the framework conditions for the localization of digitalization are created and improved. Such conditions include institutional, infrastructural, technological, financial, educational and other aspects.

The conditions conducive to the start of the development of digitalization at the local level include the availability of equipment and software for local development participants and infrastructure aspects. But the presence of computers and Internet access does not



---

<sup>1</sup> [Roadmap for the implementation of the SDGs in the Republic of Belarus](#). Minsk, 2018 / [Electronic resource] // ITU: [website]

mean anything if the population does not know how to use them. Thus, it is important to create conditions for increasing the competencies of local development participants in term of the use of equipment and programs. But the depth or, in other words, the sustainability of the development of digitalization at the local level is determined by the ongoing digital transformations that lead to a change in the “lifestyle” of the participants in local development, the nature of their behavior and approaches to managing their livelihoods. For example, most people advanced in digitalization have been paying for mobile services using smartphone applications for a long time. They refused to pay for such a service by going to the bank and wasting time. More advanced residents, thanks to smartphone applications, can remotely control cleaning in apartments, the work of stoves and washing machines and the home heating system, as well as monitor and manage the quality of their health, etc. Organizations and enterprises are already widely introducing new automated logistics systems for the flow of goods and transportation, information processing and decision-making systems, remote communication and others. This is becoming the new life standard, which indicates the onset of sustainable digital transformations at the level of a person and an organization.

Digital transformations in society are very important. They are designed to increase the sustainability of local development and its contribution to the achievement of the SDGs by<sup>2</sup>:

- strengthening economic potential and its diversification (digital entrepreneurship, point farming, autonomous greenhouses, etc.);
- improving the quality and increasing the availability of social services through the introduction of innovations (health, education, culture, social protection);
- strengthening the role and contribution of the population in the adoption and implementation of local development decisions (participatory or involved development);

- improving environmental protection as the basis for sustainable development.

Thus, the level of localization of digital development is very important for the sustainability and contribution of local development to the achievement of the SDGs.

That is why the focus of this review is to study the depth of localization of digital development at the local level and the factors influencing it. The question is of interest – do local members of the development, primarily the population and business, know about national strategic approaches to digital development, about national digital platforms and whether they understand how they can use this information for the purposes of their growth, development of the territory and for achievements SDGs? Another interesting question is do people at the national level know about local needs and potential for digital development, local digital projects and how can they be supported and improved?

The review is based on an expert analysis of the framework conditions for digital development at the national level and digital development trends abroad and in Belarus. The conclusions and recommendations of the review are based on the opinion of the target groups and local residents of the regions about the level of digitalization localization and ongoing digital transformations in various key aspects of life. Special attention in the review is paid to the issues of gender impact on digital development, as well as the issues of participatory development, which, of course, is the basis for successful digital development and localization of the SDGs.

The review is structured as follows: Chapter 2 defines the key digital development terms used in this review. Chapter 3 describes the purpose and methodology of preparing the review, and provides an understanding of how digital development was assessed at the local level. Chapters 4 to 5 describe the framework conditions and the current state of digital development abroad and



<sup>2</sup> [Digital technologies to achieve the UN SDGs: overview](#) / [ Electronic resource ] // ITU: [ website ]. – (date appeals 17.07.2023)

in Belarus, the relationship of digital development with sustainable development goals, as well as in the specific Belarusian context. Chapter 6 highlights the main results of studying the degree of localization of digital development in Belarus in general and in some areas of life. Chapters 7 and 8 present conclusions, based on the research part, assess the contribution of digital development to local development and the achievement of the SDGs, and provide recommendations for strengthening digital development at the local level to accelerate the localization of the SDGs.

The review comes along with a list of used abbreviations and terms, questions for studying the development of digitalization at the local level, addressed to the population and local experts, as well as a list of regulatory legal documents in the field of digitalization in the Republic of Belarus.

The authors of the review express their gratitude to the experts from Belarus and Germany for their consultations and suggestions during the work on the review.

## 2. KEY TERMINOLOGY OF THE REVIEW

---

In anticipation of getting acquainted with the results of studying the development of digitalization at the local level, it should be noted that there is complexity and some kind of confusion with the terminology in the field of digital development. This often happens when an innovative direction develops and new terms are introduced.

Let's highlight the main terms of digital development and analyze them since the understanding of these terms is directly related to the object of study of this review. Such terms are digitalization, digital transformation, informatization, information and communication technologies, automation and computerization.

In the work of Tomashevsky K.L. (2020)<sup>3</sup>, based on an analysis of the concepts of the digital development sphere, it is indicated that "the concept of "digitalization" is derived from the noun "digit" or the adjective "digital". Digitalization can be viewed in a broad and narrow sense. Digitization in a broad sense is the process of introducing dig-

ital technologies and transmission systems at the level of telecommunication networks, switching and control means that ensure the transmission and distribution of information flows in digital form. Digitization in the narrow sense is the process of transition from an analog form of information presentation to digital. An example of such a narrow (technical) interpretation of digitalization is the transition from analog television to digital television, the transition from conventional mobile phones to smartphones.

The concept of digitalization is associated with such a new scientific and technological order, which can be called «Industry 4.0», or «Economy 4.0». Industry 4.0 is widely used. For example, this is the name of one of the 10 projects of the Hi-Tech strategy of the German government until 2020, which has received worldwide recognition due to the clarity of the goal. Industry 4.0 describes the concept of smart manufacturing based on the Industrial Internet of Things (IIoT). In a broad sense, Industry 4.0 is a new understanding of the organi-



---

<sup>3</sup> [Tomashevsky K.L. Digitalization and its impact on the labor market and labor relations \(theoretical and comparative legal aspects\)](#) / Tomashevsky K.L. [Electronic resource] // Bulletin of St. Petersburg University. Right 2: [website]. — (accessed 17.07.2023)



zation of production and management of the entire value chain throughout the entire product life cycle on a platform for the development of automation and data exchange, including the creation of cyber-physical systems, IIoT and digitalization.

The work of Petrov M., Burov V., Shklyaruk M., Sharova A.<sup>4</sup> indicates that digital transformation is a deep reorganization and reengineering of business processes with the widespread use of digital tools as mechanisms for executing processes, which leads to a significant improvement in the characteristics of processes (reduction of the time of their execution, the disappearance of entire groups of subprocesses, the boost in efficiency, reduction of the resources spent on the execution of processes, etc.) and (or) to the emergence of fundamentally new qualities and properties of them (decision making in automatic mode without human intervention, etc.). Digitalization is transforming existing jobs, necessitating the acquisition of new skills by employees to perform new tasks, which require constant professional development, the acquisition of new knowledge throughout life, the ability to use new software and new automated and robotic technological processes. With such transformations, employers will need to quickly retrain workers or replace them with specialists who already have the relevant knowledge and skills.

The work of Petrov M., Burov V., Shklyaruk M., Sharova A.<sup>3</sup> also indicates that digital development is a process of consistent digital transformation of economic activity and public administration. This stage is a natural transition from the general computerization of activities, which involves providing computer equipment, based on which automation and informatization of economic activity and public administration were carried out, to the deepening of digital transformations - the implementation of digital transformation, which displays itself in qualitative changes, consisting in both separate digital transformations and in a fundamental change in the structure of the economy,

the transfer of value-added centers to the sphere of building information resources and end-to-end digital processes.

In the explanatory dictionary of terms and concepts on digital transformation<sup>5</sup>, which was developed taking into account the regulatory framework in force in the Republic of Belarus, the terms are presented as follows:

**«Informatization** – an organizational, socio-economic, scientific and technical process that provides conditions for the formation and use of information resources and the implementation of information relations.

**Digitalization** – a new stage of automation and informatization of economic activity and public administration, the process of transition to digital technologies. It is based not only on the use of information and communication technologies to solve production or management problems but also on the accumulation and analysis of big data with their help to predict the situation, optimization of processes and costs, attraction of new contractors, etc.

**Digital transformation** – a manifestation of qualitative, revolutionary changes, consisting not only of individual digital transformations but of a fundamental change in the structure of the economy, in the transfer of value-added centers to the sphere of building digital resources and end-to-end digital processes. As a result of digital transformation, a transition to a new technological and economic structure is taking place, as well as the creation of new sectors of the economy.

**Information and Communication Technologies (ICT)** – a set of information technologies and telecommunication technologies that ensure the collection, processing, storage, distribution, display and use of information in the interests of its users. ICTs are tools for digital transformation.”



<sup>4</sup> Petrov M., Burov V., Shklyaruk M., Sharov A. The state as a platform [Text] / Petrov M., Burov V., Shklyaruk M., Sharov A. - Moscow: Center for Strategic Research, 2018 - 53 p.

<sup>5</sup> Explanatory dictionary of terms and concepts on digital transformation. [Electronic resource] // – (date of access: 17/07/2023).

Specialists of Giprosvyaz OJSC, the leading research and design and survey organization in the system of the Ministry of Communications and Informatization of the Republic of Belarus, give the following understanding of the terms:

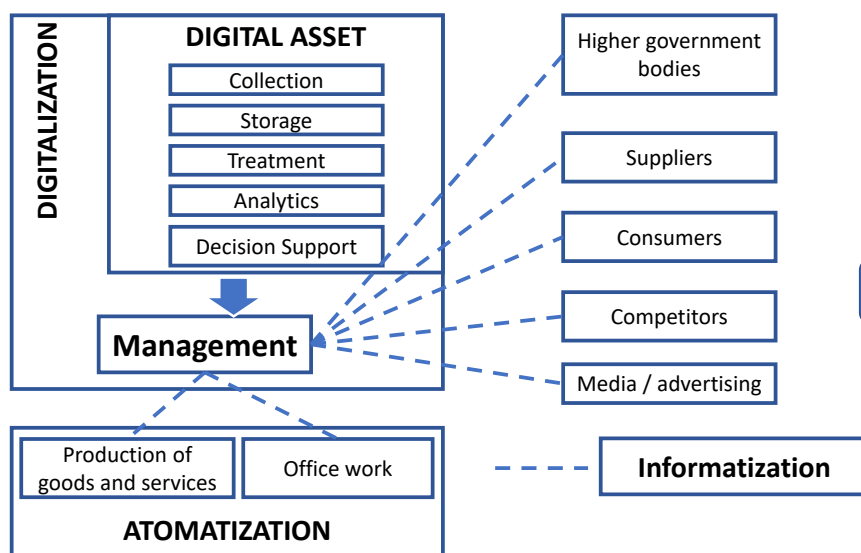
«Automation – is a direction of scientific and technological progress that uses self-regulating technical means and mathematical methods to free a person from participating in the processes of obtaining, converting, transferring and using energy, materials, products or information, or significantly reducing the degree of this participation or the complexity of the operations performed.

**Computerization** – is the process of introducing electronic computing technology, which ensures the automation of information processes and technologies in all spheres of human life to improve the quality of life of people by increasing productivity and facilitating their working conditions<sup>6</sup>».

Giprosvyaz OJSC provides a diagram of the relationship between the terms, shown in Figure 1.

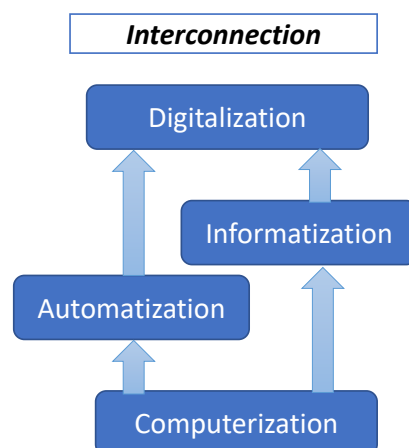
Experts in the field of digitalization indicate that digitalization will accelerate economic processes. However, digitalization accelerates management

#### *The place of digitalization in a single enterprise*



#### *Level of the digitalization:*

- 0 - no digitalization;
- 1 - automatic digital data collection is carried out in real time;
- 2 - dynamic data analytics is automatically performed and a digital asset is created;
- 3 - an intelligent decision support system was introduced;
- 4 - an ecosystem of automatic control has been created, the role of managers is to determine goals, restrictions, performance criteria, development directions and areas of activity.



<sup>6</sup> Potetenko S.V. Assessment of the level of digitalization of enterprises (organizations) and industries. / Potetenko S.V. [Electronic resource] // ITU: [website]. — (date of access: 17.07.2023)

processes in the social sphere and ecology and also changes the behavior of a person and society.

Thus, in the work of Avdeeva I.L.<sup>7</sup> it is stated that “the goal of the digital transformation of public administration has been identified, which is based on the principles of customer focus, omnichannel (a marketing term meaning the mutual integration of disparate communication channels into a single system to ensure continuous communication with the client)<sup>8</sup>, maximizing the usefulness of government activities for citizens. The growth of interaction between consumers and service providers based on digital technologies (crowd-sourcing, digital data improvement, etc.) leads to the fact that society is increasingly involved in the

development of public policy and decision-making on socially significant problems. Digital transformation and the development of the concept of «State-as-Platform» contribute to the emergence of new forms of citizenship (virtual, digital citizenship). By identifying himself on the state platform with the help of his «digital twin», a person gets the opportunity to use digital services. The transfer of interaction processes between companies and citizens into a digital environment helps to increase their transparency.

Table 1 given in the work of Giprosvyaz specialists<sup>9</sup>, presents the digital component of the quality of life of the population.

Table 1 – Digital component of the quality of life of the population

Signs	Objective (logistical) component	Subjective component
Primary digitalization	<ul style="list-style-type: none"> <li>- access of the population to the Internet and mobile devices;</li> <li>- equipment with computers, mobile devices and other gadgets;</li> </ul>	<ul style="list-style-type: none"> <li>- activity (intensity) of ICT use;</li> <li>- the nature of the circulation on the Internet;</li> <li>- social digital practices;</li> <li>- motivation;</li> <li>- digital competencies;</li> </ul>
Secondary digitalization	<ul style="list-style-type: none"> <li>- availability (accessibility) of software products, digital services and platforms</li> </ul>	<ul style="list-style-type: none"> <li>- skills in using software products, digital services and platforms;</li> </ul>
The social digital effect, digital transformations	<ul style="list-style-type: none"> <li>- providing access to digital infrastructure, digital platforms, allowing the use of digital goods and services.</li> </ul>	<ul style="list-style-type: none"> <li>- economic and social comfort (satisfaction) through the use of digital technologies.</li> </ul>



<sup>7</sup> Avdeeva, I. L. The use of platform technologies in modern public administration [Text] / I. L. Avdeeva // Bulletin of the Expert Council. - 2019. - No. 1. - P. 16

<sup>8</sup> [Omnichannel](#) / [Electronic resource] // Wikipedia: [website]. — (Accessed: 17.07.2023)

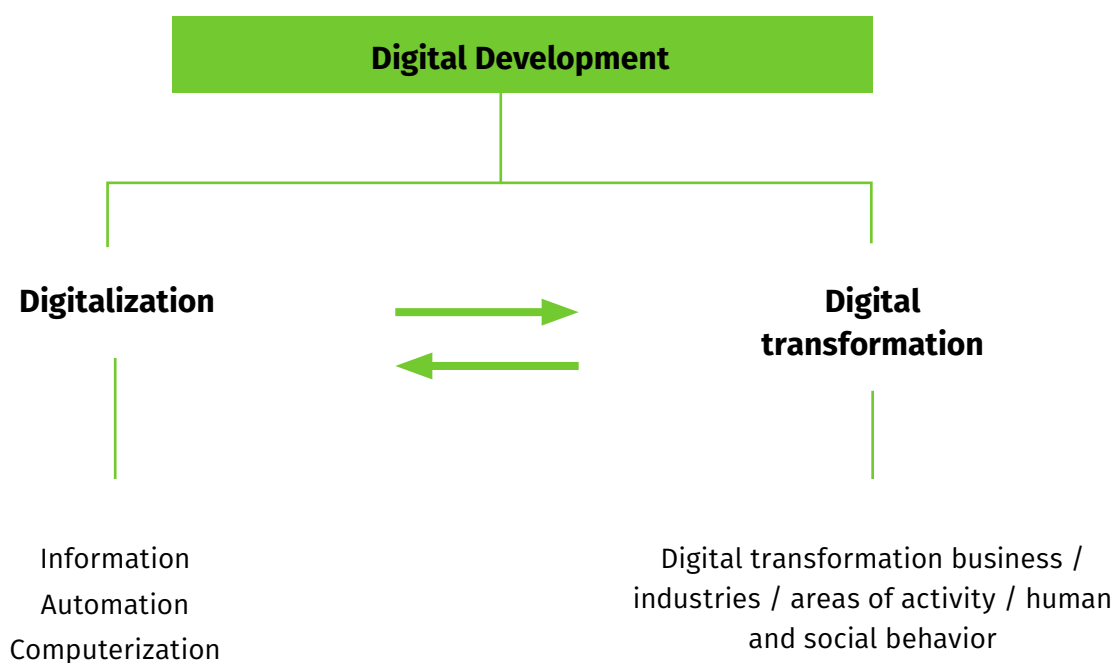
<sup>9</sup> Digital transformation at the city level: methodological materials [Text] /. - Minsk: Giprosvyaz, 2021 - 81 p.

This confirms the exceptional importance of digitalization as a platform for accelerating the achievement of the SDGs, which is reflected in the effects on the economy, social sphere and ecology.

**In the review, digital development is understood as digitalization, which creates conditions for technical equipment and the development of skills in the use of ICT, due to which digital transformations occur in various spheres of life.**

In turn, digital transformations stimulate the development of digitalization at a new level, which can be characterized as a closed cyclic process of digital development.

The relationship of terms in the field of digital development is shown in Figure 2.



*Figure 2 – Relationship of terms in the field of digital development*

# 3. PURPOSE AND METHODOLOGY OF THE REVIEW

---

## 3.1 Purpose of the review

The purpose of preparing the review is to conduct a public expert analysis and assessment of the state and conditions for the development of digitalization at the local level to accelerate the localization of the SDGs and increase the sustainability of development at the local level in Belarus.

Based on the assessment, conclusions will be proposed to enhance digital development at the local level. These findings are intended to be widely used, both in the planning of development processes at the national and local levels, and for the design of programs and projects. The review can serve as a basis for the subsequent development of the concept of an integrated project to support digital development at the local level.

For the review, the local level refers to areas of Belarus with no more than 80,000 inhabitants and which are the most typical for Belarus. The number of such districts in Belarus is 106 out of 118 or 89.83% of the total number of districts. They are

home to 5.56 million people or 60.31% of the total population of Belarus (calculations are based on data from the National Statistical Committee of the Republic of Belarus<sup>10</sup>).

The review studies also cover more densely populated areas where live more than 80,000 people. This allows you to look at the process of digital development from their perspective and compare it with less populated areas. Agglomerations introduce innovations to a greater scope, which are usually transmitted to rural areas.

For this overview, areas with less than 80,000 inhabitants will be referred to as «*rural*» and areas with more than 80,000 inhabitants will be referred to as «*urbanized*».

Digital development at the local level is viewed from two perspectives. First, from the perspective of the beneficiaries, their understanding of the status and development of digitalization and

---

<sup>10</sup> Population as of January 1, 2023 and the average annual population for 2022 in the Republic of Belarus by regions, districts, cities, urban-type settlements: statistical bulletin. [Text] /. - Minsk: National Statistical Committee of the Republic of Belarus, 2023 - 30 p.

its contribution to enhancing the sustainability of local development, as well as taking into account the needs and potential of beneficiaries to take advantage of the opportunities that digitalization provides. Beneficiaries are residents, organizations, enterprises and authorities of a certain territory.

Secondly, from the point of view of an expert analysis of the framework conditions created for the development of digitalization both in the country as a whole and at the local level. The expert evaluation was carried out on the basis of the analysis of public documents, seminars and meetings and other available data.

## 3.2 Review methodology

The development of the review was based on the following methodological approaches:

### 1. The review identified six levels to explore the depth of digital development and digital transformation at the local level (Figure 3):

**Level 1.** Institutional (legislative framework).

**Level 2.** Availability and accessibility at the local level of infrastructure and equipment for the use of ICT (hardware).

**Level 3.** Range, existence and local availability of ICTs (software).

**Level 4.** Availability, accessibility and effectiveness of educational infrastructure for training target groups in the use of ICT.

**Level 5.** Changing the behavior of target groups at the local level as a result of the use of ICT or digital transformation at the level of a person or individual target group.

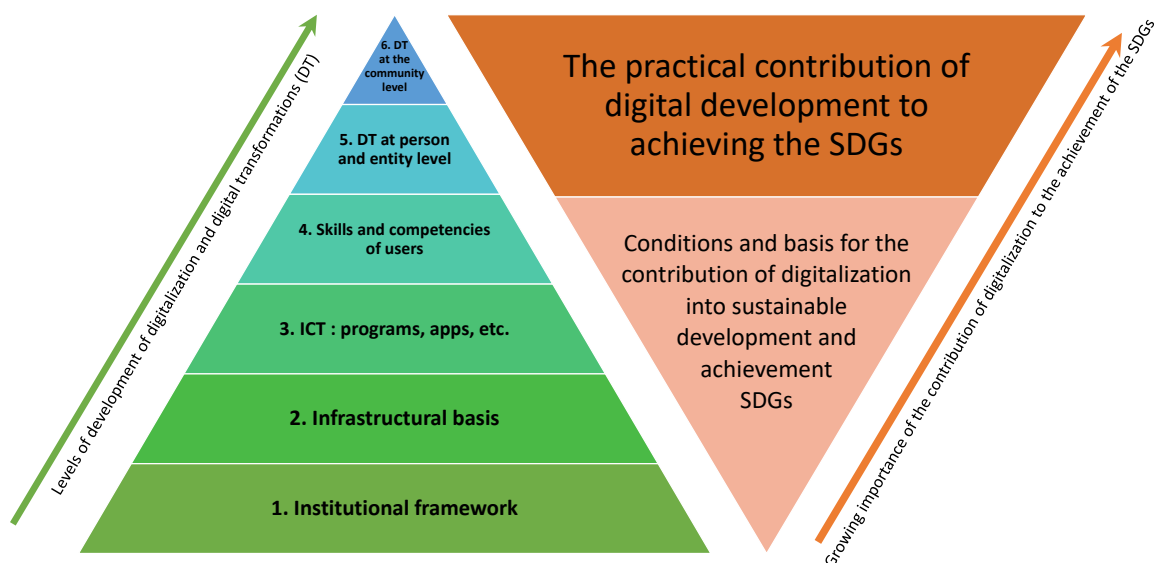


Figure 3 – The contribution of digitalization development to strengthening the significance of the contribution of the local community to the achievement of the SDGs (author's development)

**Level 6.** Changing the processes of development of society as a result of the widespread introduction of ICT (digital transformations at the community level).

The proposed system of levels is consistent with the concepts of digital development presented in Figure 2 of Section 2 “Key terminology of the review”.

The depth of localization of *digitalization* at levels 1-4 reflects the development of conditions and the presence of requirements for the onset of digital transformations that enhance and / or accelerate the contribution of local development to the achievement of global SDGs and local development goals.

But digital transformations at the 5th and 6th levels of digital development localization directly contribute to the achievement of the global SDGs and local development goals.

## 2. The assessment of the contribution of digitalization at the local level to the SDG targets related to the platform for accelerating digital transformation and social innovation was based on the recommendations of the MAPS mission (Figure 4).

During the process of preparing the review, a study was undertaken on the impact of digitalization on several areas of life that contribute to the achievement of the SDGs identified by the MAPS mission. These include SME development, employment growth, adult education, housing and

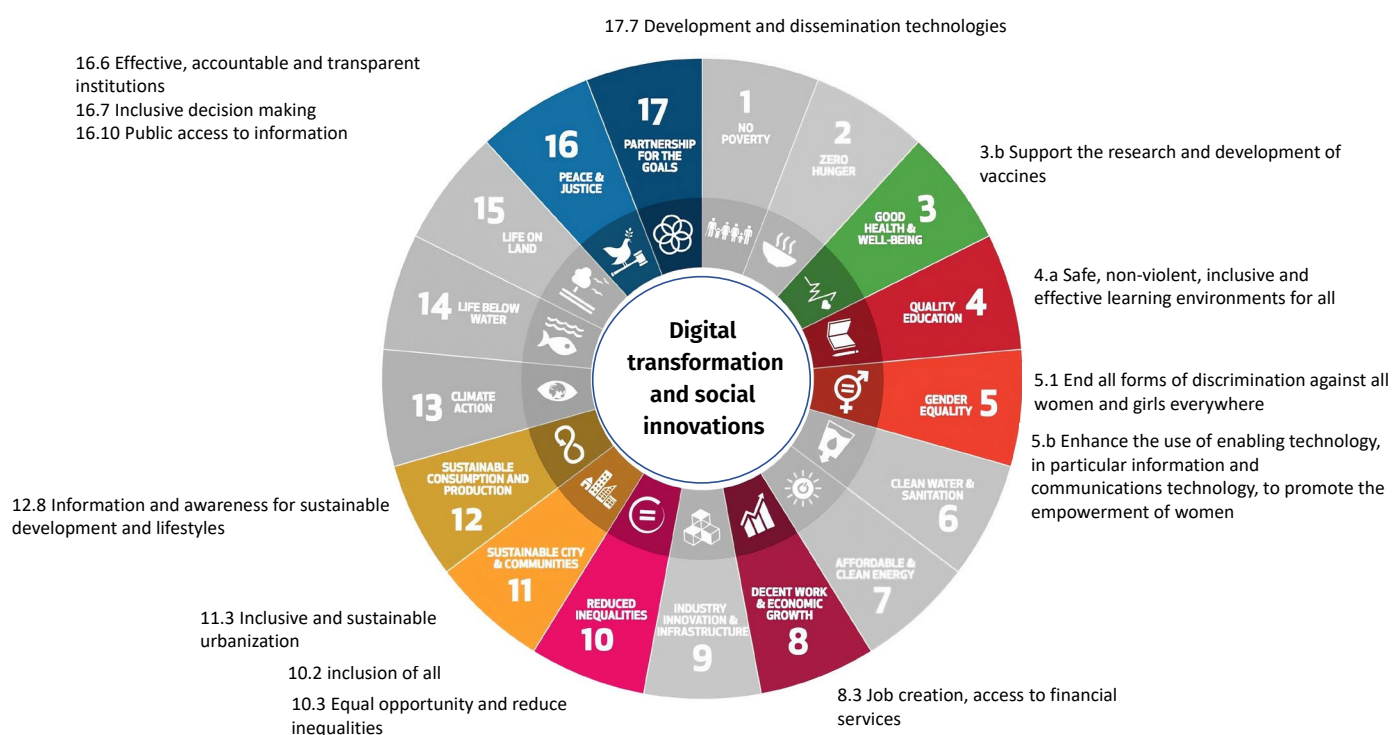


Figure 4 – SDG targets related to the Digital Transformation and Social Innovation Acceleration Platform

Table 2. Areas of life, the impact of digitalization on which was studied as part of the review

Sphere of life activity	Direction of activity	Link to the SDGs
Economy	Development of small and medium business	SDG 9, target 9.5 “Strengthen scientific research, build the technological capacity of industrial sectors in all countries, especially developing countries, including the stimulation of innovations by 2030 and the significant increase of the number of R&D workers per 1 million people, and public and private spending on R&D”.
Social sphere	Employment	SDG 8, target 8.5 “By 2030, achieve full and productive employment and decent work for all women and men, including young people and people with disabilities, and provide equal remuneration for work of equivalent value” and target 8.6 “By 2020, substantially reduce the percentage of youth who does not work, study or acquire professional skills.”
	Adult education	SDG 4, target 4 “Build and improve institutions and take into account interests of children, as well as special needs related to disability and gender aspects, and ensure safe, free of crimes and social barriers and the effective learning environment for all.
	Involved Participation	SDGs 5, 10, 16, 17
Ecology / housing and communal services	Utility management	SDG 11, target 11.3 “By 2030, scale up inclusive and environmentally sustainable urbanization and expand opportunities for participatory, integrated and sustainable planning of settlements, where the management will be based on the broad participation in all countries” SDG 12, target 12.8 “By 2030, ensure that people around the world have relevant information and knowledge about sustainable development and lifestyles in harmony with nature”

communal services and involved participation in local development (Table 2). The contribution of digital development to the environmental aspects of life was additionally highlighted, which was not done by the MAPS mission

Broader coverage of the impact of digital development on the achievement of the SDGs was not possible due to limited time, resources and organizational complexities in general.

**3. Digital transformations in the Review are considered in direct connection with social innovations. The combination of digital innovations with social innovations makes it possible to ensure openness, transparency and efficiency, introduce new technologies, achieve local development goals more effectively, ensure the inclusion of all target groups of the population and leave no one behind.**



**4. The review focuses on identifying the impact of the gender aspect on the localization of digitalization and vice versa, identifying the impact of the localization of digitalization on achieving gender equality. The proportion of women who participated in the preparation of the review was 68.24%, and men – 31.76% out of the 300 people who took part in the preparation of the review.**

**5. When preparing the review, the opinions of experts and residents of various regions of Belarus were taken into account.**

**6. In the review, the study of the development of digitalization at the local level is based on officially published data, as well as on the opinion of the beneficiaries.**

Official data include statistical data published on the website of the National Statistical Committee of the Republic of Belarus, on the website of the Ministry of Communications and Informatization of the Republic of Belarus and in other publications.

The beneficiaries were invited to develop a survey to assess the depth of digital development at the

local level. Two target groups of beneficiaries were identified:

- The first group – ordinary residents, conducted a generalized analysis of digital development by filling out a short online form on their own.
- The second group – local specialists from various spheres of life with developed competencies and an understanding of sustainable development. They conducted a more in-depth analysis of digital development in an expanded form, together with review experts.

The analysis results were processed by the authors of the review.

**7. With this in mind, the development of the review was focused and based on a limited amount of data, the proposals and recommendations given in the review should be taken as information about the opportunities that are important to use to strengthen digital development at the local level for the localization of the SDGs and local development. Review proposals deserve deeper study and implementation if it is confirmed.**

### 3.3 Task Force contributed to the Review

A total of 296 people took part in the preparation of the review, of which:

- 194 residents conducted a generalized analysis of digital development in a short form;
- 102 local experts analyzed digital development at the local level in depth together with the review experts.

**Characteristics of the target groups that took part in the preparation of the review:**

- more than half of the beneficiaries who participated in the preparation of the survey live in rural areas of Belarus (Table 3).
- The biggest number of beneficiaries who participated in the preparation of the review

have higher or incomplete higher education (Table 4). The percentage of such beneficiaries in the “local specialists” group reaches 86.3% of the total.

- The percentage of rural beneficiaries with secondary and secondary vocational education who participated in the preparation of the

survey was 30.6%, which is more than 2 times higher than the percentage of beneficiaries in urban areas.

- More representatives working in the social sphere took part in the preparation of the review (Table 5). The percentage of participation of representatives of business or enterprises

*Table 3. Percentage of beneficiaries who participated in the preparation of the review, depending on the place of residence, % of the total number of those who participated*

Index	Local Specialists	Population
Residents of rural areas with a population of up to 80,000 people, %	52.0	69.4
Residents of urban areas with a population of over 80,000 people, %	48.0	30.6

*Table 4. Percentage of beneficiaries who participated in the preparation of the survey, by level of education, % of the total number of those who participated*

Index	Extended (expert) form	short form
Secondary or secondary special education, %	13,7	30,6
Incomplete higher or higher education, %	86,3	69,4

*Table 5. Percentage of beneficiaries who participated in the preparation of the review, depending on their area of employment, % of the total number of those who participated*

Index	Local Specialists	Population
Social sphere, %	49.0	44.0
Entrepreneurship and enterprises (commercial structures), %	24.5	25.9
other areas of employment, %	26.5	30.1

was at the level of 25%. Pensioners, students, researchers and others considered themselves to be another, significant group.

- According to the age category, residents in the following age groups equally participated in

both groups: from 18 to 30 years old, from 31 to 45 years old and from 46 to 65 years old – from 30.4 to 36.3% in each group of the total number who took part (Table 6).

*Table 6. Age distribution of beneficiaries who took part in the preparation of the review, % of the total number of those who took part*

Age category of beneficiaries	Local Specialists	Population
from 18 to 30 years old	36.3	35.8
from 31 to 45 years	27.5	30.1
from 46 to 65 years	30.4	31.1
over 65 years old	5.8	3.0

# 4. DIGITAL DEVELOPMENT AND LOCALIZATION SDGS

---

## 4.1 The main challenges and trends of local development in the context of the localization of the SDGs and their relationship with the development of digitalization

A feature of this review is the application of an integrated approach to identifying challenges and trends in local development in the context of the localization of the SDGs and the impact of digitalization on achieving sustainable development.

Currently, the key problems of local development in Belarus, slowing down the transition to sustainable development, should be considered:

- **a steady decline in the population of rural areas caused by negative natural growth and mechanical outflow (SDG 3; 5; 10; 11)<sup>11</sup>**, which leads to a demographic problem and the ensuing consequences, such as:

- ▶ aging of the population, which is happening due to the increase in life expectancy of the population and the outflow of young people, as well as the active working population to cities;
- ▶ the decline of the human potential of the districts, as competent qualified personnel, will find more opportunities to embody their potential in cities;
- ▶ increasing the burden on local budgets to ensure the social protection of the population.



---

<sup>11</sup> [Population. Yearly data.](#) / [Electronic resource] // National Statistical Committee of the Republic of Belarus: [website]. — (date of access: 17/07/2023)

■ **increase in inter-district differentiation in the main parameters of socio-economic development due to weak diversification of the local economy (SDG 1; 8; 9; 10)<sup>12</sup>:**

- ▶ the basis of the economy of most weakened rural areas is agriculture; economically stronger areas are predominantly agro-industrial, which allows them to be more sustainable
- ▶ private business is not developed, the conditions for the development of private business are becoming more difficult;
- ▶ tourism as a promising type of economic activity at the local level remains in the department (under the control) of the social sphere;
- ▶ the weak potential of districts to attract and develop investments.

■ **reduced access to social infrastructure facilities, reduced transport accessibility of remote areas (SDG 3; 4)<sup>13</sup>:**

- ▶ reduction of social infrastructure: kindergartens and schools due to a decrease in the number of children and schoolchildren in villages; clubs and feldsher-midwife stations, etc. due to a decrease in the number of villagers;
- ▶ an increase in the number of sparsely populated areas and an increase in the costs of

the need to maintain life in them, including transport communications;

- ▶ a high degree of subsidization of weak rural areas.

■ **growing need for modernization of the housing and communal system (SDG 6; 7; 11; 12; 13)<sup>14,15</sup>:**

- ▶ high current wear and tear, as well as the need to consistently plan the replacement of life support systems and maintain their performance;
- ▶ limited residential sector resources for equipment upgrades;
- ▶ the high impact of the housing and communal services system on the environment in terms of greenhouse gas emissions and impact on climate change;
- ▶ the need to ensure the quality of water supply (high iron content);
- ▶ the need to switch to local fuels (wood, straw, etc.), which requires the replacement of equipment;
- ▶ increasing volumes of work on the improvement of settlements, especially in distant rural ones.

■ **an increase in the number of adverse weather events (drought) affecting both agriculture**



<sup>12</sup> Sidorenko V.P., Zaprudsky I.I. Regional differentiation of the level of industrial development in the Republic of Belarus // Zhurn. Belarusian. state university Geography. Geology. 2017. No. 2. S. 63–72.

<sup>13</sup> Likhachev, N. E. Problems of infrastructure development of the Belarusian village. [Text] / N. E. Likhachev // Bulletin of Moscow State University. A.A. Kuleshova. - 2007. - No. 4 (28). - 8 s.

<sup>14</sup> Nazarova D. V. THE SOCIAL COMPONENT OF THE HOUSING AND UTILITY SERVICE SYSTEM: PROBLEMS OF REFORMING THE INDUSTRY

<sup>15</sup> Public review of the implementation of Sustainable Development Goal 13 “Take urgent measures to combat climate change and its consequences” in the Republic of Belarus. - Minsk: 2022

**and forestry and public health (SDG 3; 13; 14; 15)<sup>16</sup>**, which results in the following:

- ▶ increasing production risks and the need to adapt agriculture and forestry;
- ▶ the need to implement measures to combat climate change;
- ▶ the emergence of invasive alien plant and animal species that pose a threat to biological diversity, the economy and human health;
- ▶ increased risk of cardiovascular and other diseases.

■ **decrease in the business activity of the population due to the administrative management system based on the “top-down” principle (SDG 5; 10; 11)<sup>17</sup>**, which results in the following:

- ▶ growth of dependency;
- ▶ persistence of gender imbalance;
- ▶ reducing the involvement of the population in solving local problems;
- ▶ redirecting the solution to any kind of problem, even petty ones, to local authorities;

- ▶ strengthening the need for budgetary resources to solve the problems of both local development and individual problems of a person and family.

■ **recurrent outbreaks in domestic animals (African swine fever) (SDG 1; 2; 3)<sup>18</sup>**.

■ **contamination of drinking water with iron, nitrates and soil degradation (SDG 6; 13; 15)<sup>19</sup>**.

■ **impact of the COVID-19 pandemic (SDG 3; 8; 11)<sup>20</sup>**, which negatively affected:

- ▶ traditional live communication and led to the online format transition;
  - ▶ economic development of traditional industries, including a sharp «fall» in the tourism industry.
- **geopolitical conflicts and sanctions directly affect local development (SDG 11; 16; 17)** due to the fact that:
- ▶ markets for products and services are shrinking;
  - ▶ narrowing opportunities to attract investment and technology;



<sup>16</sup> Where did such an unprecedented drought come from in Belarus and will it become natural? / [Electronic resource] // BT: [website]. – (Date of access: 17/07/2023)



<sup>17</sup> Kuzmenko T.V. Entrepreneurial potential of the population of Belarus: features of the sociological dimension / [Electronic resource] – (Date of access: 17/07/2023)



<sup>18</sup> V. S. Prudnikov, I. N. Gromov, A. V. Prudnikov, and M. V. Kazyuchits Epizootic features, pathomorphology and diagnosis of African swine fever in the Republic of Belarus. / [Electronic resource] – (Date of access: 17/07/2023)



<sup>19</sup> State of the natural environment of Belarus: ecological bulletin / E.I. Gromadskaya, S.A. Dubenok, S.V. Sushko, R.V. Mikhalevich, A.Yu. Kulakov, O.N. M.V.Vodeiko, E.A. Botyan, I.A. Polyanskaya; Under the general editorship of Ph.D., S.A. Dubenok - Minsk: RUE «TsNIIKIVR», 2021. - 150 p.

<sup>20</sup> Impact of the COVID-19 pandemic on social and economic processes in Belarus: sociological research / [Electronic resource] // SATIO: [website]. – (Date of access: 17/07/2023)

- participation in international communities and network associations is limited.

Overcoming the above challenges can be facilitated by maximizing the localization of digital development at the local level, promoting the introduction of digital transformations in the management of development processes both in the economy and in the management of local development. Digital development will expand the awareness of all development participants, strengthen and accelerate educational, communication and operational processes that will have a beneficial effect on all spheres of life. The development of ICT can help to increase supply chains and added value, develop cooperation and clustering, and differentiate business partners. Thanks to digital, the involvement in the development of all groups of the local population will potentially increase, the mobilization of internal resources will increase and the investment attractiveness of the region for external resources will boost, which will ultimately ensure an increase in the sustainability of local development and contribute to the localization of the SDGs.

Among the trends that in turn can enhance digital development at the local level, experts, based on their assessments (no official statistics), highlight the following:

1. More than 40 regions of Belarus, almost 30% of the total number of regions in Belarus, have become involved in the development of local (district) sustainable development strategies on their initiative and with the support of regional authorities. This indicates the growth of the potential of the districts in determining the prospects for their development with a real assessment of their potential and their capabilities based on the local community.
2. Initiative groups and organizations in almost ¾ of the regions of Belarus have been involved and continue to implement projects funded by foreign gratuitous and international technical assistance. This indicates both the presence of local human potential capable of determining the priorities of their development and attracting resources for this and their ability to develop pilot (innovative) projects of practical importance for local development, as well as the ability to effectively use the attracted resources.
3. In many regions of Belarus, there is an experience of partnerships between local non-profit organizations and local authorities, which has improved the identification and resolution of local problems in all spheres of life. In several areas, long-term public-private partnerships have attracted significant resources for local development.

Thus, local development is faced with a large number of global and local challenges, the solution of which requires an integrated approach, the support of all levels of government from local to national and the mandatory involvement of the entire community to find and implement innovative solutions. Digital development is one of the innovative tools that can facilitate and increase the effectiveness of local development with the participation of all parties in its management. But digital development also requires openness and readiness to improve development management systems at all levels.

## 4.2 The complexity and consistency of the digitalization approach and its significance as an accelerator for achieving the SDGs

The exponential diffusion and scaling of digital technologies and services has big global importance, as it provides opportunities for sustainable development and inclusive growth but also creates new threats and challenges.

On the one hand, such technologies as the Internet, artificial intelligence, big data and cloud computing can help to bridge the gap between developed and developing countries and solve global problems: poverty, hunger, climate change, etc.

On the other hand, having material (devices and infrastructure) and virtual (data exchange, etc.) dimensions, digitalization carries sources of threats that are traditionally associated with extreme consumption of resources for the production of devices, CO<sub>2</sub> emissions into the atmosphere during electricity generation, changes in flora and fauna during the construction and operation of infrastructure, the growing volume of electronic waste, etc.

**Under these conditions, one of the most important issues that international, national, regional and local actors in the field of business, science, public administration, etc. are addressing is how digital technologies can fundamentally help in the implementation of the SDGs.**

One of the latest attempts to solve this problem was made by the High-Level Panel on Digital Cooperation (High-Level Panel on Digital Cooperation), formed at the initiative of the UN. In his report «The Age of Digital Interdependence»<sup>21</sup>. The group presented a set of recommendations to help governments, companies and individuals make policy decisions about sustainable development and the digital future. The achievement of the SDGs is also driven by the Technology Facilitation Mechanism (TFM). This mechanism supports the implementation of the SDGs through the exchange of information, best practices and policy experiences among many stakeholders, namely governments, academia and research communities, the private sector, civil society and other stakeholders in the field of science, technology and innovation.

The 2030 Agenda highlights the importance of ICT in developing countries as a powerful driver of growth. Reference to ICT can be found explicitly as a target under SDG 9 “Build resilient infrastructure, promote inclusive and sustainable industrialization and stimulate innovation”, while ICT is also mentioned in targets related to climate change (SDG 13, 14 and 15), gender equality and women’s empowerment (SDG5), private sector development (SDG 8), education (SDG 4) and health (SDG 3)<sup>22</sup>.

ICTs can help accelerate progress toward each of the 17 UN Sustainable Development Goals (Figure 5).











<sup>21</sup> [Connecting the Digital Landscape](#) / [Electronic resource] // DIGITAL COOPERATION: [site]. - (date circulation: 17.07.2023)





<sup>22</sup> [Results and Indicators for Development](#). / [Electronic resource] // Capacity4dev: [site]. - (date circulation: 17.07.2023)



Figure 5 – The contribution of digitalization to the achievement of the SDGs

	<p><b>SDG 1: No poverty.</b> More than 2 billion people in the world don't have bank accounts, while access to digital financial services has been proven to help lift people out of poverty. The Financial Inclusion Global Initiative (FIGI), begun in 2017 by ITU, the World Bank and the Committee on Payments and Market Infrastructures (CPMI), with support from the Bill &amp; Melinda Gates Foundation, expands digital financial inclusion in developing countries.</p>
	<p><b>SDG 2: Zero hunger.</b> By making agricultural practices more data-driven and efficient, ICT-enabled solutions can help farmers increase crop yields while reducing their use of energy. The UN Food and Agriculture Organization (FAO) has worked closely with ITU since 2017 to bolster ICT innovation in agriculture.</p>
	<p><b>SDG 3: Good health and well-being.</b> Direct patient interaction, health informatics and telemedicine can be improved through better connectivity. The «Digital Health for Africa» partnership launched by ITU and the World Health Organization in 2017, has delivered digital health leadership capacity development for more than 15 countries in Africa. Be Healthy, Be Mobile, another ITU-WHO collaboration is carrying out projects in several countries on mHealth, in addition to maintaining the mHealth Knowledge and Innovation Hub in Europe (mhealth-hub.org). Current and forthcoming ITU standards for multimedia systems, developed in collaboration with other organizations, will support the widespread deployment of digital health applications, including telemedicine and remote medical imaging.</p>
	<p><b>SDG 4: Quality education.</b> ITU and the International Labour Organization (ILO) are leading the Digital Skills for Decent Jobs Campaign, which aims to equip 5 million young men and women with job-ready digital skills by 2030 in support of the first-ever, comprehensive UN system-wide effort for the promotion of youth employment worldwide. The Giga Initiative led founded by ITU and UNICEF monitors and promotes connectivity in schools.</p>
	<p><b>SDG 5: Gender equality.</b> According to ITU statistics, 250 million fewer women were online than men in 2017. Globally, 62% of men use the Internet compared with 57% of women. Although the digital gender divide has been narrowing in all world regions and virtually eliminated in the developed world, wide gaps persist in LDCs (where 31% of men are online, compared to just 19% of women) and in Landlocked Developing Countries (where 38% of men compared to 27% of women). To close the digital gender gap, ITU members organize the annual International Girls in ICT Day to encourage more women and girls to pursue science, technology, engineering, and mathematics (STEM) careers. Gender equality initiatives where ITU is directly engaged include EQUALS, a ground-breaking global network to build an evidence base and improve women's access to technology, build relevant digital and other skills, and promote female leadership in the tech sector.</p>
	<p><b>SDG 6: Clean water and sanitation.</b> New and emerging digital technologies facilitate smart water and sanitation management. The ITU Focus Group on Smart Sustainable Cities follows key trends in urban smart water management, including ICTs for wastewater management.</p>
	<p><b>SDG 7: Affordable and clean energy.</b> Rising tech use contributes to emissions of carbon dioxide and other greenhouse gases. But the industry is exploring ways to use greener energy, make devices more energy efficient, and incorporate solar, wind and other renewable sources into the value chain. At the same time, cutting-edge tech will be essential to cut global emissions, build smart grids and cities, electrify transport, and build sustainable economies and societies. ITU has helped set more stringent energy efficiency and emission control standards for ICTs and has outlined how smart grids can help to build more controllable and efficient energy systems and reduce carbon emissions.</p>
	<p><b>SDG 8: Decent work and economic growth.</b> Technology creates new jobs, enables resilient work and commerce, and stimulates wider social and economic development. ITU's Digital Innovation Framework helps countries, cities and other communities and systems accelerate their digital transformation, stimulate ICT-centric innovative entrepreneurship, and foster vibrant small and medium enterprises (SMEs).</p>

	<p><b>SDG 9: Improved Infrastructure.</b> Much of ITU's work directly aims to improve the extent and quality of ICT infrastructure of radiocommunication and backbone networks and to extend networks into underserved remote and rural areas. ITU's standards are improving the energy efficiency and performance of ICT networks, in backhaul, wireline and radiocommunication networks.</p>
	<p><b>SDG 10: Reduced inequalities.</b> ITU works to reduce inequality within and between countries, communities, and populations by extending access to technologies and knowledge to disadvantaged segments of society.</p>
	<p><b>SDG 11: Sustainable cities and communities.</b> «United for Smart Sustainable Cities» (U4SSC), begun by ITU and the United Nations Economic Commission for Europe (UNECE) in 2016, helps cities take key steps to become smart and sustainable. Fifty cities from a number of countries worldwide have now joined this project.</p>
	<p><b>SDG 12: Responsible consumption and production.</b> E-Waste, including waste created by ICTs, is increasing all over the world. ITU has launched a coalition to produce the Global E-waste Monitor and strengthen collaboration to address the global challenge of waste from electrical and electronic equipment. ITU is also developing global strategies, standards and policies that offer guidelines for the sustainable management of e-waste.</p>
	<p><b>SDG 13: Climate change action.</b> Digital tools allow increasingly sophisticated climate modeling. ITU facilitates international cooperation on policies and standards to help reduce energy consumption for ICT products and services. Key ITU standards promote green data centers and green power feeding systems. ITU is carrying out a joint project to model cities using digital twin modeling.</p>
	<p><b>SDG 14: Life below water.</b> ICTs are being extensively used to monitor the changing marine environment (e.g. the movement of ice flows and glacial movements). Buoys can be equipped with remote monitoring to monitor changing conditions at sea (e.g. salinity levels of water via buoys). Sensor networks and RFID chips can be used to protect endangered animals (e.g. whales and dolphins) to learn about their migratory patterns and needs.</p>
	<p><b>SDG 15: Life on Land.</b> ICTs can be used to identify, monitor, photograph and track wildlife populations. Sensor networks and RFID chips can be used to protect endangered animals (e.g. lions, elephants and tigers) to learn more about their migratory patterns and needs for protection.</p>
	<p><b>SDG 16: Peace, justice and strong institutions.</b> E-government services are helping improve the relationship between citizens and the state and improving the efficiency of the delivery of government services. ITU helps to drive citizen empowerment through its work on smart sustainable cities and key performance indicators (KPIs) that measure social inclusion, such as voter participation or the number of government services delivered through electronic means.</p>
	<p><b>SDG 17: The power of partnerships.</b> Public-private partnerships are key to bringing ICTs to all nations, peoples, and communities. Partnerships are particularly needed to build the physical infrastructure required to deliver Internet services in hard-to-reach areas and to currently disadvantaged populations, as well as to facilitate the investment, inclusion and innovation required for SDG fulfillment across the board.</p>

The COVID-19 pandemic has expanded connectivity as more people have moved online to continue working, studying and staying connected with friends and family during self-isolation. However, the challenges of the pandemic and the slowdown in economic growth created additional challenges for achieving the SDGs. The international community is learning from the global challenge of the pandemic. Increasing internet connectivity and the use of ICTs can be an important part of a more effective recovery.

Digital tools for the creation, use and transfer of initial electronic data for organizational activities used to achieve the SDGs can be defined as technologies that facilitate the transition to digital sustainability. **Digital sustainability** is clarified as an effort to develop and implement smart technologies to ensure sustainable economic growth while taking into account and integrating the SDGs<sup>23</sup>. Modern digital innovations such as artificial intelligence and machine learning methods

are showing exponential value growth and are estimated to add about 14% to the global economy by 2030. Figure 6 demonstrates the opportunities for accelerating the achievement of the SDGs in various sectors through digitalization.

In Belarus, the acceleration platform “Digital Transformations and Social Innovations”, based on an integrated approach to digitalization, helps the state, society and business to mutually benefit from modern issues. At the same time, the emphasis is usually on the development of the economy and the realization of the potential of Industry 4.0, which provides for the automation of not only production processes but also logistics, sales and business processes in general. However, this acceleration platform also activates processes and expands opportunities for the development of the human and social potential of society and the solution of environmental issues.

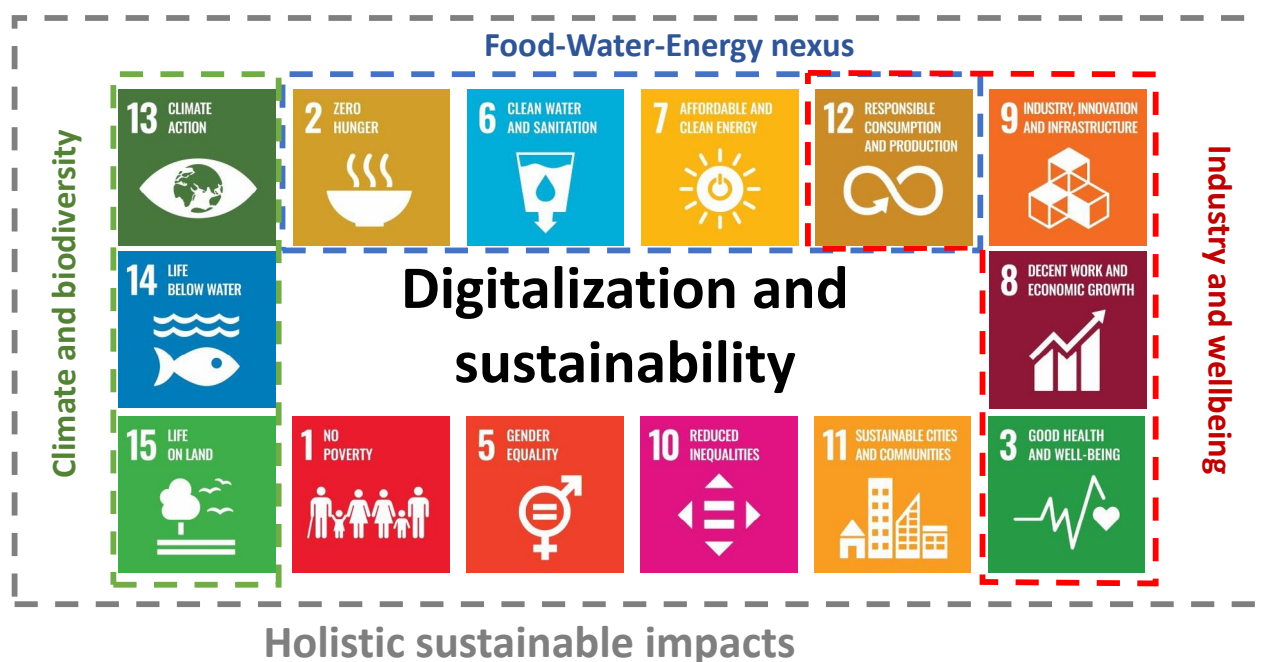


Figure 6 - Importance of intersectionality in achieving the SDGs<sup>24</sup>



<sup>23</sup> Digitalization to achieve sustainable development goals: Steps towards a Smart Green Planet: review. / [Electronic resource] // ScienceDirect: [website]. - (date circulation: 17.07.2023)

<sup>24</sup> Ibid

## 4.3 The main global trends in digital development at the local level

One of the most important characteristics of the 2030 Agenda is its universality. The Global Goals aim to be relevant to all levels of the community, from global to local. The localization of global goals and sustainable development efforts have played an important role in promoting sustainable development around the world. The 2030 Agenda introduces the concept of data-driven governance and emphasizes the goal of “significantly increasing the availability of high-quality, timely, reliable and disaggregated data by 2030”. Digital transformation is defined as “a profound transformation of business and organizational activities, processes, competencies and models to fully exploit the changes and opportunities for combining digital technologies and their accelerating impact on society in a strategic and priority way, taking into account the present and future” (i-SCOOP.eu, 2016).

With the development of technology and the expansion of access to information, there is an increasing need to use digital technologies to solve the problems of sustainable development. Below are the main trends in the development of the digital space in connection with the achievement of the SDGs at the local level in the world, summarized from UNDP<sup>25</sup> and European Union sources<sup>26</sup>:

**1. Development of digital infrastructure.** Higher-speed internet connections available in public places and the cloud, which allows data storage and software to be accessed from anywhere in the world, are making digital technologies more accessible to everyone.

**2. Development of digital technologies for sustainable development.** Digital technologies such as the Internet of Things, e-payments, distance learning and mobile applications can help to significantly improve the availability and efficiency of resources, as well as connect different populations.

**3. New digital business models.** With the development of the digital economy, new business models are emerging that can allow enterprises to scale their operations while controlling and preventing the increase in the ecological footprint. For example, digital markets can help improve the efficiency of transport and distribution of goods, but at the same time, for instance, it is easier to control and manage the waste that can be generated by packaging, which in general will be aimed at reducing environmental impact.

**4. New digital programs and projects.** Testing and adaptation of digital innovations in various spheres of life is the main goal of these programs. Given the prospects for development and the benefits that digital technologies and products created with their help today provide, large-scale projects are being implemented in many countries, for example, Industry 4.0 in Germany, Society 5.0 in Japan, the Internet + program in China or digital economy projects in Belarus aimed at the digitalization of business, production, agriculture, transport, public administration, medicine, education and other areas.



<sup>25</sup> United Nations Development Programme: UNDP Digital Strategy 2022-2025. [Electronic resource] Access mode - free, (date of access: 17/07/2023)

<sup>26</sup> Sustainable Digitalisation: Strengthening Europe's Digital Sovereignty. Position paper. // European DIGITAL SME Alliance. - 2020c.

There are numerous examples of successful global and local actions<sup>27</sup>, that support the implementation of the SDGs. For example, the Financial Inclusion Global Initiative (FIGI), launched in 2017 by the International Telecommunication Union (ITU), the World Bank and the Committee on Payments and Market Infrastructure with the support of the Bill and Melinda Gates Foundation, is expanding access to digital financial services in developing countries (SDG 1). Projects such as e-Rezeki and eUsahawan, launched by the Malaysian Digital Economy Corporation, help people acquire digital skills and find jobs online.

Data-driven management and improvement of agricultural practices and ICT-enabled solutions can help farmers increase profits while reducing energy consumption (SDG 2). The FAO has been working closely with ITU since 2017 to support ICT innovation in agriculture. Platforms such as «Ecub» in Mexico or the «Too Good to Go» app in Europe are being used to manage food waste as well as distribute food surpluses to those in need locally.

The Digital Health for Africa partnership, launched by ITU and the WHO in 2017, has developed digital health leadership capabilities in more than 15 African countries (SDG 3). Another collaboration between ITU and WHO, the “Be He@lthy, Be Mobile” initiative, is implementing mHealth projects in several countries and also supports the European MHealth Knowledge and Innovation Center (mhealth-hub.org). ITU’s current and future standards for multimedia systems, developed in collaboration with other organizations, will facilitate the widespread adoption of digital health applications, including telemedicine and remote medical imaging.

**ITU and the International Labor Organization (ILO) are leading the Digital Skills for Decent Jobs campaign, which aims to have 5 million young men and women digitally trained by 2030 to work in support of the first-ever comprehensive UN system-wide campaign to promote youth employment all over the world. The Giga Initiative, founded by ITU and UNICEF, tracks and promotes Internet connectivity in schools (SDG 4).**

Globally, 62% of men use the Internet compared to 57% of women, 250 million fewer, according to ITU statistics. While the digital gender divide is shrinking in all regions of the world and virtually eliminated in developed countries, large gaps remain in the least developed countries (where 31% of men use the Internet compared to 19% of women) and land-locked developing countries (38% men compared to 27% of women). To narrow the digital gender divide, ITU members organize an annual International Girls in ICT Day to encourage more women and girls to get involved in science, technology, engineering and mathematics (STEM) (SDG 5). Gender equality initiatives in which ITU is directly involved include EQUALS, a pioneering global network designed to build an evidence base and increase women’s access to technology, develop relevant digital and other skills and promote women’s leadership in the technology sector.

New digital technologies are promoting the intelligent management of water and sanitation. The ITU Focus Group on Smart Sustainable Cities monitors



<sup>27</sup> [New SDGs and digital transformation.](#) [ Electronic resource] - (Accessed: 17/07/2023)



key trends in smart water management in cities, including ICT for wastewater management (SDG 6). Advanced technologies will be needed to reduce global emissions, build smart grids and cities, electrify transport, and create sustainable economies and societies. ITU has helped set stricter energy efficiency and emission control standards for ICTs and shown how smart grids can help create more controlled and efficient energy systems and reduce carbon emissions (SDG 7).

**Technology creates new jobs, ensures sustainable work and commerce, and stimulates broader social and economic development. The ITU Digital Innovation Framework helps countries, cities and other communities. It also helps systems to accelerate their digital transformation, stimulate innovative ICT-centric entrepreneurship and foster dynamic small and medium-sized enterprises (SMEs) (SDG 8).**

Much of ITU's work is directly focused on improving the scale and quality of radio ICT infrastructure and backbone networks and extending networks to underserved remote and rural areas (SDG 9). ITU standards improve the energy efficiency and performance of ICT networks in backhaul, wireline and radio networks. ITU works to reduce inequalities within and between countries, communities and populations by expanding access to technology and knowledge for the poor (SDG 10). Launched by ITU and the United Nations Economic Commission for Europe (UNECE) in 2016, the Uniting for Smart Sustainable Cities (U4SSC) program helps cities take key steps to become smart and sustainable (SDG 11) and 50 cities from around the world have already joined this project.

Electronic waste, including waste generated by ICTs, is on the rise worldwide. ITU has formed a coalition to develop a Global e-Waste Monitor and strengthen collaboration to tackle the global prob-

lem of waste electrical and electronic equipment (SDG 12). ITU is also developing global strategies, standards and policies that offer guidance on the sustainable management of e-waste.

ITU supports international cooperation on policies and standards to help reduce energy consumption for ICT products and services (SDG 13). Key ITU standards promote green data centers and green power supply systems. ITU is implementing a collaborative project on urban modeling using digital twin modeling. ICTs are widely used to monitor the changing marine environment (e.g. the movement of ice flows and glaciers). The buoys can be equipped with remote monitoring systems to keep track of changing conditions at sea (e.g. salinity levels). ICT can be used to identify, monitor, photograph and track wildlife populations. Sensor networks and RFID chips can be used to protect endangered marine animals such as whales and dolphins and terrestrial animals such as lions, elephants and tigers to learn about their travel and migration routes and habitat conditions (SDG 14, 15).

E-government services help to improve the relationship between citizens and the state and improve the efficiency of public service delivery. ITU is helping to empower citizens through its work on smart sustainable cities and key performance indicators that measure social inclusion, such as voter participation or e-delivery of government services (SDG 16).

Public-private partnerships are the key to spreading ICTs to all countries, peoples and communities. Partnerships are especially important to build the physical infrastructure needed to deliver Internet services to hard-to-reach areas and vulnerable populations, and to promote the investment, inclusion and innovation needed to achieve the SDGs across the board (SDG 17).

In many countries of the world, programs and projects are being implemented to create "smart cities". A smart city is a concept of a city that uses digital tools and ICT to improve living standards, quality of services and management efficiency in

all relevant aspects of life. This term is often given a general meaning, but at the same time, many supporters and participants in the digitalization process understand it in their own way, especially when it comes to applied things.

ITU has developed its universal term – «smart sustainable city» (Smart Sustainable City, SSC), which is an innovative city in which ICT and other tools are used to improve the quality of life, the efficiency of the functioning of the city and the provision of urban services, as well as to strengthen competitiveness, meeting the needs of present and future generations without adversely affecting the economic, social and environmental components of the city. The ITU recommendations on the formation of smart and sustainable cities highlight several key areas for the development of a typical Smart City, sometimes even in combinations that are relatively unusual for public administration:

- human and social capital;
- urban environment, including urban planning processes, the sphere of housing and communal services, transport;
- mobility of citizens, including the transport sector, information and communication technologies and communications and tourism;
- urban economy, includes industry, the development of trade and services, finance, innovation;
- safety and ecology;
- digital government.

The digital society and digital technologies bring with them new ways to learn, spend your leisure time, work, explore and develop. They also bring new freedoms and rights and enable citizens to transcend physical communities, geographical locations and social positions.

However, there are still many digital transformation challenges that can increase inequality and undermine social cohesion. The digital divide is a consequence of rapid digitalization, which has led to the economic and social exclusion of millions of people, particularly vulnerable groups. As a phenomenon that exists at different levels, i.e. within and between countries, between rural and urban populations, between old and young and, ultimately, between men and women, the digital divide is not only about access to the Internet but also encompasses a broader range of issues such as accessibility, awareness and digital literacy (Internet and Sustainability Report, 2015).

In 2018, the annual High-Level Political Forum on SD published a Ministerial Declaration<sup>28</sup>, that highlights the need to act proactively to bridge the digital divide, especially the gender divide. The impact of the Internet, data, artificial intelligence and other transformative technologies on the SDGs was also addressed in UN General Assembly resolutions A/RES/72/242 and A/RES73/17, adopted in 2017<sup>29</sup> and 2018<sup>30</sup>, respectively, while the SDG Report in 2018 devoted an entire chapter to data as an accelerator for achieving the SDGs. The 2019 SDG Report shows the disparity between countries with Internet access, with more than 80% of the population in developed countries using the Internet, compared to 45% in developing countries and 20% in the least developing countries. This is



<sup>28</sup> [Sustainable development](#). [Electronic resource] // digwatch: GENEVA INTERNET PLATFORM: [ site ]. – (date of access: 17/07/2023)



<sup>29</sup> [Impact of rapid technological progress on the achievement of the Sustainable Development Goals](#) / Resolution adopted by the General Assembly on 22 December 2017 / UNDOC – (date of access: 17/07/2023)



<sup>30</sup> [The Impact of Rapid Technological Progress on the Achievement of the Sustainable Development Goals and Targets](#) / Resolution adopted by the General Assembly on November 26, 2018 / UNDOC

why mitigating and minimizing the adverse impacts of technology and ensuring that it is a driver of sustainable development is so important.

The widespread process of digitalization and the introduction of ICT creates new high-tech jobs, while other jobs become redundant and are subject to reduction. The main question is whether the new scientific and technological revolution associated with the construction of Economy 4.0 will have similar consequences. Digitalization also raises the question of the nature of the relationship between workers and Internet platforms as well as between workers and robots.

Data, as the new currency for innovation, is also considered an asset for the SDGs. Target 17.18 of SDG 17 calls for increased availability of high-quality, timely and reliable data disaggregated by income, gender, age, race, ethnicity, migratory status, disability, geographic location and other relevant characteristics in the national context. Often, the lack of capacity and resources, safety and local conditions make it difficult to collect and analyze SD data. To address this issue, the Global Data Partnership for Sustainable Development (Data4SDGs) was created based on the recommendation of the Independent Expert Advisory Group on the Information Revolution for Sustainable Development (IEAG), which aims to engage stakeholders, including governments, international or-

ganizations, civil society and academia to collaborate on data production and use.

Thus, the localization of global goals and sustainable development efforts have played an important role in promoting sustainable development around the world. With the development of technology and the expansion of access to information, there is an increasing need to use digital technologies to solve the problems of sustainable development through the development of digital infrastructure and technologies for sustainable development, the design of new digital business models and the implementation of new digital programs and projects. The main features of digital transformation are its global nature and operation with intangible benefits (ideas, information and relationships) and network principles in coordinating markets and society. There are numerous examples of successful global and local digitalization and ICT uptake that support the implementation of the SDGs. At the same time, there are many challenges associated with digital transformation, such as unequal access to digital technologies and different rates of their absorption, which leads to inequality and stratification of society, as well as the need to ensure the security of personal data. For this reason, it is necessary to coordinate international efforts and properly manage this process for digitalization and ICT development to be, in essence, truly sustainable.



## 4.4 Digitalization and sustainable development at the local level: main trends in the European Union and India

Today, digital change is one of the top priorities for the EU. Various policies and regulations should improve digital literacy and create new opportunities for citizens and businesses. Digitalization should also contribute to the EU's environmental agenda and help achieve climate neutrality<sup>31</sup>. The specific objectives of the European Union in relation to digitalization are set out in the document «Digital Decade Policy Program», adopted by the European Parliament and the Council of the European Union in December 2022<sup>32</sup>. The main goals of the Digital Decade Program are focused to 4 points: a qualified population and highly qualified specialists in the field of digital technologies; secure and sustainable digital infrastructures; digital transformation of business; digitalization of

public services (Figure 7)<sup>33</sup>. The program aims to strengthen basic digital rights, increase transparency and security and promote digital literacy.

To achieve this, the European Commission will work with each Member State to set targets to be achieved by 2026. The Digital Economy and Society Index (DESI) is an important tool for measuring digitalization. It exists already since 2014 and contains data and indicators for different aspects of digitalization on European and also on national level. In order to accelerate the digital transformation, DESI will be enhanced and new indicators related to the Digital Decade Program such as the share of companies which adopted advanced technologies such as Artificial Intelligence are in-

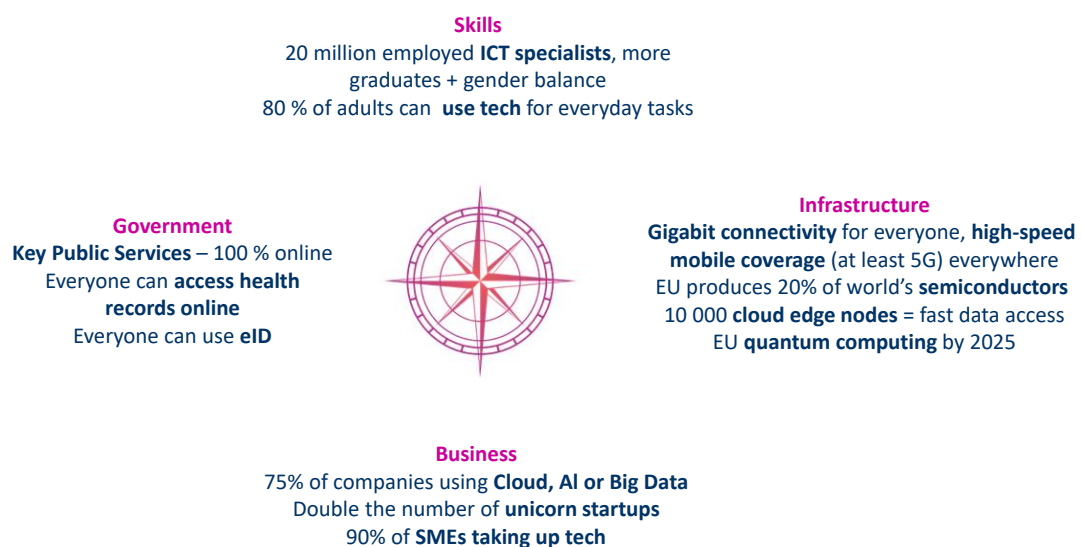


Figure 7 – Main objectives of the EU Digital Decade Program



<sup>31</sup> [Decision \(EU\) 2022/2481 of the European Parliament and of the Council of 14 December 2022 establishing the Digital Decade Policy Programme 2030](#) / an official website of the European Parliament: [site].

<sup>32</sup> [Decision \(EU\) 2022/2481 of the European Parliament and of the Council of 14 December 2022 establishing the Digital Decade Policy Programme 2030](#) / an official website of the European Union: [site].



<sup>33</sup> [Europe's Digital Decade: digital targets for 2030: European Commission](#) / [Electronic resource] // an official website of the European Union: [ site ]. - (date circulation: 17.07.2023)



cluded since 2022<sup>34</sup>. Although the impact of the Digital Decade Policy Program on the local level is considerable, there is no specific mention of the local level in the program. However, the program does make specific reference to rural areas and the need to ensure digital participation in these areas.

The DESI provides a wide range of indicators to monitor the digitalization process in Member States. It includes indicators such as «Internet user skills and advanced digital skills», «SMEs with a basic level of digital intensity» or «Digital public services for citizens» and many more<sup>35</sup>. While DESI and the annual reports provide a rich basis for comparing digitalization across EU Member States, DESI does not contain data at the sub-national level. This would have been interesting as regional disparities at country level are likely to vary across EU Member States. However, some of the DESI indicators could also be useful when transferred to the local level.

In the realm of sustainable development, the European Union is committed to implement the SDGs. The SDGs do not contain specific goals which address digitalization, but digitalization is related to several goals such as SDG 8, SDG 9 or SDG 17. In the recently published report on sustainable development in the European Union digitalization is mentioned only in SDG 4 with the indicator “share of adults having at least basic digital skills” and the target to reach 80% (current state; 53.9 %) as well as in SDG 17 with the indicator „Access to technology – Share of households with high-speed internet connection”<sup>36</sup>. Nevertheless, digitalization is

indirectly also included in other indicators such as in SDG 9, with the indicator “R & D (Research and Development) intensity”.

An important European Union initiative combining sustainable development and digitalization is the «100 climate-neutral and smart cities» mission<sup>37</sup>. The mission provides funding to 100 cities across Europe to achieve climate neutrality. One of the themes of the mission is the co-design of smart systems and services for user-centered shared zero-emission mobility in urban areas, using digital technologies to achieve lower emissions in the mobility sector. The main goal of the mission is climate neutrality at the local level through smart city approaches, but no specific targets or benchmarks for digitalization are included in the mission. Due to the multi-level governance system of the European Union, digitalization and sustainable development at the local level is not only addressed at the European level, but also at the national member state level.

In Germany, for example, funding programs such as the Smart Cities Model Projects and the Stadt.Land.Digital initiative are promoting digitalization at the local level. In order to measure digitalization at the local level, several surveys have been conducted asking municipalities how they perceive the current state of their community in terms of broadband development, technical equipment of hardware and software, IT security, and financial and personal resources. The situation in German municipalities considering the current state of digitalization is heterogenous. 50% of the responding German municipalities consid-



<sup>34</sup> [«Weg in die digitale Dekade»: Rat verabschiedet politisches Schlüsselprogramm für digitalen Wandel der EU // Europäischer Rat/Rat der Europäischen Union](#)

<sup>35</sup> [The Digital Economy and Society Index \(DESI\): Shaping Europe's digital future](#)



<sup>36</sup> [Sustainable development in the European Union Statistical annex to the EU voluntary review // Eurostat Supports the SDGs. – Luxembourg: Publications Office of the European Union, 2023, 78 c.](#)

<sup>37</sup> [EU Mission: Climate-Neutral and Smart Cities](#)



er the current state of digitalization as satisfactory, 20% as good (only 1% consider the situation as very good) and at the same time 26% evaluate the current state of digitalization as bad.<sup>38</sup> Another indicator was whether or not the municipality had already adopted a public digitization strategy. Nearly half of the municipalities in Germany have not adopted a digitization strategy, and 30% of the municipalities are in the process of elaborating a strategy, which indicates the need to accelerate digitalization. It seems that while some municipalities are quite advanced concerning the digitalization, other municipalities (not only, but mainly smaller municipalities) lack behind. Main obstacles for digitalization in the municipalities are the need for skilled workers, the lack of professional expertise and the tight budget situation of many municipalities.

## DIGITALIZATION AT THE LOCAL LEVEL IN INDIA

Another example of digitization at the local level is the country of India. As the world's most populous country with huge disparities between highly developed and poor regions, India's development considers digitalization as a key issue for successful development. Therefore, the Indian government released the Digital India program, which aims to promote e-services and digital connectivity between citizens and the government<sup>39</sup>. The program started in 2015 and includes different pillars such as public internet access program, broadband highway as well as open data platforms. The pro-

gram also includes connecting rural areas with high-speed internet networks. The so-called vision areas of Digital India contain ideas about the main goals of the program, the ideas include «mobile phone & bank account enabling citizen participation in digital & financial space», shareable private space on a public cloud, digitally transformed services for improving ease of doing business, leveraging Geospatial Information Systems (GIS) for decision support systems & development, universal digital literacy and collaborative digital platforms for participatory governance. These visions characterize the key direction that India's digital transformation should take.<sup>40</sup>

A report on the impact of the Digital India strategy on achieving the SDGs shows the strong link between digitization and sustainability.<sup>41</sup> The document lists various interventions of the Digital India program and highlights their contribution to specific SDGs. For example, a project to make textbooks available in digital form contributes to SDG 4, or the installation of smart meters optimizes the use of resources such as energy, water, and roads/infrastructure.

India's Voluntary National Review for the United Nations High Level Political Forum for Sustainable Development 2020 mentions digitization in a variety of ways, with indicators to measure SDG 16 including the number of government services provided online and digital payment transactions. However, this data on digitalizing India is generally not provided at the local level, but at the national level.<sup>42</sup>



<sup>38</sup> Lorenz Hornbostel, Désirée Tillack, Michael Nerger, Volker Wittpahl, Alexander Handschuh, Janina Salden. *Zukunftsradar Digitale Kommune Ergebnisbericht zur Umfrage 2022*. – Institut für Innovation und Technik (iit), Berlin, 2022, 52 c.

<sup>39</sup> *India's Hindu nationalism since 2014 embraces SDGs for its own agenda*.

<sup>40</sup> *Vision & Vision Areas // Digital India*



<sup>41</sup> *Digital India for Sustainable Development Goals: Pathways for Progress*. – Ministry of Electronics & Information Technology (MeitY), New Delhi, 2016, 48 c.

<sup>42</sup> *INDIA VNR 2020: DECADE OF ACTION* / – New Delhi: Government of India, 2020 – 188 c.



One of the major initiatives in India to digitize the local level is the «100 smart cities» mission program, which was launched by the Prime Minister of India in 2015. The program aims to promote Smart Cities by leveraging new innovative technologies. Through a call for participation, cities could apply for the program. In several rounds, a total of 100 cities were selected. The implementation of the program has not been as quick as expected, but several cities have realized projects such as data sharing management or the development of a geographic information system (GIS).

The Ministry of Housing and Urban Affairs in India has also published a report on measuring the quality of life in Indian cities and towns. Some of

the indicators address digital issues, such as: percentage of schools with access to digital education, availability of digital passenger information in public transport, percentage of electricity connections covered by smart meters.<sup>43</sup>

Thus, The analysis of the situation in the European Union and in India showed that digitalization is considered a political priority and different funding programs have been established in both regions. One of the key issues is how to measure the process of digitization at the local level. There seems to be no one perfect indicator, but rather a plethora of different indicators that are used to measure what successful local digitization actually means.



---

<sup>43</sup> [LIVEABILITY STANDARDS in cities \[Текст\]](#) / : Ministry of Urban Development/Government of India, — 48 с.

# 5. TRENDS IN DIGITAL DEVELOPMENT AT THE NATIONAL LEVEL IN THE REPUBLIC OF BELARUS, WHICH FORM THE CONDITIONS FOR THE LOCALIZATION OF DIGITAL DEVELOPMENT

---

## 5.1 Framework conditions for digital development in the Republic of Belarus

The digital transformation of the economy is becoming the main path of innovative development. Belarus relies on the wide dissemination of innovations, the digitalization of all spheres of life and the creation of an “IT country”.

The place of the Republic of Belarus in the world rankings in the field of digitalization gives us an understanding of the scope of digital develop-

ment in the country and acts as an indicator of the need to implement measures aimed at overcoming modern challenges and creating broad opportunities for increasing competitive advantages (Table 7). The position of Belarus in the international ratings grew rapidly until 2020 but has now decreased by 10-30 points.

In the latest report of the International Telecom-

Table 7 – Belarus in international ratings

Rating name	Place
Global Innovation Index (GII), 2022	77/132
eGovernment Development Index, 2022	58/193
E-Participation Index, 2022	90/193
Index network readiness (Networked Readiness Index), 2020	65/130
Information and Communication Technologies Development Index (ICT Development Index), 2017	32 /176

munication Union «Measuring the Information Society», published in 2017, Belarus took the final 32nd place in the ICT Development Index (IDI) rating out of 176 countries of the world. It is a composite index launched by the International Telecommunication Union in 2009 to measure ICT development and compare rankings across countries over time. Over the entire history of the existence of this rating, the Republic of Belarus has risen from 53rd place in 2007 to 32nd place in 2017. During this time, the Republic of Belarus has repeatedly entered the top ten countries with the most dynamic development of ICT (in 2012, 2013 and 2015).

The UN Global E-Government Development Index EGD, which allows people to assess the level of digital development through the introduction of digitalization in the structure of public administration, shows that in 2022 the Republic of Belarus ranked 58th. Compared to 2020, the index decreased by 18 points (in 2020, the index value corresponded to the 40th place in this rating, in 2018 - the 38th).

By 2020, according to a UN review, Belarus was the leader in the Eastern European region in terms of the development of information and communication infrastructure. The telecommunications infrastructure sub-index grew by 20.3% over 2 years. The level of development of electronic services in Belarus has not changed significantly compared to 2018 (the web services sub-index corresponded to a value of 0.7).

Furthermore, in 2018-2019, Belarus received a high value in the open government data development index (the index value corresponds to 0.96). These results were achieved through the creation of the National Open Data Portal (data.gov.by) in 2018. Currently, work is underway to create regulatory legal conditions for its active exploitation by interested parties.

An analysis of the E-Participation Index (EPI) shows that in 2022 the Republic of Belarus entered the subgroup of countries with a high level of the index (0.7–1), taking the final 58th place.

In the Global Connectivity Index (GCI, Huawei), the Republic of Belarus ranked 47th in 2017-2019. Belarus also has a high rating on the Global Innovation Index (GII). According to official data, in 2015 Belarus ranked 53rd, in 2016 - 79th and in 2022 the country held the 77th position out of 193 countries.

According to the GSMA Mobile Connectivity Index (GSMA Mobile Network Index), which evaluates 163 countries around the world on such indicators as infrastructure, financial affordability, the ability and willingness of the population to use the Internet, the availability and relevance of online content and services, for 2021 the indicator of the Republic of Belarus was 69.5 (61.8 in 2015).

Defining digital development as a national priority, the Republic of Belarus creates the necessary basic conditions: a developed data transmission network that meets international standards, reliable data storage and processing centers, in-

frastructure for interdepartmental information interaction, identification mechanisms, tools for making electronic payments, modern information security tools. In terms of the development of the national IC infrastructure, which is an important condition for the constructing digital economy, the main trend, as well as throughout the world, has been the construction of telecommunication networks to provide broadband access to the Internet.

According to the United Nations, the Republic of Belarus takes the 24th place among 196 countries in terms of the provision of fixed broadband Internet access.

In 2019, work on the construction of fiber-optic communication lines in an apartment building was completed. In addition, the construction of fiber-optic communication lines was completed to connect all city educational institutions (within the framework of the State Program). By now, almost the entire population has access to and uses broadband Internet (Table 8).

In the development of cellular mobile telecommunications networks, a bet was made on the development of wireless broadband access – if by the beginning of 2016 this figure was 60 subscribers per 100 inhabitants, then by the end of 2022 it had grown to 101 subscribers per 100 inhabitants. Significant efforts were directed to the modernization and expansion of third-generation (3G) networks, which made it possible to increase the scope of the population with services up to 99.9% and the territory – up to 97.1%. The implementation of the investment agreement made it possible to introduce fourth-generation (4G) cellular mobile telecommunication services in the Republic of Belarus. Currently, this technology is available to 98.0% of the population with coverage of 83.2% of the territory and about 4.5 million subscribers actively use it. Thus, residents of almost all regions have access to Internet resources through a broadband network or mobile network. The quality of communication in some regions is still problematic but work in this direction is actively ongoing.

*Table 8 – Dynamics of the information and communication infrastructure of the Republic of Belarus (according to the Belarusian National Statistical Committee)<sup>44</sup>*

Name of indicator	2015	2017	2019	2020
Number of subscribers and users of wireless broadband Internet access per 100 population	60,5	76,4	89,9	92,6
Number of subscribers and users of wired broadband Internet access per 100 population	30,7	33,5	34,2	34,8
Percentage of the population aged 6-72 using the Internet in the total population aged 6-72, %	67.3	74.4	82.8	85,1

<sup>44</sup> Information Society in the Republic of Belarus, 2021 [Text] /. - Minsk: National Statistical Committee of the Republic of Belarus, 2021 - 95 p.



The practical results of many projects of the latest State Program will become available to a wide range of users after its realization (ID-card for remote identification, electronic services implemented on the basis of information systems being created, scaling the Electronic Prescription and Electronic School projects within the country), which will increase the level of application of information technologies at the local level.

At the end of 2022, about 1.2 thousand research and development projects were simultaneously carried out in Belarus, not counting innovative and investment projects. Approximately 2/3 of them are precisely applied in nature and are commissioned by the real sector of the economy. For

the most part, this research and development is based on ICT because in the system of priorities for the current 5 years, ICT was the first to be identified with a number of critical areas of research.

As part of the formation of unified approaches to regional digital transformation in 2019, a standard concept for the development of «smart cities» in the Republic of Belarus was developed and approved, which during 2019–2020 was adapted and extended to 11 cities (districts) of the country (Orsha, Baranovich, Pinsk, Novopolotsk, Polotsk, Mozyr, Lida, Borisov, Soligorsk, Molodechno, Bobruisk) identified as pilot projects. For these 11 cities, comprehensive plans for accelerated development have been developed and approved by the decisions of

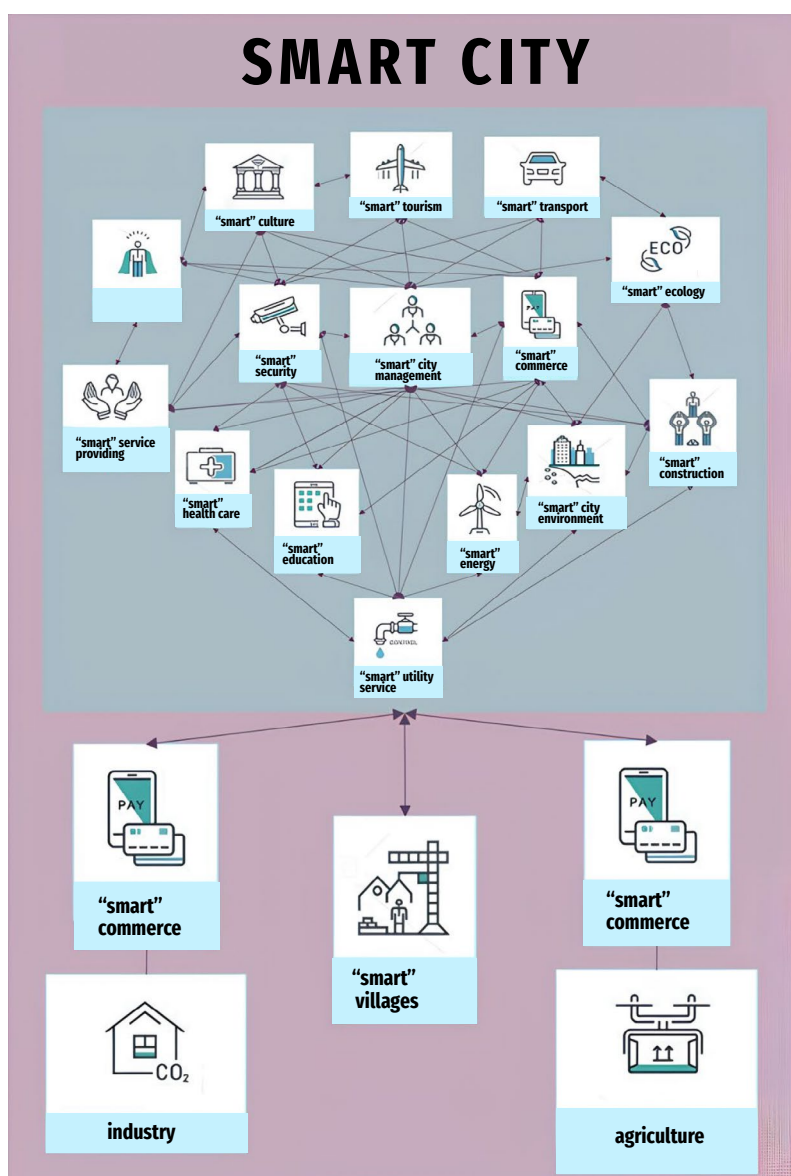


Figure 8 – Smart city ecosystem



the relevant regional executive committees. The development of directions leads to the formation of elements of a “smart city”, which are interconnected and form the ecosystem of a “smart city” (Figure 8). A smart city responds to climate change, the processes of urbanization and depopulation, to political and economic instability, involving the population in management processes, using information technology data to ensure a better quality of services and quality of life and preventing the degradation of the natural environment.

To implement the “smart city” concept, it is planned to build a wireless communication zone (5G) as the basic infrastructure of the “Internet of Things”; introduce a public transport monitoring system; create a multifunctional urban portal focused on the use of mobile applications and the provision of a wide range of urban infrastructure services and services that ensure the vital activity of citizens.

## 5.2 Legislative aspects of the development of digitalization

As mentioned above, digital transformation is one of the key priorities for the development of Belarus and one of the accelerators recommended by the MAPS mission to speed up the localization of the SDGs in the Republic of Belarus. At the national level, there is a constant process of improving legislation and creating an infrastructure for the development of digitalization. In Belarus, at the legislative level, two main mechanisms for supporting the introduction of ICT and digitalization are defined – state scientific and technical programs and the state program for innovative development (i.e. the program-target method is the basis). Scientific and technical programs act as a connection between the subjects of scientific and technical activity and sectors of the real sector of the economy.

The study of digitalization as an accelerator of sustainable development, through understanding its social and legal aspects and their evolution, is extremely important in a comprehensive consid-

eration of all significant factors in the development of society. The intensity of digital transformation processes is closely related to the state of a stable functioning legal system<sup>45</sup>, as well as the effectiveness of its implementation in practice. A more complete list of documents defining the policy and measures of the Republic of Belarus in the field of digitalization and digital transformation is listed in Appendix 3 of this review. The most significant of them are listed below.

The systemic formation of e-government at the national level in Belarus began in 2002, when the **State Informatization Program «Electronic Belarus»** was approved **by the Decree of the Council of Ministers of the Republic of Belarus No. 1819 of December 27, 2002**. The essence of the program was the computerization of state institutions and the transition to the provision of reference and registration services to the population in electronic systems.

---

<sup>45</sup> Andrievich, A. M. Legal basis for the digitalization of the economy in the Republic of Belarus. Sustainable development of the economy: state, problems, prospects / A. M. Andrievich [Text] // Proceedings of the XV International Scientific and Practical Conference, Pinsk, April 23, 2021 - Pinsk: PolesGU, 2021. - S. 109-111.

In 2011, the **Decree of the Council of Ministers of the Republic of Belarus No. 384 dated March 28, 2011**, approved the **“National Program for the Accelerated Development of Services in the Sphere of Information and Communication Technologies for 2011-2015»**. This program revealed detailed stages and structure of the implementation of the e-government project. The main goal of the e-learning and human capital development subprogram was to create conditions conducive to the development of the information society based on the development of human capital and the widespread introduction of e-learning elements. The objectives of the subprogram were defined as follows: creation of a national system of electronic educational resources; improvement of the infrastructure and services for access to national and global educational resources; improvement of the system of personnel training in the field of ICT.

**«Informatization Development Strategy in the Republic of Belarus for 2016–2022»**, approved by the **Presidium of the Council of Ministers of the Republic of Belarus No. 26 dated November 3, 2015**, defines the principles of the state policy of the Republic of Belarus in the field of informatization and the main directions for the development of the information society, taking into account a combination of factors affecting its progress.

The process of transition of the Republic of Belarus to a digital economy is reflected in the **State Program for the Development of the Digital Economy and the Information Society for 2016–2020**, approved by the **Resolution of the Council of Ministers of the Republic of Belarus No. 235 dated March 23, 2016**. The implementation of the program was designed to ensure the further fast and high-quality fulfillment of digital innovations and technologies of «smart cities» in the national economy and the sphere of life of society to promote the further development of e-government. For the sphere of labor relations, the most significant solution to two goals of forming a digital economy is the development of human capital and the development of remote employment. The implementation of the concept of «smart cities» was also reflected in the **National Action Plan for the**

**Development of the «Green» Economy in the Republic of Belarus until 2020**, approved by the **Resolution of the Council of Ministers of the Republic of Belarus No. 1061 dated December 21, 2016**.

**Decree of the President of the Republic of Belarus No. 466 dated December 15, 2016 «On Approval of the Program for the Social and Economic Development of the Republic of Belarus for 2016–2020»** defined digital transformation as one of the components of the growth of competitiveness of economic sectors, within which it was planned to create full-fledged e-government and transfer 75% of administrative procedures in electronic format by 2020.

On December 21, 2017, **Decree of the President of the Republic of Belarus No. 8 “On the Development of the Digital Economy”** was issued, which provides a list of 38 types of activities in the field of high technologies and simplification of working conditions for residents of the High Technology Park. The Decree highlights the importance of creating conditions for the introduction of blockchain into the country’s economy, other technologies based on the principles of distribution, decentralization and security, operations performed with their use, as well as for the circulation of digital assets (tokens). Tax incentives and preferences are provided for participants in relations related to the use of modern technologies, as well as measures aimed at increasing the legal protection of participants in relations related to the use of modern financial technologies. With its adoption in Belarus based on the High Technology Park, the sector of information and software services began to actively develop, blockchain technologies, mining, the use of cryptocurrencies and smart contracts were regulated, and the possibility of concluding agreements on the absence of competition with workers employed in the Park’s residents was also provided. Thus, it was supposed that Belarus will develop as an IT country.

In 2019, the State Committee for Science and Technology (SCST) prepared a **comprehensive forecast of the scientific and technological progress of Belarus for 2021-2025 and up to 2040** for 14 ma-

for sectors of the economy. Based on the results of the forecast, common priorities for scientific, technical and innovative activities were developed. The document defines digital information and communication technologies as the priority area.

With regard to the development of remote employment, **the Labor Code of the Republic of Belarus of July 26, 1999**, was supplemented in 2019 with a new chapter 251 “Peculiarities of regulating the labor of workers performing remote work” (**Law of the Republic of Belarus of July 18, 2019 No. 219-Z “On changing laws”**). This chapter of the Labor Code of Belarus, which entered into force on January 28, 2020, regulates the concept of “remote work”, the features of concluding, amending and terminating employment contracts with remote workers, some features of labor protection, working hours, rest time for workers performing work remotely.

The need to stimulate the introduction of ICT in the real sector of the economy, the implementation of administrative procedures in electronic form, as well as improving the training of personnel for the digital economy is reflected in the **National Strategy for Sustainable Development of the Republic of Belarus for the period up to 2035 (NSSD-2035)<sup>46</sup>**, approved by the protocol of the meeting of the Presidium of the Council of Ministers dated February 4, 2020 №3. The implementation of the NSSD-2035 priorities signifies the achievement of sustainable urban development based on the principles of the «green economy», including the development and implementation of «green» urban development technologies, circular economy, sustainable transport, clean energy supply, involvement of unused and inefficiently used property in economic circulation, improvement of the quality of the living environment. As part of the digital economy, existing business models will also be transformed in the social sphere: from

e-commerce and services for the development of telemedicine, online learning, intelligent housing and communal systems, intelligent integration, and to online coordination of city administrations, services and infrastructures.

**Decree of the President of the Republic of Belarus dated September 15, 2021 No. 348** approved **the State Program for Innovative Development of the Republic of Belarus for 2021–2025**. The program is formed on a competitive basis and includes many incentive mechanisms to support innovative projects. Thanks to them, 78 innovative projects were implemented in 2021-2022, most of which are projects in the field of ICT.

At present, the main mechanism for digital development is **the State Program «Digital Development of Belarus» for 2021–2025, approved by Resolution of the Council of Ministers of February 2, 2021 No. 66**, in which the main goal of digital development is to create conditions for increasing the competitiveness of the national economy and the quality of life citizens of the Republic of Belarus through the introduction of advanced information technologies in the processes taking place in the sectors of the economy, the social sphere, and the management of urban infrastructure. The State Program mainly included events of a national, sectoral and regional system-forming nature, the implementation of which made it possible to create digital sectoral and regional platforms and fundamentally new technological business processes.

This program, unlike previous legal acts, is linked to the SDG, which is very important, “considering that the State Program provides for a comprehensive digital transformation of public administration processes, regional and sectoral development. Its results will also have a positive impact on the achievement of most of the SDGs, including in the areas of healthcare, education, ensuring the



<sup>46</sup> [National Strategy for Sustainable Development of the Republic of Belarus for the period up to 2035 \(NSSD-2035\)](#) [Electronic resource] // Ministry of Economy of the Republic of Belarus [official site]. - (accessed 18.07.2023).

environmental sustainability of settlements and others”<sup>47</sup>.

Other state programs for the period up to 2025, sectoral and (or) intersectoral programs, regional programs (plans) and informatization programs included measures in the field of informatization of a departmental nature aimed at solving problems of an industry (regional) scale in terms of computerization, automation, informatization the main processes, as well as activities that contribute to the development of smart city technologies.

What are the current indicators for assessing the localization of digital development at the local level?

According to the NSSD-2035, “...the criteria for digital development will be:

- an increase in the share of Internet users from 79.1 in 2018 to 95% of the total population in 2035;
- increase in the share of exports of IT services from 21.2% to 25% in total exports of services.

Ultimately, a digital society will be formed and Belarus will become a leader in the export of software products among European countries<sup>48</sup>.

According to the subprogram “Regional Digital Development” of the state program “Digital Development of Belarus” for 2021-2025 “... as a result of digital regional development, the construction of a modern regional management system that meets technological challenges will be ensured, a direct impact will be made on improving the quality of life of citizens in the cities of the Republic Belarus». More clearly, other subprograms of this state program indicate the formation of infrastructure.

In all documents: the NSSD-2035 and the state program «Digital Development of Belarus» for 2021-2025, no indicators have been identified by which it would be possible to assess the onset of digital transformations and their sustainability.

In this regard, the development of a system of indicators that reflects both the development of infrastructure, the availability of ICT, digital competencies, as well as the onset of the sustainability of digital transformations, needs to be highlighted as very relevant, which may also affect the list of planned activities.



<sup>47</sup> [State Program “Digital Development of Belarus” for 2021-2025](#)



<sup>48</sup> [National Strategy for Sustainable Development of the Republic of Belarus for the period up to 2035 \(NSDS-2035\)](#) [Electronic resource] // Ministry of Economy of the Republic of Belarus [ official site]. - (accessed 18.07.2023).

## 5.3 National and regional digital platforms contributing to local development

The subprogram «Regional Digital Development» of the State Program «Digital Development of Belarus» for 2021-2025 provides for the implementation of activities, the results of which should be system-forming for the development of smart city technologies in all regions of the country. In this regard, within the framework of this subprogram, standard platforms «Smart City» and «Smart Region» are being created according to uniform standards with industry digital platforms, the main tasks of which are:

- collection and processing of data streams generated as a result of the operation of urban infrastructure facilities based on a built-in analytical apparatus (application of big data analysis technologies) to provide support for managerial decision-making in the framework of the socio-economic development of the city (region);
- creation and improvement of geographic information systems to ensure the operation of standard platforms, the transition to the practical application of information modeling technologies for urban planning units and urban spaces (City Information Modeling, CIM – technologies for creating «digital twins» of cities that allow you to effectively model the development of an urban area and manage various areas city life);
- development of regional information and communication infrastructure, including the development of NB-IoT technology (Narrow Band Internet of Things) for data exchange between digital devices to ensure the operability

of the Smart City, Smart Region platforms and their services;

- adaptation and implementation of standard platforms in the cities of the Republic of Belarus;
- creation and development of standard services based on the developed Smart City and Smart Region platforms in various areas, including housing and communal services, accounting and disposal of property, construction and territorial planning, management of urban and transport infrastructure facilities, healthcare, education, provision public security, environmental monitoring, organization of citizens' participation in city management, development of culture, tourism and the service sector in general (implementation at the regional level is advisable after agreement with the Ministry of Communications and Informatization, as well as the republican government body in charge of the relevant area, to exclude duplication of projects at the republican and local levels).

The subprogram «Regional Digital Development» of the State Program «Digital Development of Belarus» for 2021-2025 is the main tool for implementing the national project «Smart Cities of Belarus»<sup>49</sup>. The project provides:

- consolidation of a set of «smart cities» within the framework of a single digital ecosystem «digital state»;



<sup>49</sup> About the project “Smart Cities of Belarus” / [Electronic resource] // Ministry of Communications and Informatization of the Republic of Belarus: [website]. — (date of access: 18/07/2023).

- integration of existing and prospective «smart» solutions (state, industry, public, private and others) within the boundaries of an administrative-territorial unit;
- provision of digital platform services and services to solve a wide range of tasks to ensure a comfortable living and working environment.

By 2025, it is planned to cover all regional and 11 district centers with the regional state digital platform «Smart City (Region)»: the cities of Orsha, Baranovich, Pinsk, Novopolotsk, Polotsk, Mozyr, Lida, Borisov, Soligorsk, Molodechno, Bobruisk. The implemented and scalable digital innovations will improve the quality of life of the population. It will also increase the investment attractiveness of the regions and ensure the creation of the necessary conditions for the formation of actual “points of economic growth” in the country.

It is assumed that as a result of the transition to platform solutions, a digital information ecosystem will be formed in the country, built on the basis of industries and regions created under the State Program of Digital Platforms, interacting with each other in an automated mode. Shared digital platforms facilitate the interaction between users, the collection and use of its data and contribution to the emergence of network effects, in which the effectiveness of digital platforms increases with the number of their users.

Digital platforms naturally become tools for practical integration in the economy. To some extent, this process is similar to the processes that took place during the beginning of industrialization, when enterprises actively united in syndicates for the joint marketing of products or in consortiums for the implementation of joint investment projects. Currently, similar processes are taking place through the creation of electronic platforms that distribute resources and do not require lengthy approval processes. Digital platform solutions that are developed using modern technological

trends, including REST style (using DevOps, Agile methodologies), containerization management (Docker, Kubernetes), continuous integration (Jenkins, GitLab), deployment of various environments according to a template (Puppet, Ansible, Terraform) and others allow to optimally collect the industry’s (region) data, conduct their analytics, provide business process designer services and convenient mechanisms for updating them, scale and interact with other digital platforms.

The methodology for building digital platforms is based on microservice architecture. It implies the rejection of a single, monolithic structure when creating technical solutions. Thus, instead of performing all the functions of a technical solution on the server using in-process interactions, several applications (services) are used, each of which corresponds to some limited functionality. Moreover, these applications (services) can run on different servers and interact with each other. The main advantage of the microservices architecture is that it allows people to update applications (services) in parts as needed, which is in demand with the flexible dynamics of tasks, functions, the emergence of new participants and user roles. Microservice architecture is designed to provide flexibility and dynamic development to digital platforms.

As part of the formation of the informatization infrastructure, the following most significant works for the development of e-government technologies are being carried out. In 2020, the creation of **a nationwide automated information system (OASIS) was completed**<sup>50</sup>, which is the core of e-government, as well as the creation of **the Belarusian Integrated Service and Calculation System (BISRS)**.

Today, the following key services are provided with the help of OASIS:

- a single portal of electronic services<sup>51</sup> (it provides 112 types of electronic services for legal entities and individuals, as well as 44 types of administrative procedures);



<sup>50</sup> [OASIS Services](#) / [Electronic resource] // NTsEU: [website]. — (date of access: 18/07/2023).



<sup>51</sup> [Single portal of electronic services](#) / [Electronic resource] // Single portal of electronic services: [website]. — (date of access: 18/07/2023).



- One Window software package<sup>52</sup> (796 organizations (2,038 users) are connected, 202 types of administrative procedures are being carried out);
- the system of interdepartmental electronic document management of state bodies<sup>53</sup> (hereinafter – SMDO) (about 13.2 thousand Belarusian organizations and departments work with it);
- the state system for managing public keys for verifying the electronic digital signature of the Republic of Belarus<sup>54</sup> (more than 793 thousand electronic digital signature keys (hereinafter referred to as the EDS) have been issued).

It is expected that upon completion of work on the development of OAIS, its users will be provided with the following opportunities: to enter the system, it will be possible to use an ID card; the interaction of state bodies will be available in the form of electronic services; a platform solution will be created for the exchange of electronic documents, messages and other information between state bodies and organizations, the public and business entities, as well as with subjects of other states; wide application of integration formats and interfaces and other new functionalities will be ensured.

Nowadays, more than 100 sets are available for machine reading on **the National Open Data Portal**<sup>55</sup> Preliminarily, employees of state bodies and organizations learned the rules of working with the portal and open data. To maintain their relevance and ensure that the portal is filled with new data in demand, a regulatory legal framework is being formed

As a result of the implementation of the most significant measures of the State Program aimed at the digital transformation of processes in all spheres of society, the following results were achieved:

- developed software and methodological support for the Republican information and educational environment – the basis for the formation of a single information space of the industry, the basic element of the project **«Electronic School»**<sup>56</sup> (customer – Ministry of Education);
- active work was carried out to connect healthcare institutions to **the Electronic Prescription system**<sup>57</sup> (the customer is the Ministry of Health): by the beginning of 2020, 592 healthcare institutions were connected; 10,106,978 e-prescriptions were issued;



<sup>52</sup> PC “One window” / [Electronic resource] // NTsEU: [website]. — (date of access: 18/07/2023).



<sup>53</sup> SMDO services / [ Electronic resource] // NTsEU: [website]. — (date of access: 18/07/2023).



<sup>54</sup> GosSUOK / [ Electronic resource] // NTsEU: [website]. — (date of access: 18/07/2023).



<sup>55</sup> Database of open public data for business, journalism, marketing, science and just for fun / [ Electronic resource] // Open data Belarus: [website]. — (date of access: 18/07/2023).



<sup>56</sup> Unified platform of electronic services for education / [Electronic resource] // Know.by: [website]. — (date of access: 18/07/2023).



<sup>57</sup> Electronic prescription / [ Electronic resource] // RUE “BELPHARMATSIYA”: [website]. — (date of access: 18/07/2023).

- the software for the state information resource **“Register of Administrative Procedures for Legal Entities and Individual Entrepreneurs” was developed<sup>58</sup>** (the customer is the Ministry of Economy), the resource was piloted, a draft Decree of the President of the Republic of Belarus “On Administrative Procedures for Business Entities” was prepared and is being finalized, which contains provisions required to put the Register of Administrative Procedures into permanent operation;
- **a unified register of licenses<sup>59</sup>** was developed (the customer is the Ministry of Economy), from July 1, 2020, information from it is provided as an electronic service on a single portal of electronic services;
- completed in 2020 work on the creation, modernization and implementation of specialized information systems aimed at the digital transformation of tax management processes (**AIS «Tax Calculation»<sup>60</sup>**), FSZN (**AIS «Personalized accounting»<sup>61</sup>**), Ministry of Finance (**AIS financial settlements<sup>62</sup>**), KGC (**AIS «Control activity»<sup>63</sup>**) and other government agencies.

In addition, important results in terms of the use of information technology have been achieved in many industries within the framework of other government programs and projects.

**Social sphere. Healthcare** Active work is underway to create **a centralized e-health system<sup>64</sup>**, in the country, which stimulates the transition to the use of electronic medical records containing medical information about the patient and through which permanent remote access to medical data will be provided. It will also ensure the transition to supporting the processes of providing medical care mainly in electronic form, for example maintaining documents for various purposes, organizing the work of emergency medical care, accounting for the provision of medicines and medical products, sanitary and epidemiological monitoring, laboratory diagnostics, etc.

**Education** **Electronic educational resources** (textbooks, methodology and other educational materials) have been created and are developed. The **«Electronic Journal/Diary»<sup>65</sup>**, services are used and access control systems to schools are tested. A unified platform of electronic services for education was created **Know.by<sup>66</sup>**.



<sup>58</sup> [All administrative procedures for business. Officially](#) / [Electronic resource] // Register of administrative procedures: [website]. — (date of access: 18/07/2023).



<sup>59</sup> [Unified register of licenses](#) / [Electronic resource] // Unified register of licenses: [website]. — (date of access: 18/07/2023).



<sup>60</sup> [ERIP personal account](#) / [Electronic resource] // ERIP: [website]. — (date of access: 18/07/2023).



<sup>61</sup> [Personalized accounting](#) / [Electronic resource] // Fund for Social Protection of the Population: [website]. — (date of access: 18/07/2023).



<sup>62</sup> [Automated system of interbank settlements of the National Bank of the Republic of Belarus](#) / [Electronic resource] // BRMC: [website]. — (date of access: 18/07/2023).



<sup>63</sup> [Control \(supervisory\) activities](#) / [Electronic resource] // State Committee for Property of the Republic of Belarus: [website]. — (date of access: 18/07/2023).



<sup>64</sup> [The concept of e-health](#) / [Electronic resource] // Ministry of Health of the Republic of Belarus: [website]. — (date of access: 18/07/2023).



<sup>65</sup> [Opportunities](#) / [Electronic resource] // Schools.by: [website]. — (date of access: 18/07/2023).



<sup>66</sup> [Unified platform of electronic services for education](#) / [Electronic resource] // Know.by: [website]. — (date of access: 18/07/2023).



**Employment and social protection of the population** Basic information resources and systems are under development or were created. They accumulate the necessary data and the functionality for the industry and services for the population is gradually increasing, on their basis, among them: the **state information system of social protection**<sup>67</sup>; data bank of social payments; ACS «Employment of the population», the **portal of the state employment service**<sup>68</sup>; corporate information system for managing the social and labor sphere (CIS «Management»); **AIS of the Fund for Social Protection of the Population**<sup>69</sup>; interdepartmental information system for accounting of large families<sup>70</sup>; database of able-bodied citizens not employed in the economy<sup>71</sup>. Active work is underway to switch to «electronic work books».

**Financial sector** There is an automated system of financial settlements, which is designed for the formation, control, accounting and reporting on the execution of budgets at all levels. To improve work, an integrated information system for managing public finances is under development. A single settlement and information space was created and is successfully functioning **for making payments by individuals and legal entities**<sup>72</sup> (ERIP). There is an automated **system of interbank settlements**<sup>73</sup>, and a system of non-cash settle-

ments for retail payments. Banks are actively implementing mobile applications that allow holders of bank payment cards to make payments using mobile devices. In 2017, on the basis of blockchain technology, the National Bank implemented applied tasks for maintaining registers of issued bank guarantees, as well as forming a register of securities transactions.

**In agriculture** an information system for the identification, registration and traceability of animals and products of animal origin was created and is functioning – **«Animal Identification Traceability System»**<sup>74</sup> («**AIMS**»), designed for state regulation and management in the field of identification, registration, traceability of farm animals, as well as identification and traceability of products of animal origin. The software complex **«Bukhstat»**<sup>75</sup> is aimed at receiving, transmitting, collecting, processing, accumulating and storing data from accounting reports, including the formation of summary reports for analyzing data from enterprises and organizations, the system of the Ministry of Agriculture and Food; data of marketing information and monitoring of prices for the main types of agricultural products; data on the activities of peasant (farm) enterprises; departmental and statistical reporting data.



<sup>67</sup> [State Information System of Social Protection \(GISS\)](#) / [Electronic resource] // AGAT-SYSTEM: [website]. — (date of access: 18/07/2023).



<sup>68</sup> [Employment Service](#) / [Electronic resource] // Ministry of Labor and Social Protection of the Republic of Belarus: [website]. — (date of access: 18/07/2023).



<sup>69</sup> [Corporate portal of the Fund](#) / [Electronic resource] // Social Protection Fund: [website]. — (date of access: 18/07/2023).



<sup>70</sup> [New electronic service for the formation of a database of large families](#) / [Electronic resource] // NTSEU: [website]. — (date of access: 18/07/2023).



<sup>71</sup> [Services are available regarding the provision of information from the database of able-bodied citizens not employed in the economy](#) / [Electronic resource] // NTSEU: [website]. — (date of access: 18/07/2023).



<sup>72</sup> [Service provider's office](#) / [Electronic resource] // ERIP: [website]. — (date of access: 18/07/2023).



<sup>73</sup> [Automated system of interbank settlements of the National Bank of the Republic of Belarus](#) / [Electronic resource] // BMRTS: [website]. — (date of access: 18/07/2023).



<sup>74</sup> [National automated information system for identification, registration, traceability of animals and products of animal origin \(AIMS\)](#) / [Electronic resource] // RCTT Belarus: [website]. — (date circulation: 18.07.2023).



<sup>75</sup> [Software complex for automated processing of accounting and statistical reporting](#) / [Electronic resource] // RUE «Beldorcenter»: [website]. — (date of access: 18/07/2023).

In the transport sector, work is underway to develop systems for the operational and continuous monitoring of the transport and operational condition of roads, control of the technological processes of their construction, repair and maintenance, to monitor the situation on the most important sections of roads, to inform road users about the situation on the roads. A dynamic weighing system was introduced for heavy and (or) large-sized vehicles, a system for remote issuance of travel permits for them. The Belarusian Railway has introduced **a system for selling travel documents via the Internet**<sup>76</sup>, including a mobile application. Within the framework of the intelligent transport system of the city of Minsk, a number of elements operate an automated traffic control system, a system for photo and video recording of traffic violations<sup>77</sup>, a public transport management system and others.

In the management system of housing and communal services, an automated information system **«Calculation-ZhKU» was introduced**<sup>78</sup>, which automated the business processes of producers of utilities and other services to account for the volume of services rendered, and accelerated settlements between consumers and suppliers. **Portal «May Republic»**<sup>79</sup> is successfully used by the population to submit real-time applications for solving communal problems and receive their

results in the “before and after” format. In total, more than 1.5 million people use the portal. To organize the work of the dispatch services of housing and communal services, streamline and improve the efficiency of their work, **the automated system «Dispatch Service» is used**<sup>80</sup>. Based on it, mobile applications «Mobile Master» and «Mobile Dispatching Room» operate, which are actively used by specialists of public utilities in the process of performing work. Active implementation and use of AIS **«DomUchet» continues**<sup>81</sup> and **«Energy Efficiency Map»**<sup>82</sup> – tools that automate the business process for housing and communal services, allowing to reduce the cost and improve the quality of services provided to the population, by taking into account the labor, material, financial resources of enterprises. PUE “Center for Information Technologies of the Minsk City Executive Committee” is developing **an electronic interactive map “Minsk Municipal Waste Management Scheme”**<sup>83</sup>, which is a single cartographic resource with complete information about the objects involved in municipal waste management.

**Information support of «smart solutions»** The output of most processes in smart city subsystems is a dispatcher or dispatch service that distributes tasks between responsible departments and specialists. The more subsystems, the more dispatchers. Because of this, various difficulties arise



<sup>76</sup> [Online ticket service](#) / [Electronic resource] // BC: [website]. — (date of access: 18/07/2023).



<sup>77</sup> [The system of photographic fixation of violations of the speed limit](#) / [Electronic resource] // SZA O “Safe Belarusian Roads”: [website]. — (date of access: 18/07/2023).



<sup>78</sup> [About AIS “Calculation-ZhKU”](#) / [Electronic resource] // ERIP: [website]. — (date of access: 18/07/2023).



<sup>79</sup> [Republican portal Garadian gaspadarky](#) / [Electronic resource] // My republic115.bel: [website]. — (date of access: 18/07/2023).



<sup>80</sup> [AS Dispatch Service](#) / [Electronic resource] // IT Minsk: [website]. — (date of access: 18/07/2023).



<sup>81</sup> [AIS “DOMUCHET”](#) / [Electronic resource] // IT Minsk: [website]. — (date of access: 18/07/2023).



<sup>82</sup> [Interactive map of energy efficiency of residential buildings](#) / [Electronic resource] // IT Minsk: [website]. — (date of access: 18/07/2023).



<sup>83</sup> [Ecological map of the city of Minsk](#) / [Electronic resource] // [website]. — (date of access: 18/07/2023).

such as tasks are duplicated and conflicts occur when they are assigned. The problem is designed to be solved by the dispatching «single window» being developed – an automated service, which can be managed by one employee. The service automatically distributes applications that come from different smart city subsystems. The main advantages of the «single window» for the administration are quality control and deadlines for the execution of tasks; auto-assignment of tasks using artificial intelligence; reducing the load on dispatchers; instant routing to the performer; reduction in problem-solving time. For citizens, a “single window” is convenient because they do not need to use different systems and applications. They solve all their tasks and problems through one personal account. This is a new way of interaction between service consumers, administration and partner organizations, social communities, etc. In the IT industry, engagement systems combine disparate record systems into a single whole: supplier accounting systems, vendor ecosystems and business transaction accounting systems. In the concept of a smart city, recording systems are all auxiliary elements that are integrated into a single platform and its users are both administration employees and citizens.

**Regional development.** Smart City is a set of autonomous solutions: Active Citizen, Safe City, Smart Lighting, Smart Utilities, etc. All these are disparate elements. When they accumulate, the city «ripens» to a single smart platform that helps to manage urban processes and gives a holistic view of them. Using a single platform, people can control all elements of the smart city project and aggregate data that comes from various sources, ensuring the principle of one-time information entry. The platform correlates events and highlights the most significant ones. For example, to manage the transport network, weather conditions, traffic congestion, congestion of individual modes of transport, etc. are correlated. To manage the environmental situation, the level of emissions, electricity consumption and the quality of tap water are monitored.

The mechanism for the comprehensive digital transformation of cities defines the consistent implementation of the project «Smart Cities of Belarus», starting with eleven cities (districts) of the country, identified as potential centers of economic growth in which it is planned to carry out a priority digital transformation. An analysis of approaches to the creation of a domestic digital platform for supporting Smart Region technologies, the development of algorithms and experimental software for a prototype of such a platform was carried out using the example of the Orsha region in 2020. In fact, the digital platform is presented as an interface that connects clients on different sides of the platform, which defines a set of rules and processes that determine the interactions between clients on different sides of the platform; the presentation of data generated by clients on one or more sides of the platform; infrastructure protocols connecting clients on different sides of the platform. For the fullest coverage of the functions of regional administration in the process of conducting the study, an analysis was made of the structure of regional administration and areas of responsibility of the regional administration.

An integrated approach to automating the activities of the regional administration means choosing a common platform that, on the one hand, would ensure the automation of all business processes of its activities, on the one hand. On the other hand, it would provide for the possibility of a phased implementation of functionality, giving flexibility in choosing the necessary blocks and the possibility of rapid implementation. The administration itself can determine the set of necessary components and select priority areas for digitalization. Selected public sector solutions should allow the district administration to improve communication and cooperation with citizens, partner organizations and employees, forming a reliable basis for the initiatives of the emerging «e-government» of the district. In addition, an integrated information system, necessary for timely decision-making, provides new opportunities to improve the quality

of public services, which both businesses and citizens are waiting for.

In addition to common platforms, solutions are being implemented in Belarus that contribute to the development of a particular area at the local level. For example, **an intelligent lighting control system in the city of Novogrudok** made it possible to reduce electricity consumption by up to 25-30% and thereby improve road safety.

**Spatial data in smart city solutions (in the system of the State Property Committee).** The use of geodata is based on the use of digital terrain maps (DCM) and GIS. To facilitate the perception of spatial data in GIS, typical three-dimensional models can be used, which are created on the basis of city plans, topographic maps or survey maps and contain the surface of the terrain, buildings, road network objects, hydrography, vegetation and other objects of a simple form. Building a basic model is the fastest way to obtain a high-quality three-dimensional terrain model.

GIS is actively used by many enterprises and industries to improve the efficiency of personnel, resource, infrastructure and product management. GIS adapted for the tasks of a particular enterprise is called corporate GIS. Currently, many corporate GIS have been developed for enterprises of the fuel and energy complex, for example, an oil company, transport and communications, education systems, etc.

For example, **the «Interactive Map of Minsk»<sup>84</sup>** was developed by the Information Technology Center of the Minsk City Executive Committee for busi-

ness entities and government bodies and is a new modern information solution for controlling the allocation of territories by the administrations of districts of Minsk to business entities for cleaning, landscaping and improving the efficiency of the property management process.

In everyday life, government services, legal entities and private owners need information about the land. The solution to a number of issues on land rights, on the allocation of land plots for residential, commercial, industrial development and engineering and transport infrastructure facilities requires accurate and up-to-date information on land resources. In this regard, land information systems (LIS) are being created on the basis of GIS technology.

The basis of the VMS is the land cadaster, i.e. official register of property and information on the boundaries and condition of the land. **VIS of the Republic of Belarus<sup>85</sup>** is a geographic information system with land and cadastral content that allows people to solve a number of tasks with access through a browser. The purpose of the operation of the VMS of the Republic of Belarus is to maintain a reliable and up-to-date database on the state and use of land resources of the relevant districts (cities), regions and the Republic of Belarus as a whole to ensure the solution of the tasks facing the land management service. Currently, **a national geoportal of spatial data of the Republic of Belarus is being developed<sup>86</sup>**, which will allow the issuance of geodata to users online. Thus, the issuance of geodata to users online will allow the use of centrally updated unified geodata in **the Smart City smart platform»<sup>87</sup>**.



<sup>84</sup> [Interactive map of the city of Minsk](#) / [Electronic resource] // IT Minsk: [website]. — (date of access: 18/07/2023).



<sup>85</sup> [ZIS geoportal](#) / [Electronic resource] // Republican subsidiary unitary enterprise "Design Institute" Gomelgiprozem ": [website]. — (date of access: 18/07/2023).



<sup>86</sup> [Geoportal Goskartgeofond](#) / [Electronic resource] // Belgeodeziya: [website]. — (date of access: 18/07/2023).



<sup>87</sup> [Description of the platform](#) / [Electronic resource] // smart.by: [website]. — (date of access: 18/07/2023).

Among the important projects is [www.smart.by](http://www.smart.by) – an Internet resource of Belarus dedicated to the implementation of innovative solutions in the field of «smart cities» (Smart City). The Internet platform was created to develop smart projects and implement the concept of a «smart city» in the whole country, demonstrate solutions based on innovative technologies such as the Internet of Things (IoT), machine learning, big data (Big Data),

cloud computing, artificial intelligence, 5G and others. Users of the site have the opportunity to submit their own project for the «smart city». In addition, the portal will allow establishing partnerships between developers of smart solutions, studying public opinion on the quality of implemented and proposed solutions, collecting proposals for improving smart projects (through the feedback form) and using urban life systems.

## 5.4 Key players in digital development in Belarus

This section will review the institutionalization of SDG implementation processes in the Republic of Belarus, including the existing inter-industrial coordination and intersectoral cooperation.

The key player in digital development in Belarus and the responsible customer of the State Program «Digital Development of Belarus» for 2021–2025 is the Ministry of Communications and Informatization of the Republic of Belarus. The customers of the state program activities are state bodies, organizations subordinate (accountable) to the President of the Republic of Belarus or the Council of Ministers of the Republic of Belarus, state legal entities and business entities in respect of which the Republic of Belarus or an administrative-territorial unit, having shares (stakes in authorized funds), can determine the decisions made by these business entities.

An interdepartmental working group was created among the representatives of the customers of the events, the Ministry of Economy and the Ministry of Finance, as well as interested representatives of the IT community (associations, infrastructure

operators, cellular mobile telecommunications operators and other organizations).

In Belarus, there are a number of intersectoral structures with public participation that ensure the digitalization of the country: the Council for the Development of the Information Society under the President of the Republic of Belarus, the Council for an independent regulator in the field of information and communication technologies, and the Council for the Development of the Digital Economy. The functioning of these structures is regulated by **the Regulations on the Council for the Development of the Information Society under the President of the Republic of Belarus (Decree of the President of the Republic of Belarus of November 8, 2011 No. 515)**, **the Regulations on the Council of an independent regulator in the field of information and communication technologies (Decree of the President of the Republic of Belarus of November 8, 2011 No. 515)** and **Decree of the Council of Ministers of the Republic of Belarus dated February 28, 2018 No. 167 “On the establishment of the Council for the Development of the Digital Economy”**.



The Ministry of Industry, as part of the implementation of the sectoral policy, has identified JSC «Central Research and Design and Technology Institute of Organization and Management Technology» as the lead organization responsible for the digital transformation of industrial enterprises. On the basis of this enterprise, a competence center for the digital transformation of the industry of the Republic of Belarus is being organized, which will form the policy and main directions for the development of enterprises of the country at the stages of implementing the Industry 4.0 concept.

Within the framework of the State Program for Innovative Development of the Republic of Belarus for 2021–2025, in addition to the program-targeted approach to achieving the set goals, a national system of innovative infrastructure entities is being actively formed, the most important element of which are science and technology parks. Today, 17 technology parks were created, which are located in all regional centers and some other cities. The share of residents of technoparks, the main activity of which is ICT, is about 40% of the total number of 252 residents. The status of a technopark resident allows a legal entity, regardless of size and form of ownership, to apply for a number of tax benefits and lower rates of payment for electricity.

**The High Technology Park (HTP) functions as an institution for digital transformations in the country and the Center for Digital Development has been established. Since 2017, the number of resident companies in the HTP has increased by more than 5 times. In 2019, 319 new companies joined the HTP and 236 more in 2020. Today, the HTP has 1,021 residents and about 70,000 employees<sup>88</sup>.**

Operational and Analytical Center under the President of the Republic of Belarus (OAC). The OAC regulates the cybersecurity activities of Belarus' information infrastructure facilities. Organizations reporting to the OAC are implementing projects such as the Republican cloud platform, the unified Republican data transmission network, comfortable and fast 4G Internet, etc. These projects create conditions for the development of e-government technologies in Belarus. NTSEU is the operator of such interdepartmental information systems as the system of interdepartmental document management of state bodies (SMDO) and the nationwide automated information system (OASIS). To ensure information security, a center for monitoring and countering computer attacks in the financial sector (FinCERTby) was created.

To create conditions for the developing of an information society based on the human capital and the widespread introduction of e-learning elements, a number of new IT specialties were developed in Belarus. Moreover, information system for electronic enrollment in higher education institutions was designed and information services were created to ensure the interaction of educational institutions, governments and population.

Thus, the intensity of digital transformation processes is closely related to the state of a sustainable and stably functioning institutional and legal system, as well as to the effectiveness of their implementation in practice. The program-target method is at the heart of managing the development of digitalization and the introduction of ICT in the Republic of Belarus. Legislative acts regulating the sphere of digitalization and ICT development in Belarus have formed and are developing the basis for deepening digital development with gradual consistent localization at the regional and local levels, including the implementation of state programs. However, at the legislative level, measures are not indicated that allow expanding the capabilities of the population, organizations and



<sup>88</sup> Figures and facts

local authorities to use digitalization and ICT for local development purposes, including the creation of digital development support structures at the local level.

In this regard, it is of particular interest to study the question of whether *local development actors*, the population, businesses and others know about the national platforms and whether they are able to use them *to their advantage* and to achieve the SDGs. There is one more interesting question of whether the developers of national digital platforms are aware of digital local development projects and to what extent these platforms and projects can be integrated or can reinforce each other.

These questions are very important. The “localization” of digital development will make it possible to carry out actual digital transformations in the management of local development, which is the main success of the work of the created digital platforms. The more users of digital platforms, the higher their efficiency, respectively, and the effectiveness of measures taken by the state. Users must be aware of digital platforms, be able to use them and, most importantly, these platforms must meet the needs of users and users must need them. Therefore, these issues were evaluated in the analysis of the perception of digital development at the local level, the results of which are presented in the next chapter.

## 6. STATUS AND TRENDS OF DIGITAL DEVELOPMENT AT THE LOCAL LEVEL

---

The study of the state and trends of digital development at the local district level included, first of all, an assessment of the perception of local development actors of the concept of “digitalization” as a tool that can assist in accelerating the development of their region. Understanding perception provides a more holistic look at the state and contribution of digitalization to the development

of key, from the point of view of local actors, areas of development, namely: the development of small and medium-sized businesses, employment, housing and communal services, opportunities to increase the level of adult education, issues of local development and gender equality at the local level.

### 6.1 Perception of digitalization as a local development accelerator

Local development faces many challenges that can be accelerated through the localization of digital development. This was described in detail in section 4 of this review. The key players on which the localization of digitalization depends are local residents, entrepreneurs, organizations and enterprises, and authorities, which, due to their understanding of the purpose and skills in using dig-

italization, can carry out digital transformations of living conditions, making them more comfortable, safer, harmonizing their development with ecology.

There are many difficulties in the way of localization of digital development, which can be especially seen in rural areas (Figure 9). Among them



are the outflow of personnel due to urbanization, low literacy and culture in the field of digitalization, as well as the low distribution of successful practices that demonstrate the effectiveness of digital projects developed by local development actors and implemented on their territory.

**Digital development as an innovative direction is most quickly mastered by the younger generation, whose role as a leader in the localization of digitalization is undeniable. In Belarus, the training of specialists for the IT sector is carried out in 19 universities in more than 50 IT specialties of the 1st stage of higher education. The annual graduation of specialists is more than 5 thousand people.**

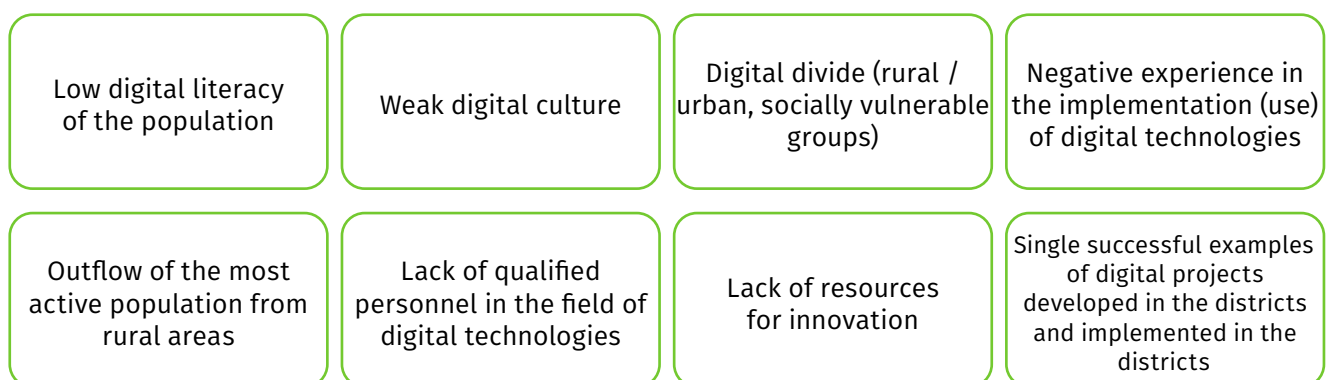
In the system of secondary specialized education, training of specialists is carried out by 34 educational institutions in 7 specialties. The most demanded specialties are: «Software of information technologies», «Programmable mobile systems» and «Software testing». The annual graduation of such specialists is more than 1 thousand people. The Ministry of Education, on the basis of applications from organizations that hire personnel and

other interested organizations, is expanding the training of specialists in IT specialties, for example, «Artificial Intelligence», «Computer Security», «Economics and Organization of Production», etc. According to the National Statistical Committee of the Republic of Belarus in 2021, the graduation rate for graduate and doctoral students in STEM was 0.28 per 1,000 people of age 25-34.

The IT sphere is filled with young specialists, the vast majority of whom, after graduating from a university (college), want to move to large cities. In areas with a population of less than 80 thousand people, there is a steady outflow of the most active and talented youth, including future IT specialists. As a result, the localization of digitalization in rural areas is mostly superficial.

Thus, at the local level, the perception of digitalization as an accelerator of local development is largely formed intuitively, mainly due to wide access to the Internet and the expansion of interpersonal communication.

Nevertheless, at present, ICT is becoming an essential attribute of almost all spheres of life of representatives of local communities: 78.4% of respondents use the Internet to carry out financial transactions and communicate with loved ones; online orders for goods and services (77.5%);



*Figure 9 – Difficulties with increasing digital competencies*

leisure (75.5%); performance of professional functions (74.5%); education (62.7%).

More than 80% of respondents use the Internet constantly. At the same time, 72.8% of the population of Belarus uses the Internet daily. 46.3% used the Internet for financial transactions, and 26.7% for interaction with government bodies. The data obtained are consistent with the data of national statistics, according to which the proportion of the population using the Internet in 2022 in rural areas was 79.7%, and in urban areas - 92.5 %. Reducing the gap in the use of the Internet between rural and urban residents is important in terms of achieving SDG 16 (target 16.10 "Ensure public access to information and protect fundamental freedoms following national legislation and international agreements"). Moreover, without access to the Internet, it is difficult to fully achieve target 4.a "Build and improve educational institutions that are child, disability and gender sensitive and provide safe, violence-free, socially barrier-free and effective learning environments for all" SDG 4.

At the same time, the understanding and perception of digitalization at the local level as a development accelerator are at the initial stage of its formation. Today, most of the respondents understand digitalization as the presence of the Internet, telephone and computer; setting up periodic banking operations for payment for services; calculations. However, even these skills and access to such technologies are already making an important contribution to the achievement of SDG 17 (target 17.7 "Facilitate the development, transfer, dissemination and absorption of environmentally sound technologies, so that they are available to developing countries on mutually agreed favorable conditions, including a number on concessional and preferential terms").

Despite the relatively weak development of digitalization at the rural level, there is already a lack of digital programs (applications), according to the interviewees, this is most acutely felt in key areas that affect local development: information on the state of the environment (41.4% of responses); development and implementation of local initiatives (39.4%); business development (36.4%); getting an education (34.3%).

Important to the perception of digitalization at the local level as an accelerator of development is the prediction by local experts of how their ICT skills will change in 15 years. Most of the respondents' answers touched upon the problems of local development and raising the level of education in the field of ICT: the use of social networks to promote goods and services, their projects and taking on-line courses on digitalization.

A positive factor in the development of ICT is the desire of representatives of local communities to improve their skills in the field of digitalization (92%), but only 66.3% have such an opportunity in their places of residence. The development of digitalization, according to the respondents, contributes most to the formation of skills: more efficient financial management; increase in income due to employment growth; reduction of transport costs; having more free time for health care and education.

The highest level of development of communication skills on social networks and buying and selling on the Internet is observed among women in general and women on maternity leave, among residents aged 18-45 years (Figure 10). The average level is observed among men, residents of district centers, disabled people, and people aged 45-65.

At the same time, the skills to use more complex software for web design and conduct online training have a rather low level of development among all social groups, except the age group of 18-30 years old, which indicates a shortage in training in relevant competencies (Figure 10).

Which aspects of local development are most affected by digitalization, according to the target groups involved in the preparation of the review?

*To the greatest extent*, the development of digitalization at the local level contributes to the growth of the availability and quality of banking services, the opening and development of businesses, and the development of tourism. *To a large extent* – reducing the outflow of young people to cities, the availability and quality of services in the field of social protection, improving transport mobility, the availability and quality of services in education and healthcare, improving the comfort of

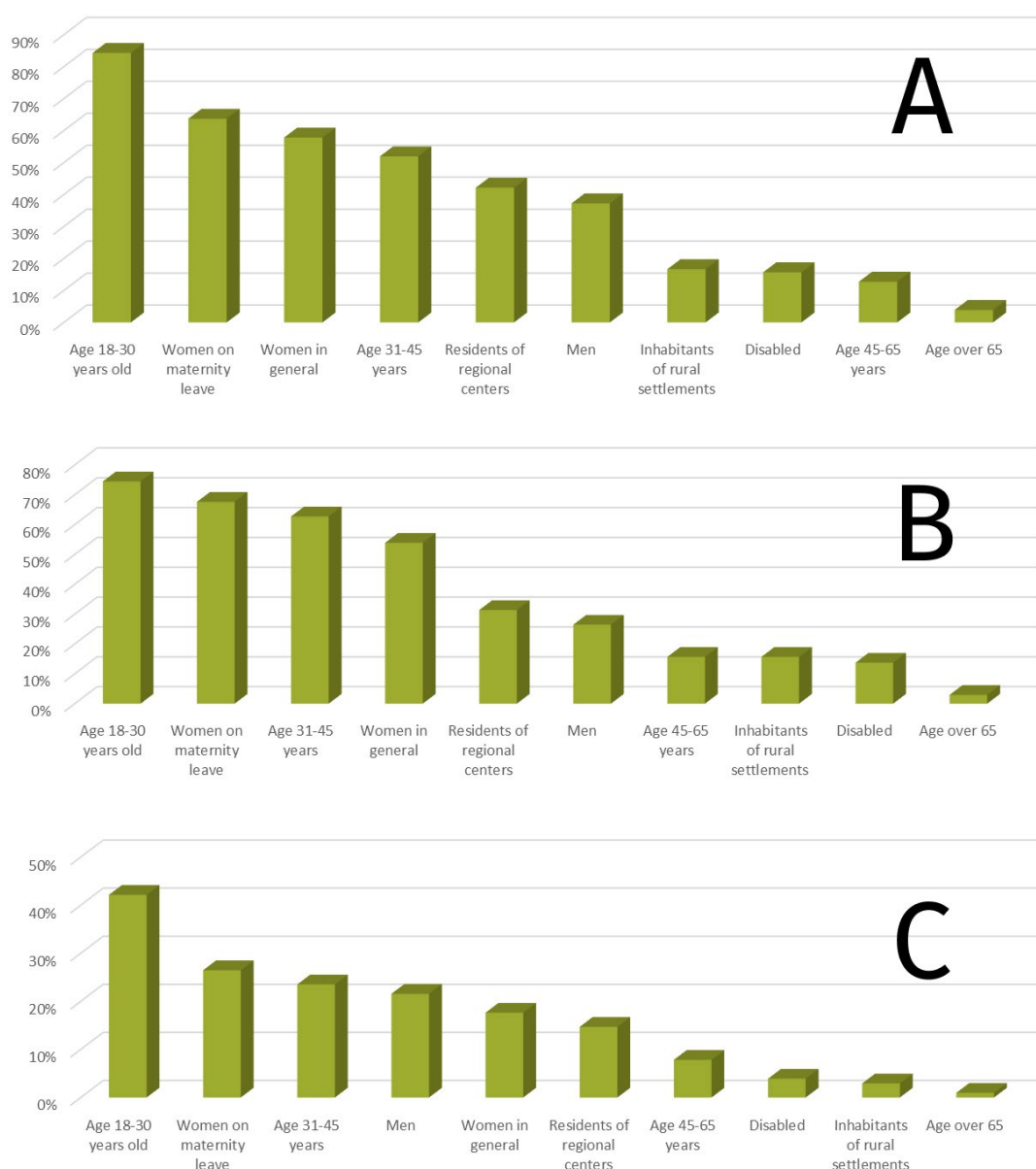


Figure 10 – The degree of development of various skills for using digitalization in different social groups: A) communication on social networks, B) buying and selling on the Internet, C) earning money through digitalization (web design, online training, etc.)

living, improving the environment, increasing the involvement of socially vulnerable groups in local development, increasing the role of women in local development, introduction of innovations in the social sphere.

Most types of economic activity, according to the respondents, have an average level of ICT use (small and medium-sized businesses, transport, agro ecotourism, services), a low level is noted in agriculture. Virtually undeveloped new types of business (creating websites, blogging, etc.).

For the social sphere, the average level of ICT use is observed in the education of children and adults, as well as in health care; low – typical for social services (elderly people, disabled people).

In the field of environmental protection, the average level of ICT use is typical for the management of housing and communal services and the low level – for monitoring and assessing the state of the environment.

A low level of ICT use is observed in decision-making for local development and an average level – for communication with authorities.

A decrease in interest in the development of digitalization can be caused by the facts of the abuse of personal information sent via the Internet, other privacy violations (for example, the misuse of images, videos, personal data uploaded to community websites) (67.6% of respondents); possible financial losses of citizens due to the fraudulent use of a payment card or as a result of receiving fraudulent messages (64.7%); infection of a computer, laptop, smartphone with a virus that led to the loss of information or time (51%).

**Thus, on the basis analysis perception of digitalization at the local level as a development accelerator, the following conclusions can be made:**

4. In rural areas (population less than 80 thousand people), due to the steady outflow of young people, there is a weak potential for using ICT. The perception of digitalization at the local level is most often associated with the availability of equipment.
5. At the local level, the understanding of digitalization as an accelerator of development is formed intuitively only through wide access to the Internet and communication on social networks.
6. The average level of ICT use is observed in the sphere of business, the low level - in the field of environmental protection and the social sphere.
7. Elderly people and people with disabilities do not actually take part in the use of ICT in any sphere of life.
8. The main purposes of using ICT are leisure, banking and housing, and communal services, less often education.
9. A lack of competencies among the local population in the use of modern software for business development and project implementation has been identified.
10. It is required to develop and implement state comprehensive programs for the development of digitalization at the regional and local levels as a cross-cutting (intersectoral) priority of local development.

## 6.2 Status and trends in the implementation of digitalization in key areas of life at the local level

### 6.2.1 SME DEVELOPMENT AND DIGITALIZATION

The SME Development Strategy “Belarus – the Country of Successful Entrepreneurship” for the period up to 2030 provides, at the main stage of implementation (2021–2030), a stable dynamic of quantitative and qualitative growth of SMEs, improvement of its sectoral and territorial structure, strengthening of the technical, technological and human resources of its subjects. According to statistics, the share of SMEs participating in joint innovation projects out of the total number of surveyed SMEs was only 0.56% in 2021<sup>89</sup>.

In the context of the outflow of young people from small towns and rural areas, the lack of invest-

ment resources, and difficulties in finding employment, it is SMEs based on digital technologies that can become the main accelerator of local development in Belarus.

Within the framework of the project «Networking to improve employment opportunities in rural areas of the Mogilev region», implemented by Bykhovskiy, Klichevskiy, Krasnopolskiy, Slavgorodskiy, Cherkovskiy district executive committees and the Local Fund for the Development of Rural Areas at the expense of the European Union, a mobile application «Local Market» was created (Figure 11). The purpose of the application is to create a

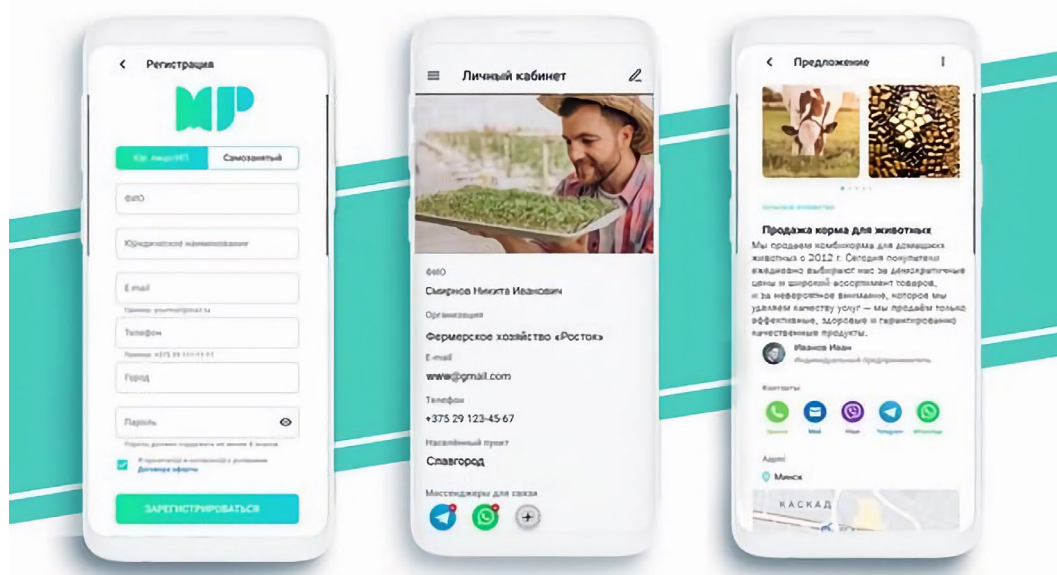


Figure 11 – Mobile application “Local market”



<sup>89</sup> Selected indicators of the European Innovation Scoreboard (EIS-2021) for the Republic of Belarus



channel for promoting local and regional services and goods that entrepreneurs from five districts of the Mogilev region.

In addition, the application was designed to support future entrepreneurs in finding new business niches, as well as to expand the resource base. The application was supposed to become a handy tool for local development structures (foundations, cooperatives, etc.) to identify and develop priority areas for business development in the region and provide it with comprehensive support: consulting, technological, technical, etc., including the assistance in cooperation and clustering. This application was intended to become one of the tools that promote the economic development of the south-eastern region of the Mogilev region to activate the economic development of which there is a special Decree of the President of the Republic of Belarus and a special regional development program. In 2020, the application was launched and the number of registered suppliers of local goods and services, as well as consumers, grew rapidly. Thus, local supply chains became more active, a local e-commerce culture began to grow and new business niches appeared. However, in 2022, due to the closure of the organization executing the project, for reasons beyond the control

of the developers, the application stopped operating. The application could not become commercial in the short period of time. The participation of local businesses in the development and implementation of this application can be called its most important uniqueness.

From the series of massive local projects that exist in Belarus, can be mentioned local sites promoting tourism services (example in Figure 12), local artisan goods and food and business card sites. Today, there are a huge number of pages on Instagram, Facebook, TikTok and other social networks that also promote local projects, services and products.

Entrepreneurs participating in the preparation of the survey (39 people) noted that nowadays the most commonly used technologies for doing business are remote communication with customers (chats, e-mail), social networks, receiving and making payments (Figure 13). More than half of entrepreneurs use accounting software and marketplace services. Less popular among entrepreneurs are monitoring systems for tracking product quality, digital systems for interacting with customers, as well as keeping records of transportation costs.

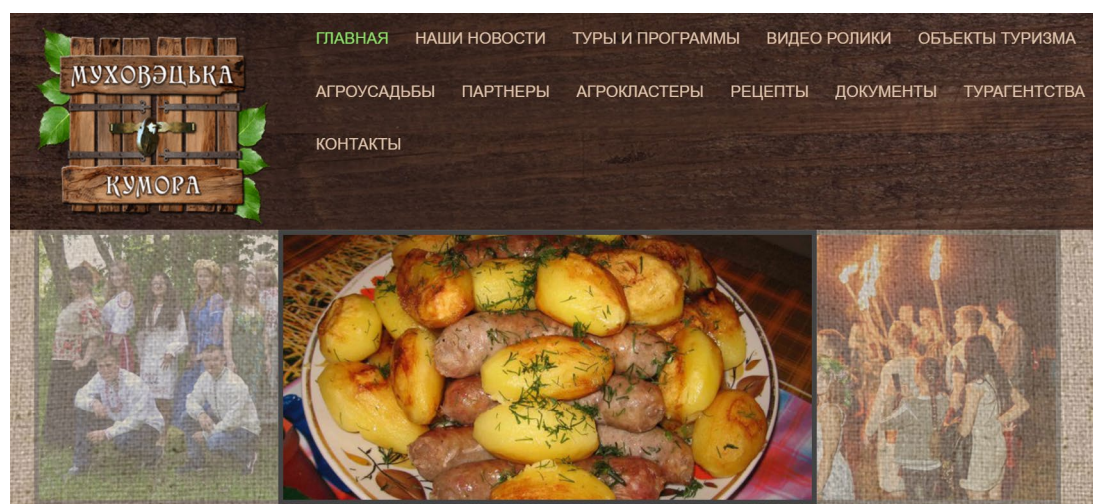


Figure 12 – Site of the cluster “Mukhovetska Kumora” (<http://www.kumora.by/>)

In general, more than 80% of entrepreneurs constantly use ICT to organize and conduct business. Therefore, 52% of entrepreneurs who took part in the study of the issue noted that digitalization can significantly increase business efficiency and another 44% agreed that this can be argued. Thus, 96% of local entrepreneurs already see the importance of digitalization for their development.

It is interesting how residents (business clients) of the regions see the contribution of digitalization to the development of local businesses. 27.0% of the residents participating in the study noted that thanks to digital technologies, local businesses

have significantly increased their efficiency and 32.4% noted that this can be argued. This means that almost 60% of consumers of SME services have already experienced the effectiveness of digitalization, which was used by both SMEs and consumers themselves.

Among the positive changes in business development that have occurred due to digitalization, entrepreneurs noted, first of all, the strengthening of trust between customers and businesses and the improvement of the quality of goods and services (Figure 14). A significant aspect of the impact of digitalization has been the increased partic-

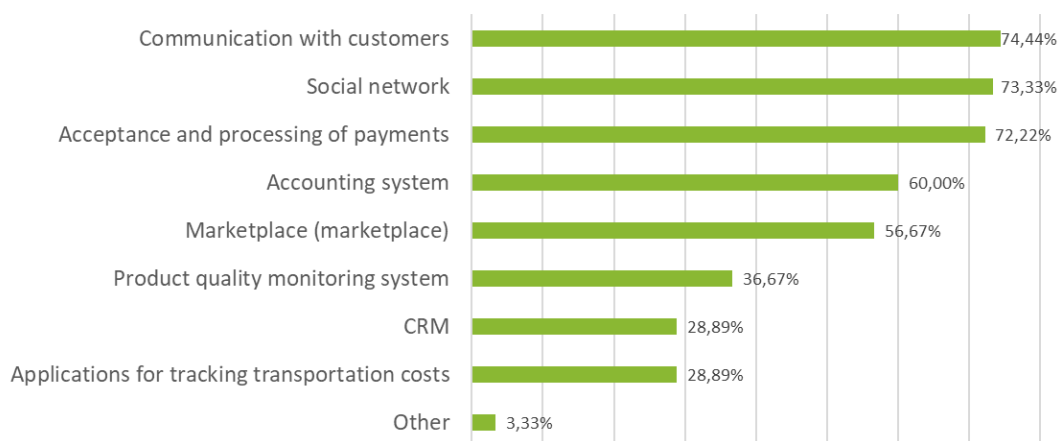


Figure 13 – Most common ICTs used for business



Figure 14 – Distribution of the effects of the impact of digital development on entrepreneurial activity, % of the total number of participating entrepreneurs

ipation of local businesses in local development and their social and environmental responsibility. Around half of entrepreneurs noted the strengthening of the interaction between businesses and the government thanks to digital technologies.

We believe it is important to present a number of results of a study assessing the needs for use and the level of use by target groups of Bykhovsky, Cherikovsky, Krasnopolsky districts of the Mogilev region in their activities of technologies and methods based on the principles of low-carbon development, carried out by IP A.M. Lavrinenko in 2021. These studies have shown that representatives of already established businesses, where more than 5 people work and where is a certain growth in development, have an interest and need for digitalization. Self-employed people and entrepreneurs in rural areas who are committed to trade and services and have unstable incomes are interested in training but it is difficult for them to find resources for digitalization training.

The studies of A.M. Lavrinenko also revealed the negative experience of existing entrepreneurs on the introduction of digital technologies in business. In particular, there is difficulty in creating and further maintaining the site, trying to implement CRM systems, setting up paid advertising, etc. This happens due to a number of factors:

- Low level of understanding of the mechanism of work of digital technologies by entrepreneurs in the districts.
- Weak advice from organizations providing services for the implementation of digital technologies.
- Lack of concrete examples of successful implementation of digital technologies among entrepreneurs of the district (there were no such examples among the respondents).
- The scope of activity of enterprises in the districts is mainly retail trade (1-2 people in the state), catering services, agriculture and woodworking, where digital technologies in

small businesses in these areas do not play such a significant role.

Lavrinenko A.M. makes conclusions about weak digital culture in general and it's not only security, as shown in many studies where small and medium businesses do not understand that there are risks of data violations, customer abandonment, etc. It is more about the importance of showing entrepreneurs how to use modern digital technologies to develop entrepreneurship, even in the so-called "depressed" areas that are selected for the study.

Lavrinenko A.M. highlights the digital divide. There are different opportunities in the regions, incl. Internet speed and network coverage, access to knowledge. The digital divide also manifests itself in the fact that small businesses compete with medium and large businesses, where there is a team, marketers, time and budget. When an enterprise is small, it does not have any of the above. Perhaps you need to consider a boxed (package) solution, where everything is in one place and at once for a specific niche. We need to popularize the opportunities and benefits of digitalization more, we need a unified digital environment so that the regions understand that despite the fact that they live, for example, in Krasnopolye, they have the same opportunities as in Minsk.

Thus, it is obvious that the development of SMEs using IT technologies can and should become the most important accelerator for boosting entrepreneurial activity and an early transition to sustainable development at the local level. This is evidenced by a survey of both entrepreneurs and clients of entrepreneurs participating in the preparation of the review, as well as previous studies by IP Lavrinenko A.M. Digital development can significantly contribute to the creation of new jobs and industries, improve the investment image of the territories, and improve the quality of life of the population. However, other conditions are also important, such as the provision of resources for the development of SMEs and other preferences, support for the creation of public-private projects and programs aimed at local development.



## 6.2.2 EMPLOYMENT GROWTH AND DIGITALIZATION

Digital transformations have a powerful impact not only on the quantitative but also on the qualitative characteristics of employment<sup>90</sup>. Digitalization leads to the emergence and spread of such atypical forms of employment as remote work, freelancing and work based on Internet platforms that allow it to be performed outside the location of the employer.

Created atypical forms of employment have had a serious impact on the organization of work and how employers and employees interact with each other. There are scholarly discussions both about the status of those who work through an online platform and whether online platforms them-

selves can be considered employers. According to the National Statistical Committee, the share of employment in knowledge-intensive activities in total employment in 2021 was 35.2<sup>91</sup>. The share of exports of medium and high-tech goods for the same period accounted for 31.7% of the total exports of goods.

From this point of view of employment, it is important not only that certain professions are becoming a thing of the past and new ones are emerging, but also that traditional approaches to the employment relationship are becoming less and less applicable<sup>92</sup>. Low and medium-skilled jobs are the most susceptible to automation. Con-

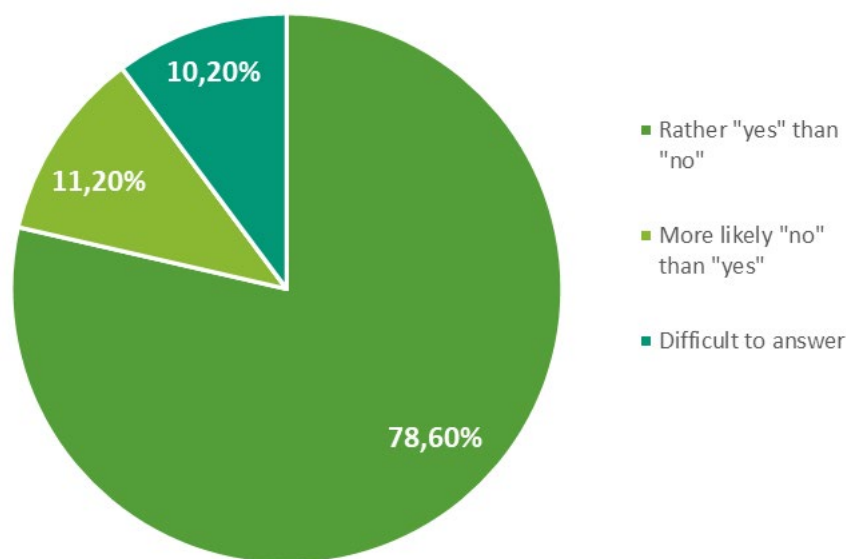


Figure 15 – Does the development of digitalization contribute to the growth of employment?



<sup>90</sup> Tomashevsky K.L. Digitalization and its impact on the labor market and labor relations (theoretical and comparative legal aspects) [Text] / Tomashevsky K.L. // Bulletin of St. Petersburg University. Law 2. - 2020. - No.. — S. 398-413.

<sup>91</sup> Science and innovation activity in the Republic of Belarus, 2022 / Electronic resource / / National Statistical Committee of the Republic of Belarus.: [website]. - (date of access: 17/07/2023)

<sup>92</sup> Lyutov, N. L. Adaptation of labor law to the development of digital technologies: challenges and prospects. [Text] / N. L. Lyutov // Actual problems of Russian law. — 2019. - No. 6 (103). - S. 109.

versely, programmers are most in demand in the context of digitalization. At the same time, there may be a flow of labor resources into the digital economies of more developed countries and into the digital ecosystems of global digital platforms.

Let's consider what qualitative changes in employment are taking place under the influence of digitalization in the regions of Belarus and in general, whether digitalization has an impact on employment. According to 79% of the 98 respondents, the development of digitalization contributes to employment growth. At the same time, they record a

medium or strong impact of digitalization on the availability of jobs and wage growth (Figures 15 and 16A). More than 62% of those participating in the study rated the impact of digitalization on reducing the outflow of young people to large cities as strong and medium and only a third of those participating rated this impact as low (Figure 16B).

62% of respondents say that residents of rural areas are not able to earn money due to the presence of digital skills, while only 37% of the district center think the same (Figure 17).

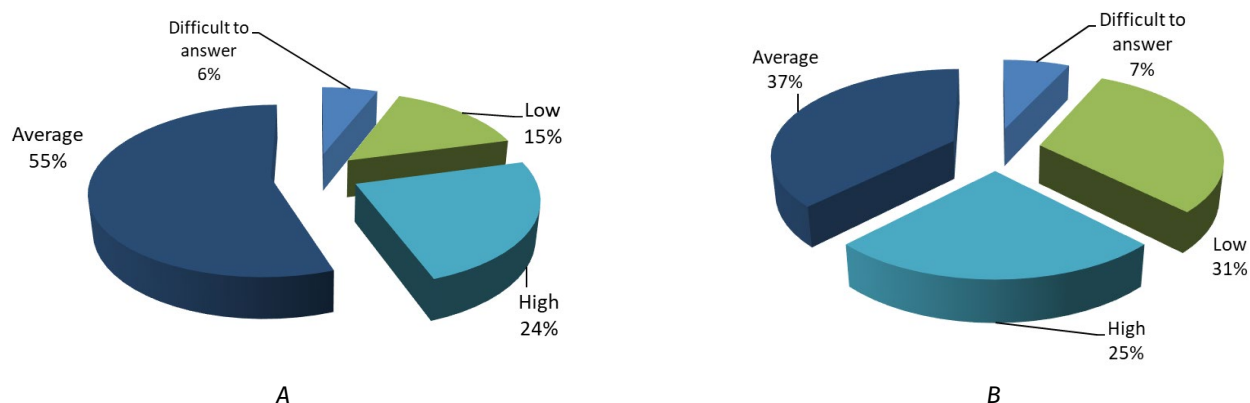


Figure 16 – Assessing the impact of digitalization on job availability and wage growth (A), reducing the outflow of young people to large cities (B)

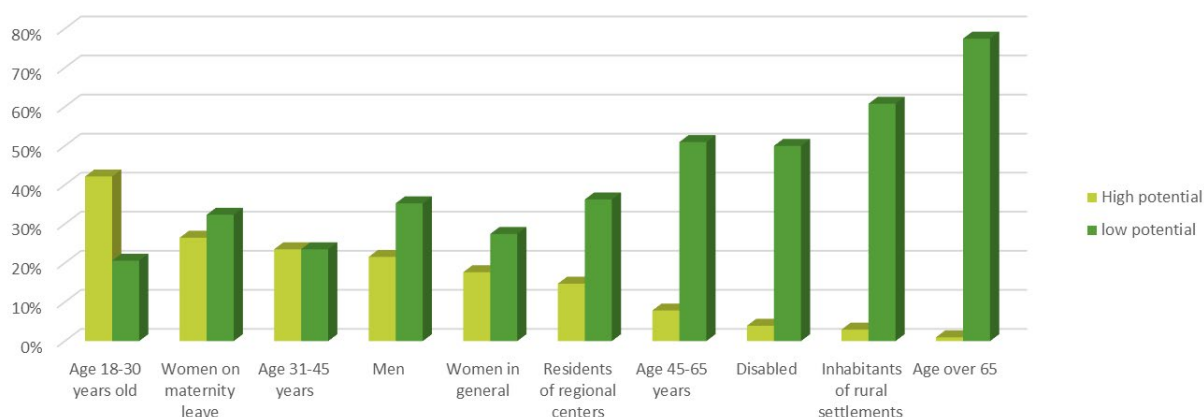


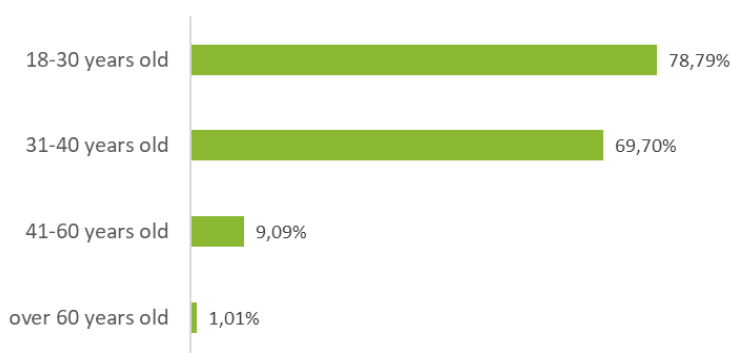
Figure 17 – Distribution of the potential of various target groups to earn money thanks to digitalization (web design, online training and other types of employment)

52% believe that digital technologies contribute to income growth to some extent with the highest percentage among women and those aged 18-30 and 31-40 (Figure 18). People aged 41 and older are less likely to use ICTs to increase employment and income as they age.

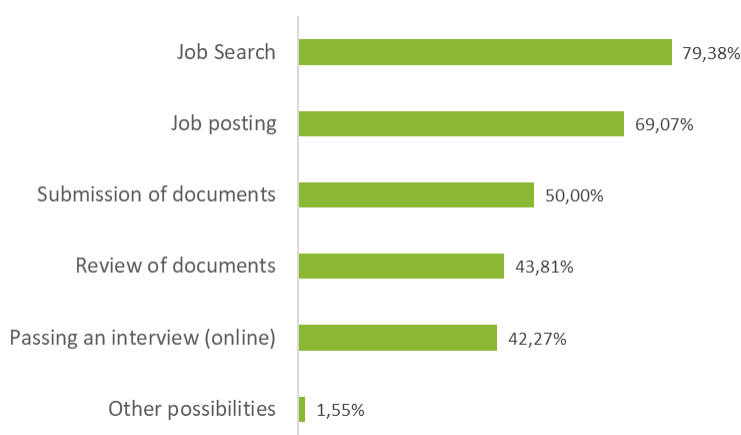
For the majority of respondents among the population, thanks to the Internet, the availability of diverse information has significantly improved. This made it easier to find and post information about existing vacancies, which was noted by 79.38% and 69.07% of people participating in the study, respectively. Half of the participants noted that they had applied for employment online. Slightly less than half of the respondents noted that their documents were reviewed online and they were also interviewed online for employment (Figure 19).

Improvements related to employment are also associated with an increase in the applicant's potential. The highest priority for this is training, which was confirmed by 55.1% of the respondents (Table 13). A third of the respondents noted that they are also looking for resources (the type of resources was not specified) that they can use to increase their employment, information to choose the best employer and they are also interested in finding a job remotely. Those, who are less interested, are looking for new business ideas (17.3% of respondents) and information about a mentor who could support them – 11.2%.

At the same time, many people use special sites with vacancies (77.55%) and freelance platforms (46.94%) to find a job (Figure 20). To a lower range, those who are looking for a job are interested in websites with business ideas and marketplaces. Only a third of the respondents are interested in



*Figure 18 – The share of the population by age categories by the intensity of the use of ICT for employment growth*



*Figure 19 – Prioritization of processes undertaken by job seekers to find a job*

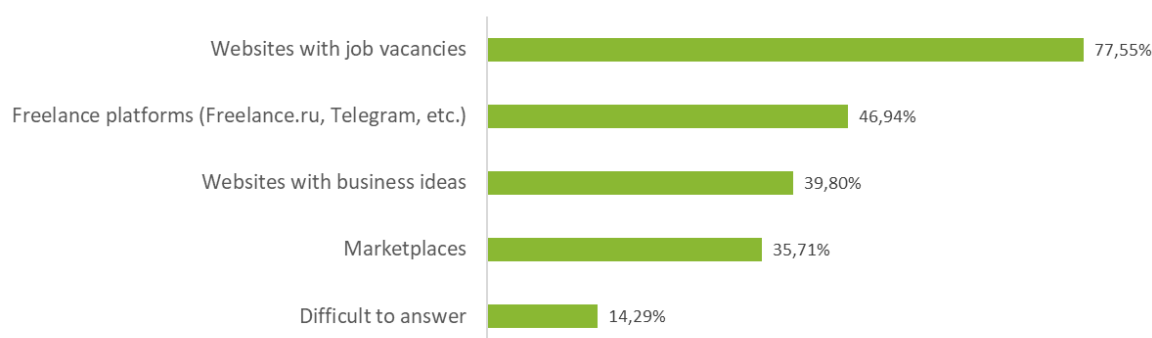
this information. This indicates that the local people involved in the preparation of the survey are more interested in working for somebody than working independently.

When considering issues related to digitalization, the participants answered “I find it difficult to answer”, which indicates the insufficiency of their competencies in this area. This is especially true for innovative areas, for example, digital platforms. Thus, almost 15% of the participants could not answer this question.

An important result of the research was the fact that the respondents testified that digitalization not only provided them with the opportunity to access the Internet but also that digitalization is already affecting life. Thus, about 70% of respondents believe that digitalization contributes to increased competition in the labor market, improving the quality of labor resources and improving working conditions for offered vacancies (Figure 21). More than 80% note the role of digitalization in increasing the mobility of labor resources (opportunities not only to work remotely but also to retrain, find a new job, open new business niches, etc.).

*Table 13. Prioritization of directions for looking for resources and information to increase employment*

Index	Percent of interested people, %
Learning Search	55.1%
Finding resources	34.7%
Finding the best employer	34.7%
Remote job search	33.7%
Search for business ideas	17.3%
Mentoring search	11.2%
Other	1.0%



*Figure 20 – The popularity of digital platforms for employment growth*

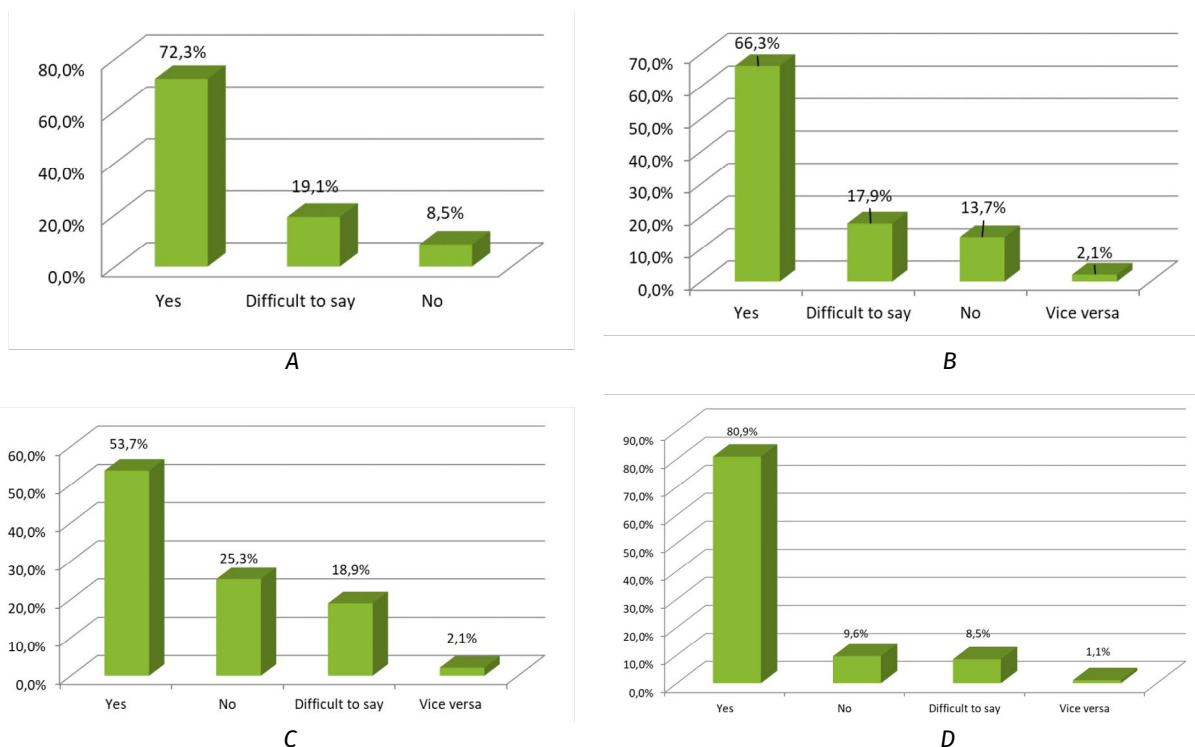


Figure 21 – The strength of the impact of digitalization on increasing competition in the labor market (A), improving the quality of labor resources (B), improving working conditions for offered vacancies (C) and increasing labor mobility (D)

### 6.2.3 ECOLOGY, INCLUDING IMPROVEMENT OF THE HOUSING AND COMMUNAL SERVICES SYSTEM AND DIGITALIZATION

One of the key objectives of the State Program “Digital Development of Belarus” for 2021-2025 is to increase the level of comfort and safety of life of the population through the creation and implementation of smart city technologies, including systems for remote monitoring and accounting for the state of the housing stock, energy consumption, the state of the environment, video analytics and more.

Take a look at examples of the introduction of ICT for the above mentioned purposes. As part of improving the tools for monitoring environmental components using new digital technologies the development of a pilot information resource for Belarus “System for online monitoring of the state of

environmental components in the city of Orsha and Orsha district” was completed in 2021. The information resource contains observational data on the state of atmospheric air, surface and groundwater, land and background radiation, as well as the results of local monitoring provided by nature users with the possibility of analyzing their changes over time. It will allow people to develop and implement more effective measures to protect the environment. This example demonstrates the local contribution to the achievement of SDGs 13, 14 and 15 at the local level.

Thanks to UNDP support, Belarus implemented projects to accelerate local sustainable development in 2021-2022<sup>93</sup>, namely:



<sup>93</sup> [How can digitalization, green economy and inclusion change the small towns of Belarus for the better?](#) / [Electronic resource] // UNDP Belarus: [website]. – (date of access: 18.07. 2023).

- Creation of an intelligent street lighting control system in Novogrudok. Energy-efficient technologies and “smart” lighting control can reduce carbon dioxide emissions by 90 tons per year, which reduces the cost of the city budget for street lighting by more than 30,000 rubles per year.
- A digital waste management system was piloted in Pinsk, Polotsk and Novopolotsk, and. 66 sensors connected to the cloud system were installed on the garbage containers.
- In Korma, Novopolotsk, Pinsk and Novogrudok, the UNDP Laboratory for Accelerating Sustainable Development in Belarus conducted a digital inventory of city parks, squares and alleys. The collection of information on the state of green spaces and their characteristics for a single database helped to determine further steps to improve the quality of green areas and expand their areas, as well as to reduce the financial burden on the city budget. Such large-scale and thorough work became possible thanks to the use of a special digital application for recording and monitoring the condition of trees and shrubs, as well as the active participation of local volunteers. The initiative has shown that the creation of

digital databases makes it possible to make timely, thoughtful and effective decisions in urban green planning.

- Residents of two high-rise buildings in Novogrudok became participants in an information campaign to stimulate responsible consumption of heat and water. Moreover, the UNDP Laboratory for Accelerating Sustainable Development in Belarus developed information leaflets where residents could compare their costs for paying for heat and water with the reference consumption of resources in a similar apartment. Thanks to the initiative, residents were able to reduce their consumption of cold water by 7%, hot water by 5.5%, and heat energy by 5.9%

There are interesting digital projects in the field of ecology, such as the Green Map project (<http://greenmap.by/>) and the Zero waste map of Minsk (<https://ecoidea.me/ru/zerowaste>) (Figure 22). The Green Card project is an interactive map that contains information about important environmental objects: collection points for waste and unnecessary things; organizations involved in environmental protection; places where installations for renewable energy are set; unique natural areas – parks, squares, nature reserves, etc. The



Figure 22 – Minsk City Zero waste map

Zero waste map reflects places that help to have a zero-waste lifestyle. For example, it shows places where people can buy bulk goods or places with reusable alternatives to disposables and more.

As part of the preparation of the review, the contribution of digitalization to the use of housing and communal services by the population, the effectiveness of which can significantly affect the environment, both in terms of the consumption of natural resources and in terms of the release of waste products into the atmosphere, water sources, etc., was analyzed.

More than 40% of respondents use digital technologies to control the consumption of such resources as water, gas and electricity consumption (Figure 23). About 35% control and regulate heating. Waste management is used by less than 15% of the population. At the same time, more than a third

of the participants found it difficult to answer the question about what kind of housing and communal services they manage using ICT. This indicates both the weak ability of users to manage housing and communal services and weak competencies in understanding what can be done in this situation.

According to the population, the main use of ICT in housing and communal services is to provide comfortable living conditions (Figure 24). Digitalization also makes it possible to reduce the consumption of natural and energy resources and, accordingly, save money. At the same time, 38.3% of respondents believe that digitalization will tell people what should be repaired or changed in the management of housing and communal services. To a lesser extent, the respondents noted the importance of digitalization in housing and communal services for monitoring the state of the environment (30.85%).

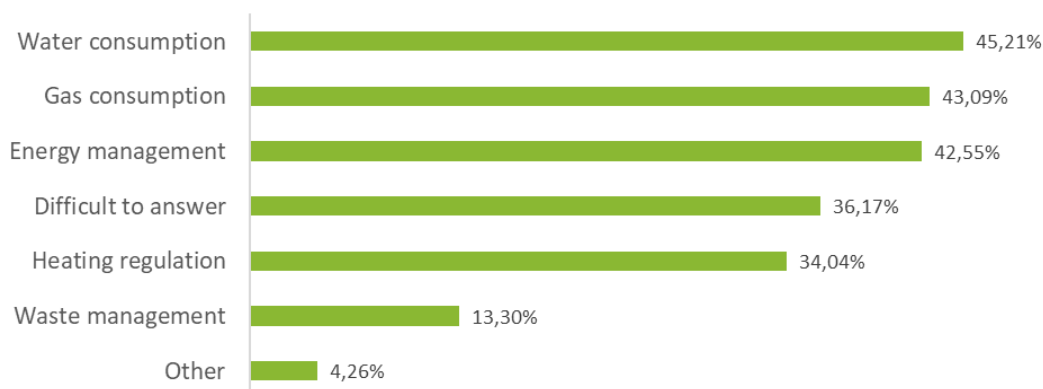


Figure 23 – The degree of digitalization of utilities / resource consumption in the housing and communal services sector

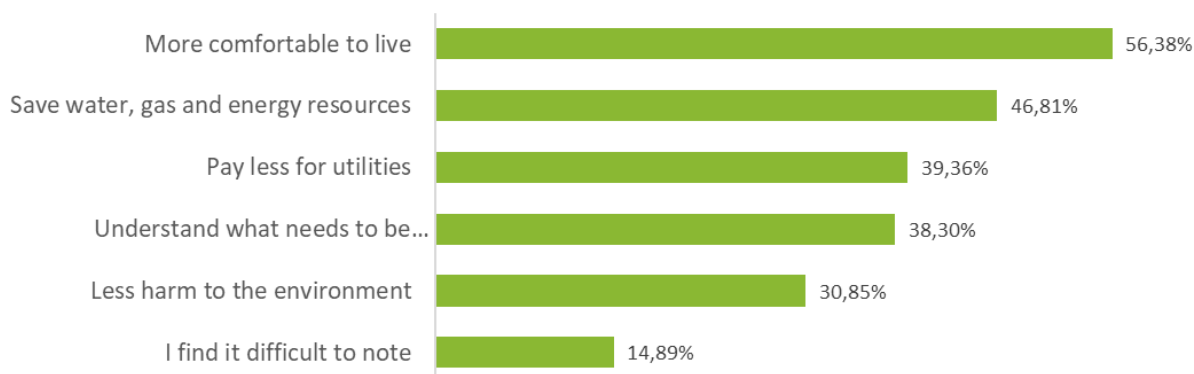


Figure 24 - Priority of the effects of the impact of the use of ICT in the management of public services



Almost 90% of respondents believe that the system of payment for housing and communal services through Internet banking is best digitalized (Figure 25). Slightly less than half of those participating in the study noted the significant contribution of digitalization to accounting for data on the consumption of housing and communal services. At the same time, there is a very low level of digitalization, according to the population, of the process of reverse communication of housing and communal services with consumers. This minimizes their participation in the management of housing and communal services and in enhancing the positive effects of digitalization in housing and communal services for their own comfort, for the efficiency of the housing and communal services itself, and the preservation of the environment.

Data processing showed that digital technologies for managing public services are used by men and

women almost equally – 53.6% of the respondents (Figure 26). However, taking into account the fact that almost 30% of the respondents indicated as women are more likely to use ICT to manage housing and communal services than men (9.18%), it is obvious that the leadership in the development and implementation of ICT in this area belongs to women.

It is important to mention that the task of digital transformation of housing and communal services is especially relevant in connecting with the goals and objectives set in the NSSD-2035. At the stage of preparation and implementation of digital transformation, the current model and structure of management and regulation of the housing and communal services system requires improvement and optimization. This conclusion is based on the methodology of process reengineering (complete restructuring, not “improvement”), which would be



Figure 25 – The level of digitalization of the housing and communal services function according to the population

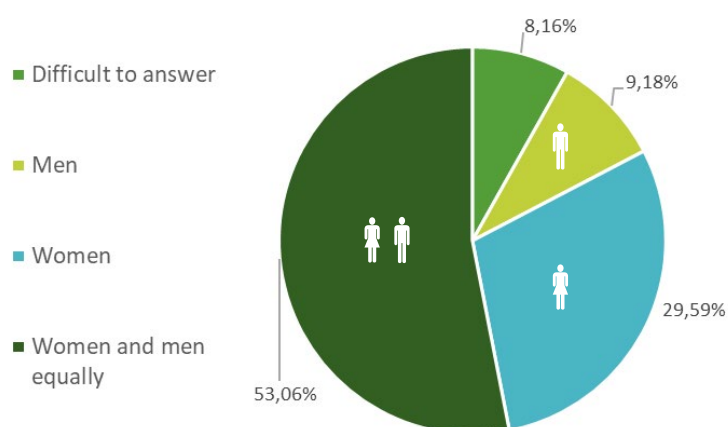


Figure 26 – Gender leadership in the use of ICT for managing housing and communal services.

a real practice orientation in the context of moving towards the «Industry 4.0» through the digital transformation of all sectors of the economy. The modern digital transformation of housing and communal services can be divided into two groups of technologies: complex (which change the system itself) and communication (which facilitate the relationship of local residents with housing and communal services). In review, the authors equally explored both groups of technologies and summarizing the results, it can be stated that the

«localization» of digitalization in the housing and communal services has begun. The progress of digitalization of the activities of the organization of the work of the housing and communal services itself is tangible, which ensures the accounting of the services provided and settlements with consumers. However, the ability of consumers to manage the quality of the services they consume remains weak due to technical capabilities and insufficient competencies.

#### 6.2.4 EDUCATION AND DIGITALIZATION

The spread of COVID-19 has become a significant challenge to humans, including the education system. COVID-19 served as an impetus for the development of distance learning. Digital transformation involves the introduction of new digital educational technologies, such as the use of augmented reality, artificial intelligence and big database technologies. Within the framework of the State Program «Digital Development of Belarus» for 2021-2025, it is planned to develop an educational platform to increase the digital literacy of the population, create a showcase of digital projects, reduce the digital divide by organizing access to universal services and building fiber-optic communication lines to settlements with 50 and more households.

In recent years in Belarus, within the framework of state programs, the digital infrastructure of educational institutions has improved<sup>94</sup> significantly. The share of educational institutions covered by the E-School project from the total number of educational institutions in 2020 was 80.0%. More than 90% of educational institutions in Belarus have broadband access to the Internet.

In 2018, as part of the STEM education project<sup>95</sup> The Education for the Future Association, in cooperation with public and private organizations,

launched a project to create a network of STEM centers based on regional institutions of general secondary education in Belarus. The goal of the project is to provide an opportunity for high-quality and innovative school education to as many children as possible. A sustainable system of STEM centers can not only act as a social lift for talented children but also contribute to the development of cities with a population of less than 80 thousand inhabitants and rural settlements. In the future, it is planned to make the system of STEM centers multi-level. The network of regional STEM classes is planned to be supplemented with regional STEM hubs in which the most gifted students of regional STEM centers could be involved in engineering and technical creativity together with students of colleges and universities. All regional STEM hubs in the future should be coordinated with the national STEM center in Minsk, which prepares children and teenagers for international competitions. This project is under development «from the bottom up», making a solid foundation for the regional and national structures that will be created later.

While preparing this review, the authors focused on the digitalization of *adult education*, which is extremely important for the conscious participation in sustainable development processes, primarily at the local level. Today, the level of com-



<sup>94</sup> State Program «Education and Youth Policy» for 2021-2025 / [Electronic resource] // Ministry of Education of the Republic of Belarus: [website]. — (date of access: 18/07/2023).



<sup>95</sup> Development of the STEM approach and STEM centers in Belarus (date of access: 18/07/2023).

petence of the adult population determines the depth of digital transformations in the management of quality of life and local development.

**In the study of the impact of digitalization on changing opportunities for adult learning, representatives of both the education sector (28% of the respondents) and the population not associated with this sphere (72%) took part.**

The importance of digitalization in the context of the development of education at the local level is

evidenced by the results, according to which 64.1% of respondents believe that digitalization and the development of ICT contribute to the increase in demand for educational services (Figure 27).

62.7% of respondents noted that they use the Internet for educational purposes, while 46% of respondents spoke about high motivation to improve their skills in the field of digitalization. At the same time, 34.3% of respondents lack digital programs (applications) to improve their level of education.

Quite a significant number of interviewees noted (33.3%) that they plan to study (Figure 28). At

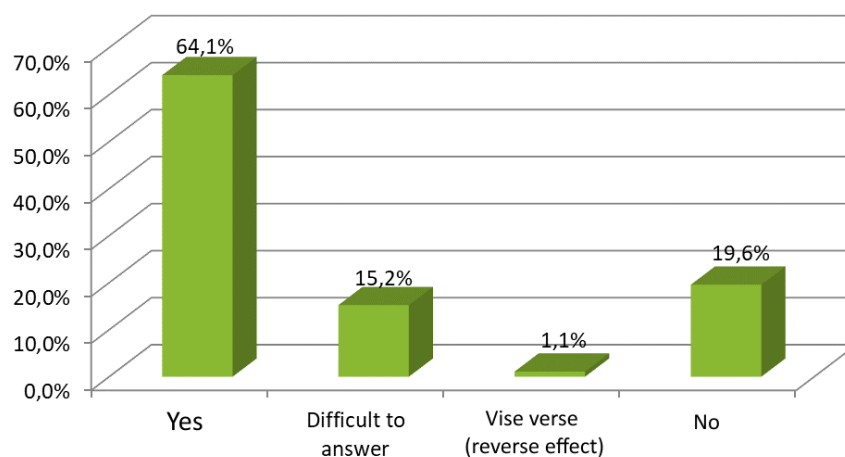


Figure 27 – Is it true that digitalization contributes to increased demand for educational services?

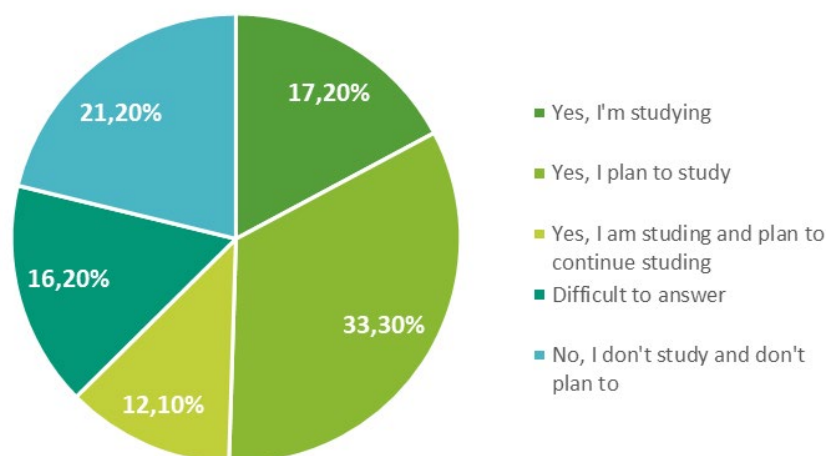


Figure 28 – Are you currently studying online or are you planning to study in the near future?

the same time, 17.2% of respondents are currently studying online and 12.1% are studying now and plan to study further.

**The most commonly used channels for obtaining information and knowledge in the field of digitalization at the local level were:**

- independent development (82%);
- friends (35%);
- educational institutions (24%);
- specialized online courses (21%);
- relatives (20%).

At the same time, 22% of respondents noted the amplifying effect of digitalization, which allows them to commit more time to education.

The most commonly used digital platforms (programs) for learning are Google, Youtube, Telegram and other messengers and ZOOM (Figure 29). Less popular are specialized online platforms, such as Microsoft Teams or Moodle, most likely due to the lack of promotion and poor practical use at the local level.

Among the main changes in a person caused by the digitalization of adult education were named (Figure 30) the skills to search for answers on the Internet (78.4%), increased initiative (52.6%) and

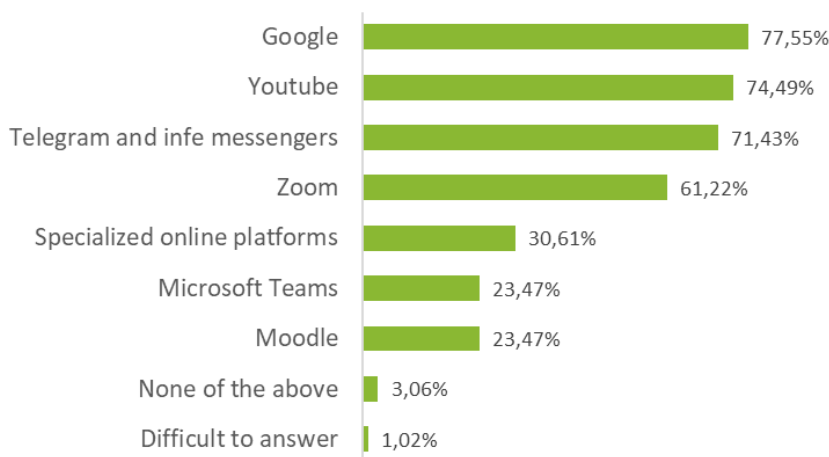


Figure 29 – What digital solutions (platforms, programs, etc.) do you use / plan to use for learning?

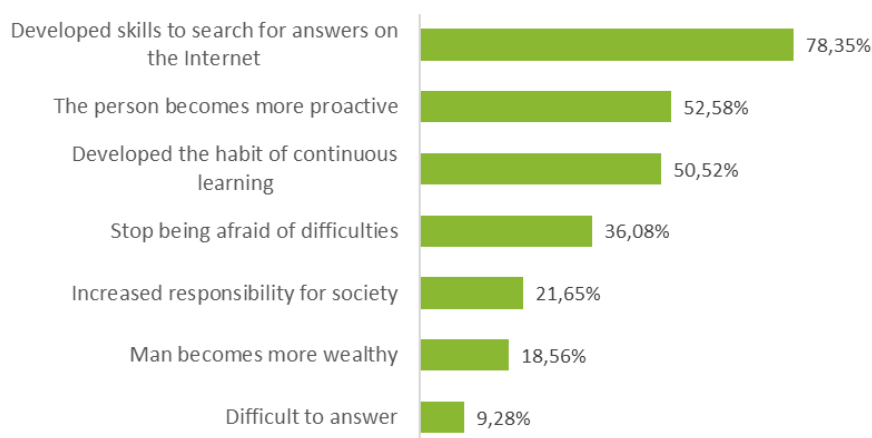


Figure 30 – What has digitalization in adult education changed in a person

the pattern of continuous learning (52.5%). To a lesser extent, this contributed to overcoming the fear of difficulties (36.1%) and the growth of responsibility for society (21.6%).

The most popular areas for continuing education due to digitalization are management, psychology, sustainable development and further education in a person's field of activity (Figure 31). A relatively unexpected result was the answer that digitalization is less helpful to learning economics and programming (18.56% and 14.43%, respectively). Ecology, sociology and medicine have become outsiders to the opinion of the population on this issue. Probably, this choice was made due to the demand and the possibility of applying the acquired knowledge at the local level.

The results of the study indicate the importance and growing role of digitalization in improving the accessibility of education and the acquisition of new skills by adults. Representatives of local communities actively master modern digital programs and platforms, they are also motivated to receive continuous education using ICT and constantly expanding the set of skills and abilities to use information technology at work and home. This contributes to the development of both professional competencies and personal qualities of the local population. At the same time, the fact that the local population lacks competence in the effective use of digitalization to obtain education and increase their potential is obvious.

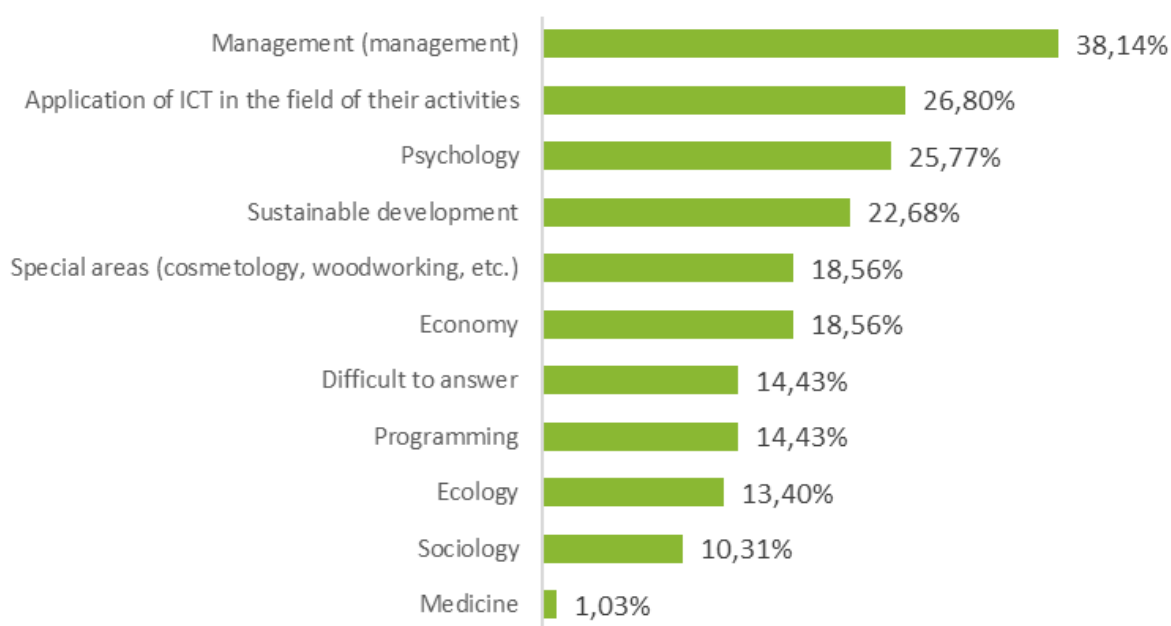


Figure 31 – In what area do you continue to study due to digitalization?

## 6.2.5 DIGITALIZATION AS A TOOL FOR CREATING E-GOVERNMENT AND INVOLVED PARTICIPATION IN LOCAL DEVELOPMENT

Mastering ICT for development management, regardless of the level of administrative-territorial division, including at the local level, has been and remains one of the most urgent tasks, which is in line with SDG 16, target 16.7, “Ensure responsible decision-making by representative bodies at all levels with participation of all sectors of society”. To ensure compliance with modern requirements for the quality of services provided to the population, as well as the timeliness of managerial decisions, government bodies need to have a deeper understanding of the possibilities of ICT. Enriched with new knowledge, it is necessary to fundamentally rethink our activities following the existing challenges. It is necessary to compare how they perform management functions now and how the functioning of the governing body should be improved in the near future to ensure territorial development on the principles of sustainable development.

Just installing and configuring autonomous automated systems for existing business processes cannot lead to the increase in efficiency or transformational changes needed to solve the complex problems that territorial governments face today. This entails the need to master a strategic holistic systemic understanding of what the administration of the region needs, taking into account its specifics: geographical, historical, demographic,

economic, personnel, environmental and previous history of work informatization.

In this regard, the developed Concept of the pilot regional project “Krichev – a small smart city. Krichevsky district. Let’s develop together»<sup>96</sup>. The main goal of implementing the concept is to improve the level and quality of life of the population living in the city of Krichev and the Krichevsky district. It was expected that ICT would allow authorities to directly interact with communities and urban infrastructure and manage urban development processes, working to improve the quality of life of citizens. The concept was developed in 2018. At present, several elements of this concept were implemented, in particular, the work of the systems «Electronic BUSINESS», «Safe City», electronic health care, ticket purchases, etc. were established.

Taking into account the specifics of the district and the factors listed above, three main directions for the implementation of the concept of a «smart city» are proposed, the achievement of which requires digital development *at the local level* (Table 14).

The involved participation of all target groups living in the territory is one of the most important guarantees for a successful transition to local

Table 14. The most important directions for the development of a “smart city”

I. Public Administration	II. Innovation economy	III. City infrastructure
Administrative services to citizens	Innovations in industry, clusters, city districts	Transport
Representative and direct democracy	Smart workforce: education and employment	Energy / Utilities
Citizen Services: Quality of Life	Creation of knowledge-intensive companies and investment projects	Environmental Protection / Safety



<sup>96</sup> [Smart City](#) / [Electronic resource] // Krichevsky District Executive Committee: [website]. — (date of access: 18/07/2023).

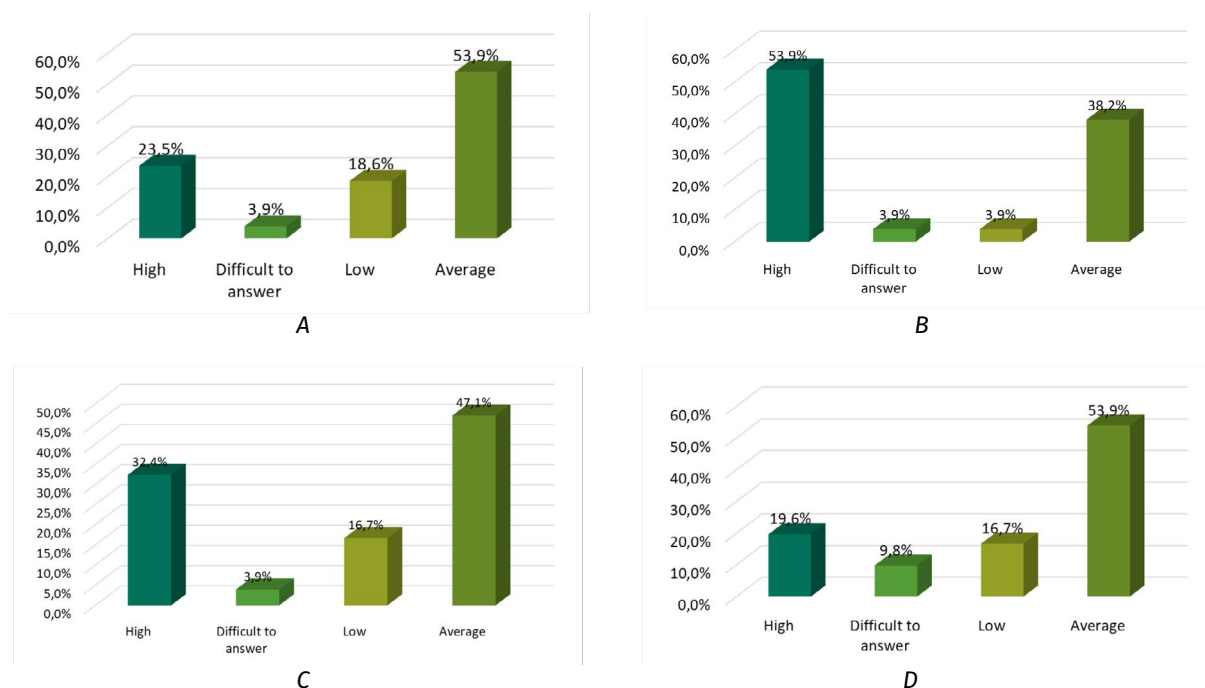
development. One of the results of participatory development is an increase in the number of local projects and initiatives being developed and implemented that contribute to all aspects of life.

According to those who participated in the preparation of the review, it is precisely the lack of digital solutions that is most significantly felt in the development and implementation of local initiatives (39.4% of respondents answered this way) and in the field of informing about the state of the environment (41.4%).

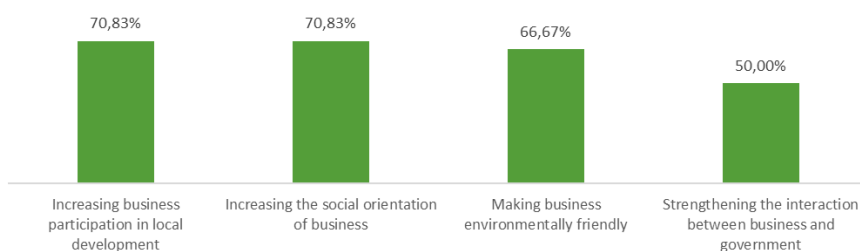
The vast majority believe that the development of digitalization contributes to facilitating communication in society, increasing openness and trust in

society, and raising social and environmental responsibility (Figure 32).

A great example is the contribution of digitalization as an accelerator of development processes and a tool for improving the efficiency of local government in changing the positioning and role of business in society. Figure 33 shows that the majority of entrepreneurs who took part in the preparation of the review noticed that thanks to the introduction of ICT, their role in local development will increase and their social and environmental responsibility will increase. More than 50% note that the inclusion of ICT in management processes will strengthen the interaction between businesses and the government.



**Figure 32 – Assessing the contribution of digitalization to increasing openness and trust in society (A), facilitating communication in society (B), increasing social responsibility of society (C) and environmental responsibility of society (D)**



**Figure 33 – Assessing the contribution of digitalization to enhancing the role of business in local development**



In general, according to the respondents (53.92%), digitalization can significantly enhance communication in society as a whole, which can be used to determine and agree on development prospects, issues of solving urgent problems, mobilizing internal resources, etc. (Figure 34). Around half of the respondents report the significance of the contribution of digitalization to increasing the attractiveness of life in the territory for young people and to improving the external image of society. They believe that the contribution of digitalization to the growth in the number of projects involving the population, business and government, as well as to the increase in the social and environmental community of society, is significant. In this way, respondents see a connection with improved social issues in the community, which also contributes

to a more sustainable form of local development. However, the proportion of respondents connecting digitalization with increased environmental responsibility of society is quite small, especially compared to other aspects of social processes (Figure 35).

The results of the study of the impact of digitalization on various modern life processes show that at present, digitalization has most deeply affected banking services (53.54%), tourism development, as well as opportunities to open and develop a business (47-48%) (Figure 35). The significant contribution of digitalization to transport mobility, to the wider introduction of innovations in the social sphere and to improving the quality of services in healthcare and education is obvious. Relatively

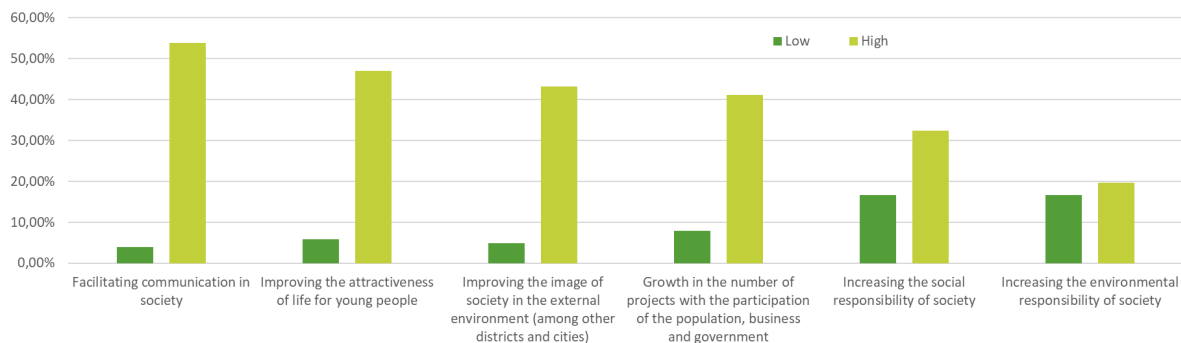


Figure 34 – The level of impact of digitalization in the activation of social processes



Figure 35 – The degree of contribution of digitalization to the activation of social processes

weaker is the impact of digitalization on housing and communal services, employment and the outflow of young people from rural areas to cities.

Special attention should be paid to the fact that more than a quarter of the respondents stated the importance of digitalization in enhancing the role of women, men and socially vulnerable groups in the activation of social processes at the local level. This means that at the local level, there are still unengaged, “hidden” and undiscovered reserves for development. This applies not only to social processes. Earlier in the review, it was already noted the low potential of people aged 45 years and older and people with disabilities to earn money with the help of digitalization (Figure 15). The disclosure of this potential can be facilitated by the availability of education, information and popu-

larization of best practices, development and implementation of accessible specialized programs.

The research results indicate the importance and necessity of localization of digital development to ensure participatory sustainable local development and contribution to the achievement of the SDGs. Thanks to digitalization, information and communication processes in society are activated, the role and contribution of all local target groups to local development is increasing, and the attractiveness of the territory for development is growing. Amplifying this effect with the availability of resources can have a synergistic effect to launch and support the activities of internal development mechanisms that are transparently managed by local authorities together with the community.

#### 6.2.6 GENDER ASPECTS OF DIGITALIZATION

Understanding gender perspectives in ICT use is important for assessing the achievement of SDG 5 (target 5.1 “End all forms of discrimination against all women and girls everywhere”) and SDG 10 (target 10.3 “Ensure equal opportunities and reduce inequalities of outcomes, including by eliminating discriminatory laws, policies and practices and promoting the adoption of appropriate legislation, policies and measures in this regard”).

According to the data provided by the National Statistical Committee of the Republic of Belarus, information and communication technologies are necessary for both women and men to function effectively in the modern digital and virtual world<sup>97</sup>. According to data obtained in 2022, 93.1% of women and 91.6% of men in the city actively use the Internet. In rural areas, these figures are lower and amounted to 80.3% for women and 78.9% for

men. At the level of 95-97% of respondents, both men and women from urban and rural areas almost equally have a mobile phone and use cellular communication services.

Therefore, women and men equally use personal computers (Table 15). Until 2019, there was a trend toward an increase in the use of computers (61.2-81.0%) and then a decrease in this indicator. This might be due to several reasons, such as the indulgence of communication restrictions after the end of the most critical phase of the COVID-19 pandemic, as well as the active use of other means of communication by the population, such as smartphones. The same data indicate more active use of personal computers by the urban population compared to rural residents, by almost 20% of the number of respondents.



<sup>97</sup> [Means of communication](#) / [Electronic resource] // Gender statistics / National Statistical Committee of the Republic of Belarus: [website]. — (date of access: 18/07/2023).

Table 15 – The share of the population using a personal computer, by place of residence,<sup>98</sup> %

Year	Rural population		Urban population	
	women	men	women	men
2013	43.9	48.7	64.6	67.8
2014	51.6	54.5	68.7	72.7
2015	55.9	54.7	72.2	74.6
2016	57.6	57.9	75.6	77.5
2017	61.4	59.4	75.9	77.4
2018	64.3	62.0	75.8	78.9
2019	64.7	61.2	78.6	81.0
2020	61.4	57.0	77.0	79.1
2021	61.3	60.1	72.9	74.3
2022	57,0	56,6	74,1	76,1

The National Statistical Committee analyzed the skills of the population in the field of ICT according to the following parameters:

- taking security measures,
- copying, pasting or moving information within a single document,
- sending an email with attached files,
- using basic arithmetic formulas in spreadsheets,
- connection and installation of new devices,
- search, download, install and configure software,
- creation of electronic presentations using special software,
- transfer files between the computer and other devices,
- writing computer programs using a specialized programming language,
- copying or moving files or folders.

The data obtained demonstrate that none of the analyzed skills indicators was noted by more than 50% of the respondents. This means that half of society remains with a low level of digital literacy. With the complication of the indicator for assessing digital skills from copying files to programming, the percentage of respondents with relevant skills decreased to 0.3-0.5%. To clarify this, the examples are provided below (tables 16-18).



<sup>98</sup> [Share of the population using a personal computer](#) / [Electronic resource] // Gender statistics / National Statistical Committee of the Republic of Belarus: [website]. — (date of access: 18/07/2023)

Table 16. Sending an email with attached files, % of the total number of respondents

Year	Rural population			Urban population		
	both sexes	women	men	both sexes	women	men
2018	19.0	22.1	15.0	39.3	39.7	38.7
2019	20.7	23.7	16.7	43.2	43.7	42.6
2020	17.5	21.8	11.9	40.1	40.5	39.7
2021	17.8	20.6	13.9	36.5	37.6	35.1
2022	20.4	23.3	16.3	41.1	42.6	38.8

Table 17. Search, download, installation and configuration of software, % of the total number of respondents

Year	Rural population			Urban population		
	both sexes	women	men	both sexes	women	men
2018	12.7	11.0	15.1	28.6	23.8	35.1
2019	13.2	12.2	14.5	26.8	22.4	32.8
2020	10.8	10.9	10.7	23.4	19.2	28.7
2021	12.1	11.3	14.7	22.4	18.5	28.1
2022	15.4	14.0	17.4	29.2	25.4	34.5

Table 18. Skills of the population in writing computer programs using a special language, % of the total number of respondents

Year	Rural population			Urban population		
	both sexes	women	men	both sexes	women	men
2018	0.7	0.7	0.7	3.0	1.7	4.7
2019	0.7	0.6	0.8	2.5	1.8	3.4
2020	0.5	0.3	0.7	1.6	0.6	2.7
2021	0.4	0.3	0.5	1.7	0.9	2.7
2022	0.8	0.9	0.5	1.3	0.5	2.5

There is a trend of differences between the digital skills of men and women depending on the place of residence. Men in urban environments are relatively more skilled at performing more complex operations than women, which is not the case in

rural areas. In rural areas, the opposite is probably the case, with women having a higher level of digital skills compared to men on a number of indicators.

### The research shows that:

- men and women are equally very interested in improving their digitalization skills, regardless of where they live (Table 19). In rural areas, the proportion of women who are prone to online learning is almost twice the proportion of men who study online. These distinctions are blurred in the urban environment.

In general, there is a significant difference between the rural population and the urban population. The urban population has more digital competencies than the rural population, regardless of gender differences.

- Both in rural and urban areas, women and men in general actively use Internet banking and social networks for communication, and also use information from the websites of government agencies (Table 20). To a lesser extent, they use the Internet for income generation, promotion of goods and services, and programming.

There are some differences between men and women in the search and use of information on the Internet, however, these fluctuations are not so significant and do not allow people to assert the existence of any regularities.

Table 19 – The interest of women and men in improving competencies, % of the total number of respondents

Index	Rural area		Urban area	
	Women	Men	Women	Men
Percentage of those, who are interested in improving skills in the field of digitalization, %	89.74%	93.33%	91.18%	85.71%
Percentage of students currently studying online and those who plan to study in the near future	51.28%	62.60%	79.41%	78.57%

Table 20 – Priority of the purposes of using the Internet by women and men, % of respondents

Index	Rural area		Urban area	
	Women	Men	Women	Men
For programming	20.51%	26.67%	23.53%	14.29%
For income	25.64%	13.33%	41.18%	28.57%
To promote goods and services on social networks	48.72%	60.00%	47.06%	57.14%
For online courses	56.41%	73.33%	76.47%	64.29%
To obtain information from the websites of government agencies	64.10%	86.67%	70.59%	78.57%
For communication on social networks	82.05%	93.33%	88.24%	78.57%
To use internet banking	84.62%	86.67%	94.12%	78.57%

There is clearly a higher activity in the use of digital infrastructure and ICT by women in urban areas, in contrast to rural areas. A relatively inverse relationship is observed for men. Men in rural areas are more active in using digital infrastructure and ICT than men in urban areas. The above mentioned points require further study. This is probably due to the fact that women in rural areas are more socially active and use digital innovations. The same, based on the data obtained, should be also attributed to men in cities who are more interested in digital innovation than women. However, on a number of issues, especially employment issues, a different trend can be observed. For example, the contribution of digitalization to the formation of the labor market is more highly valued by rural men than women (Table 21). This emphasizes the importance of taking into account the gender aspect in any research.

- Men believe that this impact of digitalization on the labor market is rather stronger than women (Table 21).

At the same time, in cities and urban areas, the impact of digitalization on the labor market is much higher than in rural areas.

- There are differences in the perception of both women and men living in areas of different levels of development, as well as men and

women living in the same area with the same level of development, exposure to the impact of digitalization of various life processes associated with public participation in local development.

Therefore, compared with women in urban areas, women in rural areas believe that digitalization has a greater impact on increasing the environmental responsibility of society and facilitates communication in society (Table 22). At the same time, women in urban areas believe that digitalization is more conducive to increasing the social responsibility of society than noted by rural women. Moreover, women in urban areas confidently state the fact that digitalization in their territories has a greater impact on life processes than in rural areas.

Men living in rural areas believe that the impact of digitalization on public participation in local development and facilitating communication in society is much stronger than men living in urban areas (Table 23). As in the example with women, men mention a more significant contribution of digitalization to social processes in urban areas compared to rural areas.

Between men and women living in rural areas, there are insignificant differences in the perception of the impact of digitalization on the studied

*Table 21 – Assessment by women and men of the degree of impact of digitalization on the formation of the labor market, % of respondents*

Index	Rural area		Urban area	
	Women	Men	Women	Men
Growing demand for educational services for employment	51.28%	53.33%	67.65%	57.14%
Improving the quality of labor resources	53.85%	60.00%	67.65%	71.43%
Increasing competition in the labor market	53.85%	60.00%	79.41%	85.71%
Increasing workforce mobility (work remotely)	66.67%	73.33%	79.41%	85.71%

Table 22. Evaluation by women of rural and urbanized areas of the effectiveness of the impact of digitalization on the development of society, % of respondents

Index	Rural area		Index	Urban area
Increasing social responsibility	17.95%		Increasing environmental responsibility	20.59%
Openness and trust in society	17.95%		Facilitates communication in society	21.50%
Increasing public participation in local development	20.51%		Openness and trust in society	23.53%
Increasing environmental responsibility	23.08%		Increasing public participation in local development	32.35%
Creation of public-private partnership	28.21%		Creation of public-private partnership	35.29%
Facilitates communication in society	35.90%		Increasing social responsibility	41.18%
Growth in the number of projects	35.90%		Growth in the number of projects	44.12%
Improving the attractiveness of life for young people	38.46%		Improving the attractiveness of life for young people	52.94%

Table 23. Evaluation by men of rural and urban areas of the effectiveness of the impact of digitalization on the development of society, % of respondents

Index	Rural area		Index	Urban area
Increasing environmental responsibility	20.00%		Increasing environmental responsibility	7.14%
Openness and trust in society	26.67%		How digitalization facilitates communication in society	25.58%
Creation of public-private partnership	26.67%		Increasing public participation in local development	28.57%
Increasing social responsibility	33.33%		Openness and trust in society	35.71%
Growth in the number of projects	33.33%		Creation of public-private partnership	35.71%
Improving the attractiveness of life for young people	33.33%		Increasing social responsibility	50.00%
Increasing public participation in local development	40.00%		Growth in the number of projects	57.14%
How digitalization facilitates communication in society	46.67%		Improving the attractiveness of life for young people	71.43%



areas of social development (Table 24). The exceptions are the area of environmental activities, which, according to men, is less affected by digitalization, as well as the area of ensuring public participation in local development, which, again, according to men, is more covered by digitalization than women.

Rather unexpected was the almost identical perception of both women and men living in urban areas of the impact of digitalization on various areas of public life (Table 25). However, it should be mentioned that, unlike women, men consider the impact of digitalization on the environment to be minimal, but much more appreciate the impact of

*Table 24. Evaluation by women and men of rural areas of the effectiveness of the impact of digitalization on the development of society, % of respondents*

Index	Women	Index	Men
Openness and trust in society	17.95%	Increasing environmental responsibility	20.00%
Increasing social responsibility	17.95%	Openness and trust in society	26.67%
Increasing public participation in local development	20.51%	Creation of public-private partnership	26.67%
Increasing environmental responsibility	23.08%	Increasing social responsibility	33.33%
Creation of public-private partnership	28.21%	Growth in the number of projects	33.33%
Growth in the number of projects	35.90%	Improving the attractiveness of life for young people	33.33%
Facilitates communication in society	35.90%	Increasing public participation in local development	40.00%
Improving the attractiveness of life for young people	38.46%	Facilitates communication in society	46.67%

*Table 25. Evaluation by women and men of urban areas of the effectiveness of the impact of digitalization on the development of society, % of respondents*

Index	Women	Index	Men
Increasing environmental responsibility	20.59%	Increasing environmental responsibility	7.14%
Facilitates communication in society	21.50%	Facilitates communication in society	25.58%
Openness and trust in society	23.53%	Increasing public participation in local development	28.57%
Increasing public participation in local development	32.35%	Openness and trust in society	35.71%
Creation of public-private partnership	35.29%	Creation of public-private partnership	35.71%
Increasing social responsibility	41.18%	Increasing social responsibility	50.00%
Growth in the number of projects	44.12%	Growth in the number of projects	57.14%
Improving the attractiveness of life for young people	52.94%	Improving the attractiveness of life for young people	71.43%

digitalization on increasing social responsibility, developing project activities and also increasing the attractiveness of the territory for young people.

An analysis of the impact of digitalization on the processes of public participation in local development through project activities shows that in general from 30 to 60% of respondents assess it as medium and high (Table 26). This confirms the importance of digitalization for the effective management of local development.

Women in rural areas appreciate the impact of digitalization on the processes of public participation in local development more highly than men. In urbanized areas, women and men equally appreciate the impact of digitalization on local development.

Such studies allow authors to conclude that there are no significant gender differences in assessing the impact of digitalization on various aspects of local development.

Women and men have equal access to digital equipment, infrastructure and software. The use of ICT by both women and men is declining as the complexity of programs increases.

There is a clear dependence of the growth of competencies of men and women on the place of residence. In more urbanized areas, women and men appreciate the impact of digitalization on various areas of life to a greater extent than women and men from rural areas.

Table 26. Percentage of women and men who rated the degree of impact of digitalization on public participation processes as **medium and high**, % of respondents

Index	Rural area		Urban area	
	Women	Men	Women	Men
Participation in the decision-making process	49.47%	38.64%	35.29%	28.57%
Participation in the development of projects for local development	56.84%	38.64%	41.18%	38.10%
Participation in fairs of local initiatives	56.84%	38.64%	44.12%	47.62%
Participation in communication with local authorities	60.00%	50.00%	47.32%	47.62%

## 6.3 Local structures supporting the development of digitalization

Digitization support structures for this review include organizations that work purposefully with their target groups to promote their use of ICTs. Support structures normally perform the following functions (the list is not exhaustive):

- educational (train target groups);
- informational (inform target groups about digital development);
- assist in the development and promotion of digital products;
- assist in the development of infrastructure for digitalization;
- assist in the development and implementation of local programs and projects for the development of digitalization at the local level;
- develop cooperation (partnership) for the development of digitalization;
- contribute to the attraction of resources for the development of digitalization at the local level.

The formation of a multi-level system for improving the digital competencies of the population is the most important task of state policy (NSSD-2035). In accordance with this, «... on the basis of general education schools and institutions of secondary vocational education, organizations of additional education for children, it is necessary to create experimental sites for the introduction of digital educational and methodological complexes, training simulators and virtual laboratories. It is planned to create scientific and methodological centers for conducting research, studying and

disseminating the best international practices for training, retraining and internships in the field of digital technologies. It is planned to create an effective system of vocational guidance and selection of children and young people for specialized training and employment in the field of information technology and other specialties of scientific, technical and natural sciences»<sup>99</sup>.

The architecture of digital development management in Belarus is built at the national level with the participation of regional authorities on the principle of top-down management. The approaches used to create a digital governance architecture at the national level are reflected at the local level. However, given that digitalization covers not only sectoral aspects of the development but also issues of public participation in local and national development. The introduction of structures into the architecture that ensures public participation in the development of digitalization would give them a status and accelerate the localization of digitalization and help to find solutions for many problems, which, unfortunately, is not currently available.

What organizations today are the agents of digital development at the local level or position themselves as such? Let the authors consider their presence, compiled according to the opinion of the experts of the review, based on the functions they perform. Thus:

### 1. educational (train target groups):

- ▶ to narrow specialized digitalization training which is provided by banks, shops, entrepreneurs, housing and communal services and other organizations providing services and supplying goods;



<sup>99</sup> National Strategy for Sustainable Development of the Republic of Belarus for the period up to 2035 (NSDS-2035) [Electronic resource] // Ministry of Economy of the Republic of Belarus [official site]. - (accessed 18.07.2023).

- ▶ comprehensive training for adults on the use of ICT to improve the quality of life – there are no such organizations *at the local level*;
- ▶ comprehensive training of school-age children related to the use of ICT to improve the quality of life – educational institutions.

According to 76.7% of respondents, it is possible to study ICT at the place of residence (Figure 36). Thus, the majority of residents are satisfied with educational services locally, while most often more competent friends act as knowledge providers.

## 2. informational (inform target groups about digital development):

- ▶ to narrow specialized information which is provided by banks, shops, entrepreneurs, housing and communal services and other organizations providing services and supplying goods;

- ▶ informing about the development of digitalization, innovations and distribution of best practices related to the use of ICT to improve the quality of life – *partly by local media, there are no such organizations at the local level.*

## 3. assist in the development and promotion of digital products:

- ▶ at the local level, single (not in all districts) entrepreneurs provide services for the development, content and technical support of websites and pages on social networks;
- ▶ in most localities there are opportunities to improve the material part of digitalization (purchase and repair of telephones and computers, as well as installation of software);
- ▶ development and marketing promotion of digital products – *there is no such structure.*

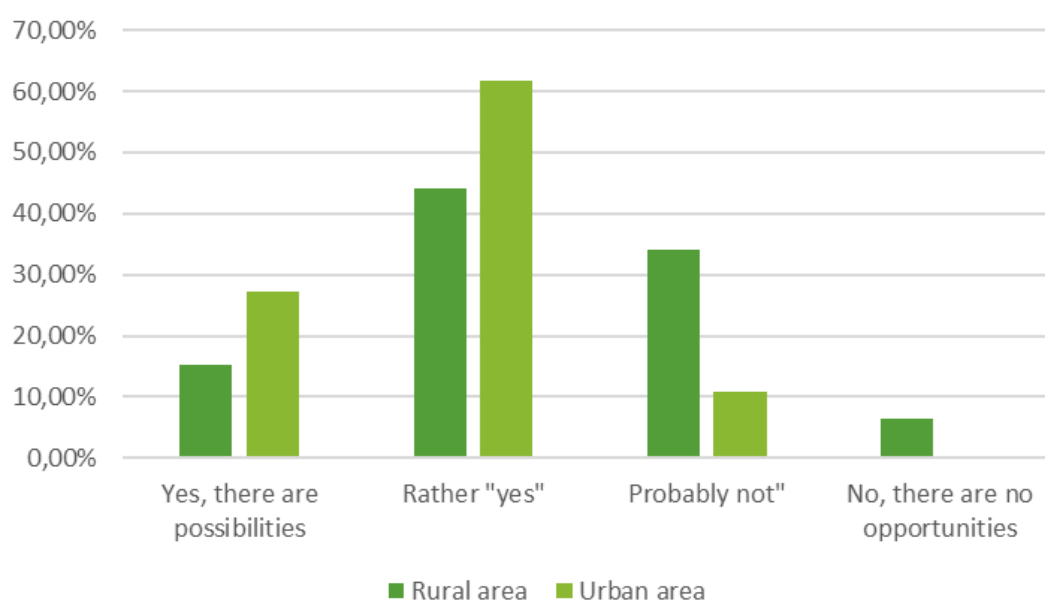


Figure 36 – Availability of opportunities to improve their ICT skills (learn digitalization) at the place of residence, rural area or urbanized area, % of respondents

**4. assist in the development of infrastructure for the development of digitalization:**

- ▶ the development of a specialized infrastructure for the development of digitalization at the local level is carried out by the decision of the head managing organizations at the national level, taking into account the size of the target group or in accordance with decisions made at the level of the Government of the Republic of Belarus.
- ▶ systematic development of infrastructure for the development of digitalization at the local level – *such structures at the local level are only defined in a pilot format for the implementation of individual projects*. For example, at the state level, an attempt is made to introduce an integrated approach to the development of digitalization for cities of 80,000+ based on the universal digital smart city platform. In these cities, to participate in the project, a responsible executor is selected in the structure of the local government.

**5. assist in the development and implementation of local programs and projects for the development of digitalization at the local level;**

**6. develop cooperation (partnership) for the development of digitalization;**

**7. contribute to attracting resources for the development of digitalization.**

- ▶ systematic development of digitalization in general at the local level (development of local strategies, programs and plans for the localization of digital development) – *such structures at the local level are only defined in a pilot format for the implementation of individual projects*. The same example of a project to introduce an integrated approach to the development of digitalization for cities of 80,000+ based on a universal digital smart city platform.

It should be noted that partial actions, mostly projects in the field of digitalization, were developed and promoted by local NGOs, as described in the corresponding section of the review. An important feature of NGO projects was the mandatory identification of the needs of target groups and the coordination of projects with key local partners and local authorities. In this case, NGOs acted as structures for promoting digital development, striving to fulfill the functions that are missing on the ground. In this case, digitalization was seen as a tool to achieve sustainable development at the local level. NGOs were the conductor of the development of digitalization according to the principle of “bottom-up” management.

In areas where there are no local NGOs, these functions were sometimes carried out by organizations at the regional or national level. Sometimes, these functions were performed by local educational, cultural or business structures.

Therefore, there are practically no structures capable of carrying out integrated management of the development of digitalization at the local level (with the exception of pilot projects) and they should be developed. At the local level, there are practically no plans for integrated digital development with an understanding of the essence, purpose, participants and resources for their implementation, with the exception of pilot cities of 80,000+. As a result, the unique features and needs of territories for the development are not sufficiently taken into account, despite the development of national unified digital platforms.

Digital development cannot be localized quickly, it is an innovative process. It is necessary to complete the formation of systemic program activities and digital development architecture from the national to the local level and to the level of beneficiaries, which can be created by incorporating both bottom-up and top-down approaches. The essential condition for this is the creation at the basic level of pilot structures to support the development of digitalization or strengthening existing organizations with new functions.

# 7. GENERALIZATION AND CONCLUSIONS

---

## 1. Digital development, including the creation of digital infrastructure, the use of ICT and digital transformations, is one of the national development priorities in Belarus.

- Digital transformation and social innovation are one of the accelerators recommended by the MAPS mission in 2017 and used to accelerate the achievement of the SDGs in the Republic of Belarus.
- Belarus has formed and continues to improve the framework conditions for digital development, in particular:
  - ▶ an institutional framework for digital development has been created, which is determined by the NSSD-2035, the Program for the Social and Economic Development of the Republic of Belarus for 2021-2025 and the State Program «Digital Development of Belarus» for 2021-2025;
  - ▶ the architecture (system of structures) of digital development has been formed from the national to the regional level and national structures for supporting digital development have been identified. The Ministry of Communications

and Informatization in cooperation with ministries and departments and their structural divisions, ensures the localization of digital development;

- ▶ there is no coordination of digital development at the local level and there are significant differences in digital development between rural and urban areas.

- Belarus takes high positions in international rankings in a number of indices characterizing the degree of digital development. In 2017, according to the ICT Development Index (IDI), Belarus ranked 32 out of 176 countries of the world; in 2020, the e-government readiness index was 40th and the E-Participation Index was 57th. According to the UN, Belarus takes the 24th place among 196 countries in terms of providing broadband Internet access.
- Fourth-generation cellular mobile telecommunications (LTE) technologies have been widely adopted and are currently available to 81.3% of the population. Implementation of (5G) technologies is planned.
- Digital development, by accelerating the development management processes,

brings new challenges that can be boosted at the local level, giving elevated to new problems. These include:

- ▶ the release of huge labor resources and the emergence of imbalances in all sectors of the economy;
- ▶ the outflow of labor resources to the digital economies of more developed countries and to the digital ecosystems of global digital platforms;
- ▶ strengthening the processes of urbanization at the expense of the rural population;
- ▶ the need to protect personal data;
- ▶ depreciation of traditional assets of business entities that have not undergone digital changes and transformation;
- ▶ the need for an approach to the system of training for the information society and the knowledge economy;
- ▶ the digital divide in society.

## **2. In Belarus, the digital development localization process is at an early stage, covering only large cities with a population of 80,000+.**

- The policy in the field of localization of digital development is laid down in the sub-program «*Regional Digital Development of the State Program «Digital Development of Belarus» for 2021-2025*», which provides the implementation of activities and the results of it should have a system-forming nature for the development of smart city technologies in all regions of the country. Its main tasks are the collection and processing of data flows from urban infrastructure facilities, the development of regional information and communication infrastructure, the adaptation and implementation of standard platforms, the creation and development of standard services based on the developed platforms.

- A *digital information ecosystem* is being formed in the country, built on the basis of the created digital platforms of industries and regions that interact with each other in an automated mode. Today, digital platforms have been created and are functioning in many key areas of society: public administration, the economy, the financial sector and payments, education, healthcare, housing and communal services, regional development, and interstate information interaction.

The effectiveness of digital platforms increases with the growth of the number of their users, which is determined by their competencies and skills, as well as the benefits of users as a result of their use of digital platforms, which allows people to talk about the beginning of digital transformations.

The research data shows that against the backdrop of a bountiful increase in the number of digital platforms, the population at the local level actively uses mostly communication and banking digital platforms. There is a need for greater public awareness of the presence and purpose, as well as the opportunities and benefits that these platforms provide to them.

- As part of the formation of unified approaches to regional digital transformation in 2019, a *model concept for the development of «smart cities» in the Republic of Belarus was developed and approved*, which during 2019–2020 was adapted and extended to 11 cities (districts) of the country (Orsha, Baranovichi, Pinsk, Novopolotsk, Polotsk, Mozyr, Lida, Borisov, Soligorsk, Molodechno, Bobruisk) identified as pilot projects. For these 11 cities, comprehensive plans for accelerated development were developed and approved by the decisions of the relevant regional executive committees.
- In many cases, *the digital transformation process is viewed as purely technical* and therefore the responsibility for the result



is shifted to the IT sector. Although a lot depends on the digital culture of the population, how ready people are for the deep digital processes that infiltrate into every sphere of their life. At the same time, for the effective implementation of digital innovations in many areas, reengineering is necessary, i.e. cardinal transformation of activity and not its consistent improvement.

- The success of digital development localization is determined by:

**1) the presence of regulatory legal acts and technical regulatory legal acts controlling the localization of digital development;**

Currently, the developed legal acts at a sufficient level provide the basis for digital development in the country in general, including the local level. However, the issues of remote employment, virtual reality, the use of cryptocurrency, etc. need further regulatory elaboration, which will become an additional motivation for digital development at the local level, where there is a lack of employers of new types of employment.

**2) availability of digital infrastructure for target groups;**

Nowadays, computers, mobile phones, Internet access and mobile communications with mobile Internet access are available almost throughout the country. In several places around the country, mainly in rural areas, the quality of access to the Internet, both through a landline connection and mobile communications, remains problematic.

Target groups do not mention serious problems with the availability and accessibility of digital infrastructure.

**3) accessibility of ICT (programs and applications) for target groups;**

Currently, the main free applications for smartphones and computers are available to the public and are actively used. The most popular are social networks. Special paid applications are used by the population if needed, more often it is related to work or hobbies. The target groups noted the lack of applications with information on the state of the environment and on the development and implementation of local initiatives.

**4) accessibility of education to improve digital skills and competencies;**

In general, studies show that digital development training at the local level is possible to organize at the local level. However, this is a process of self-education and sometimes more competent acquaintances act as providers of education.

Highly specialized digital training is carried out by systems that actively use digitalization in their activities, for example, banks, housing and communal services, and entrepreneurs.

Comprehensive training in digitalization as a development tool is not carried out.

**5) the depth and effectiveness of digital transformations at the level of a person, organization and enterprise.**

Studies show that the development of digitalization at the local level contributes to the growth of accessibility and improvement of the quality of banking services, business development and tourism to the greatest extent. Significant is the contribution of digitalization to improving the quality of life in rural areas and reducing the outflow of young people to cities, improving transport mobility, the availability and quality of services in the field of

social protection. It also affects education and healthcare, increasing the comfort of living and the role of women in local development, improving the state of the environment, increasing involvement of socially vulnerable groups in local development and implementation of social innovations.

The use of digitalization allows at the level of a person, enterprise and organization to manage available resources more effectively, primarily money and time. This, in return, allows finding opportunities for additional employment, training, communication, and improving health.

At the local level, digital transformations are generally noted, but they are not given the expected importance. These transformations most often affect the banking sector, education and business.

#### **6) the depth and effectiveness of digital transformation in the community.**

Research shows that there is a clear understanding that digitalization can make a significant contribution to improving the management of local development, both in general and in individual processes, as well as the involvement of the local population in local development management.

Many noted the contribution of digitalization to communication with local authorities in terms of requesting information and documents. To a lesser extent, the contribution of digitalization to the development of local initiatives, to increasing the social and environmental responsibility of the population is noted.

Mostly all those participating in the research stated the importance of

contributing to reducing the outflow of young people to large cities, to increase the involvement of people of pre-retirement and retirement ages, as well as disabled people in local development. However, the low digital literacy of socially vulnerable groups of the population remains the main barrier to their development of the digital space.

- The effectiveness of the localization of digital development at the local level largely depends on the support structures that can accompany this process. Today, this function in highly specialized areas is provided by the relevant organizations (banks and housing and communal services in the field of settlements). Educational institutions teach the basics of computer science to the younger generation.

A comprehensive and systemic increase in digital literacy is not carried out at the local level. In this regard, the adult population, as well as socially vulnerable groups of the population, do not have access to effective educational programs. As a result, this does not allow them to become full-fledged users of ICT and digital infrastructure, including national digital platforms.

- Interest in the development of digitalization can be negatively affected, first of all, by the facts of abuse of personal information sent via the Internet, cases of financial losses due to fraud and infection of computers or smartphones with a virus that led to the loss of information.

#### **3. The state of digital development at the local level (district level) is assessed as initial. Digital transformations are noted at the local level, they are not systemic.**

- In rural areas with a population of less than 80,000, the pace of digital transformation is almost half that of urban areas with a population of over 80,000. This is noted, first of all, due to the weakened human potential (the outflow of young people as a key driver of in-

novation) and the weaker availability of educational services in the field of digitalization in rural areas.

- More than 80% of respondents use the Internet constantly. 78.4% of the surveyed experts use the Internet to carry out financial transactions and communicate with loved ones; online orders for goods and services (77.5%); leisure (75.5%); performance of professional functions (74.5%); education (62.7%). The focus seems to be on the economical use of the Internet, while environmental use, for example, for energy or waste management is less common.
- At the local level, the understanding of digitalization as an accelerator of development is formed mainly intuitively only through wide access to the Internet and communication on social networks.
- The review examines the practical side of localization of digitalization in the following areas of life: SME development, employment of the population, management of public services, accessibility of adult education, involved participation in local development, as well as gender aspects of digitalization.
- Almost all representatives of small and medium-sized businesses use digital technologies for their business (more than 80%), which allow them to increase the efficiency of businesses, as well as open new niches, including small steps that can be taken to develop business on the Internet (website development, blogging), social media marketing, etc.). Digitalization has contributed to building trust with customers, as well as business participation in local development, helping businesses to solve local social and environmental problems. Nearly 60% of SME service consumers have already experienced the benefits of digitalization, which both SMEs and consumers themselves have benefited from.

Entrepreneurs mainly use instant messengers, social networks, as well as remote access to work with the bank and regulatory authorities. Some entrepreneurs use marketplaces.

- Digitalization contributes to the increase in employment in both traditional and atypical forms, which include employees of digital marketplace platforms, taxis, web designers, bloggers, etc. Digital skills affect employability and wage growth, increase competencies and improve the availability of resources for employment. Most applicants via the Internet are interested in working conditions, the employer, as well as in the necessary competencies for a new job. To a lesser extent, job seekers are looking for information about new business ideas and about those who could support them in the beginning.

According to the population, digitalization will increase competition in the labor market and improve the quality of labor resources (about 70% of respondents), as well as labor mobility (remote work) (about 80%).

- Digital development has contributed to the beginning of the implementation of the smart city concept. The population mentioned that the use of ICT contributes to an increase in the comfort of living, less expenditure of resources on utilities (water, gas and payment for them), which contributes to the protection of the environment. At the same time, the population does not really understand how they can manage public services due to digitalization. Digital technologies are quite widely implemented in the activities of housing and communal services in terms of payment for services through a bank, dispatching services, etc. However, the feedback from housing and communal services to consumers (individuals) is poorly organized and digitalization is poorly used for it.
- As a result of the COVID – 19 pandemic, ICT-assisted education has taken a huge leap in its development. Thus, 62.7% of respondents noted that they use the Internet for educational purposes, while 46% of respondents spoke of high motivation to improve their digital skills. At the same time, 34.3% of respondents lack digital programs (applications) for education. More than half of the respondents noted that the development of ICT has increased the de-

mand for educational services. About 62% of respondents are currently studying or planning to study, mainly in management, the use of digitalization in their activities, psychology and sustainable development. As a result, they have developed skills to search for information online, become more proactive and are less afraid of difficulties.

- Digitalization can significantly enhance communication in the local community, which can be used to determine and agree on development prospects, issues of solving urgent problems, mobilizing internal resources, etc. About half of the respondents note the significance of the contribution of digitalization to increasing the attractiveness of life in the territory for young people and to improving the external image of the local community. Consider the significant contribution of digitalization to the growth in the number of projects involving the population, business and government, as well as to increasing the social and environmental responsibility of the community.

Research results show the importance and necessity of localizing digital development to ensure the participation of local development and contribution to the achievement of the SDGs. Thanks to digitalization, information and communication processes in the local community are activated, the role and contribution of all local target groups to local development is increasing and the attractiveness of the territory for development is rising. Amplifying this effect with the availability of resources can have a synergistic effect to trigger internal development mechanisms that are transparently managed by local authorities together with the community.

- There are no big gender differences in assessing the impact of digitalization on various aspects of local development. Women and men have equal access to digital equipment, infrastructure and software. The use of ICT by both women and men is declining as the complexity of programs increases.

There is a clear dependence of the growth of competencies of men and women on the place of residence. In urban areas, women and men appreciate the impact of digitalization on various areas of life to a greater extent than women and men from rural areas. Also, in rural areas, women appear to have higher digital competencies than men.

- Studies have shown that the local population believes that the localization of digital development will have a significant impact on improving living conditions and will accelerate the achievement of a number of SDGs, in particular, SDGs 4, 5, 8, 9, 10, 11, 12, 16, 17 (see., Appendix 2. Comparative analysis of the possible contribution of digitalization to the achievement of the global SDGs and assessment of the contribution of digitalization to local development obtained during the preparation of the review). Unfortunately, in this study it was unable to analyze the power of digitalization at the local level on the achievement of the SDGs. Conducting such studies is important, as it could specify the significance, contribution and role of districts in achieving the SDGs, taking into account their specifics. It can be also noted that the connection between environmental sustainability and digitalization is weaker than the connection between digitalization and the economy and social sphere.
- The trends mentioned in the survey in the field of digitalization and the purposes of using the Internet are in line with the data published by the National Statistical Committee of the Republic of Belarus.
- There is difficulty in formulating and verifying indicators that characterize digital transformations. In this regard, the authors used indicators formulated by experts, as well as those used in various publications.

## 8. RECOMMENDATIONS FOR STRENGTHENING DIGITAL DEVELOPMENT AT THE LOCAL LEVEL TO ACCELERATE THE LOCALIZATION OF THE SDGS

---

Based on the results of the research, the authors believe that it is important to address both governments at the national level and local authorities, as well as commercial and non-profit organizations involved in digital development in the Republic of Belarus and, especially, at the local level, with the following recommendations to strengthen digital development at the local level to accelerate the localization of the SDGs and increase the sustainability of local development:

- Localization of digital development at the local level requires a systematic and comprehensive coverage of the spheres of life of the population. The conceptual key approaches to the localization of digitalization are embedded in the implemented concept of a «smart city», which creates favorable framework conditions for this. *However, today it is important*
- to pay special attention to the consumers of the services of the digital platform «smart city».* This digital platform should be of practical interest, access to specific application services that affect the person's daily life, improve business activity and everyday life and harmonize the life with the environment. It is important that the platform allows the user to contribute to the improvement of the local development management system and improve the concept of a «smart city» taking into account the specifics of each territory.
- Comprehensive digital development at the local level is difficult to implement simultaneously in all spheres of life. *In this regard, it is recommended to identify priority areas of life that have the greatest impact on the sustainability of the development of a certain territo-*

ry and to promote the consistent phased introduction of ICT and the consolidation of the achieved digital transformations in this area. Such areas, for example, can be the growth of employment and the development of SMEs, since most districts are subsidized and have a negative demographic balance. On the other hand, for example, improve the quality of social protection of the population due to the high proportion of pensioners in the demographic structure of the population of the region and other areas that are highly expensive or are constraining for local development.

- When introducing digital development in one of the selected priority areas, it is important to follow the principles:
  - ▶ *interrelation or mutual influence of various directions*: economy, social sphere and ecology. Thus, when introducing digitalization for the development of SMEs, it is important to pay attention to the issues of social and environmental responsibility of business, the creation of internal mechanisms to support local initiatives and development projects, support socially vulnerable groups of the population and social entrepreneurship;
  - ▶ *vertical integration of the needs and priorities of all stakeholders*, from the local level to the national level, which will ensure the sustainability of the localization of digital development;
  - ▶ *digital development is a cross-cutting theme* for all local programs and projects with mandatory correlation with the global SDGs.
- *Digital literacy and digital culture* today are the constraining factors of the localization of digital development. The digital infrastructure that is being created by itself will not make digital transformations. Besides, it becomes obsolete very quickly.

Understanding the possibilities and promoting practical examples of ICT applications in

businesses and everyday life are key factors motivating the widespread adoption of ICT at the local level. At the local and even at the regional level, today there are no structures that purposefully carry out information and educational work in this direction.

*Digital competencies* and skills today should become part of the workforce of all organizations and enterprises, as well as local authorities.

- Active digitalization of processes at the local level can cause *an increase in the digital divide*, further exacerbating the situation of such socially vulnerable groups of the population as people of pre-retirement and retirement age and the disabled. It is important to develop and implement digital literacy programs for these populations.
- The development of digitalization, like any other process, requires *the involvement of users*, which will ensure the effective use of the allocated resources to create applications or platforms that will meet the needs of users. Involved participation is not only providing opportunities to comment but also helps to participate in the development and implementation of digital development projects. This requires improving the educational process, creating conditions for the generation of ideas and projects, as well as their promotion, support in the implementation and evaluation of the effectiveness, followed by multiplication when the necessary effects are achieved.
- *The development of digital competencies at the local level requires conditions for their implementation at the local level*. In this regard, it is important to stimulate the development of infrastructure and technical capabilities for the application of digital competencies. This should become part of the operational plans for the development of industries and local organizations.
- *The localization of digitalization should have comprehensive incentives*, starting from im-



proving technical access and ending with moral encouragement of the population, specialists, organizations and local authorities. The formation of national and / or regional funds to support the localization of digitalization could help to accelerate this process.

- *The development of local plans (strategic and operational) for digital development could allow people to take a more comprehensive look at this problem at the local level, see weaknesses and opportunities for the development, highlight priorities and plan the necessary activities. Today, there are no such plans, except pilot cities of 80,000+ people and the local level remains in the position of *waiting for the solution of this issue from above*. In the case of developing local digital development plans, it is important to provide resources to the districts for their implementation, as well as to consider possible preferences differentiated depending on their socio-economic development and other characteristics.*
- When developing local plans for the localization of digital development, it is important to develop and implement *a system for monitoring and evaluating the effectiveness of the localization of digital development*. Today the number of smartphones in the population still characterizes the technical capabilities of the population to use ICT, but this indicator does not characterize the onset of digital transformations and their sustainability, which is the key result of digital development. In this regard, it is *important to revise the indicators of digital development*, which may also change the action plans.
- *The lack of support structures for digital development at the regional and local levels minimizes digital development efforts at the local level. In this situation, it is recommended to create such structures or increase the capacity of existing structures to perform specific functions for the localization of digital development. Considering the high return on the use of ICT in the economy, this function*

can be performed by commercial structures. However, the process of commercializing digital development localization services can take many years. The success of such a process will depend on the framework conditions in the country and the competencies of the staff of such a structure.

**At the local level, for example, digital development incubators can be created, and at the regional level, it is important to create analytical and consulting laboratories for digital development.**

- The results of the review emphasize the importance of developing pilot projects at the local level, which would include the following blocks of activities:
  - ▶ assessment of the potential of local development actors for integrated digital development at the local level;
  - ▶ development of a pilot strategic planning document for local digital development, integrated with the SDGs and national plans;
  - ▶ creation of a pilot structure to support digital development (an educational network in the field of digital development) at the local level (possibly regional / inter-district);
  - ▶ increasing the potential of socially vulnerable groups in the field of digital development to prevent the development of digital disequilibrium in society.
- There are significant differences in digitalization and digital competencies between rural and urban areas. However, digitalization is also an important aspect for rural areas, since some specific problems of rural areas (loss of population, lack of jobs) can be solved with the help of digital tools.



- There are already some examples of promoting environmental sustainability through digital tools. These successful examples could be transferred to other cities and towns.

The results presented in the review demonstrate current trends in digital development at the local level. The authors consider it is important to continue studying the issues raised in the review, which are important for understanding and evaluating the effectiveness of measures planned and taken to localize digital development, in particular:

- assessment of the impact of digitalization of individual (priority) areas of life on the contribution of the local development to the achievement of global SDGs, which will allow identifying and developing breakthrough local development projects;
- development and implementation of a system of indicators for assessing digital transformations at the local level and tools that use them for decision-making at the local level.

# ANNEX 1

## List of abbreviations and terms used

<b>CKM</b> - digital territory maps in Belarus	<b>OAIS</b> - Nationwide automated information system in Belarus
<b>EDS</b> - Electronic Digital Signature	<b>SCST</b> - State Committee for Science and Technology
<b>ESD</b> - Education for Sustainable Development	<b>SD</b> - Sustainable Development
<b>FAO</b> - Food and Agricultural Organization	<b>SDGs</b> - Sustainable Development Goals
<b>GIS</b> - Geographic Information System	<b>SMDO</b> - Interdepartmental electronic document management system in Belarus
<b>ICT</b> - Information and Communication Technologies	<b>SME</b> - Small and Medium Enterprises
<b>IIoT</b> - Industrial Internet of Things	<b>SSD</b> - strategy for sustainable development
<b>ILO</b> - United Nations International Labor Organization	<b>STEM</b> - Science, Technology, Engineering and Mathematics
<b>IoT</b> - Internet of Things	<b>TNLA</b> - Technical Regulatory Legal Acts in Belarus
<b>IT</b> - Information Technology	<b>UN</b> - United Nations
<b>ITU</b> - International Telecommunication Union	<b>UNDP</b> - United Nations Development Program
<b>LDCs</b> - The least developed countries in the world	<b>UNECE</b> - United Nations Economic Commission for Europe
<b>LIS</b> - Land information system	<b>UNICEF</b> - United Nations International Children's Emergency Fund
<b>MAPS</b> - Mainstreaming, Acceleration and Policy Support	<b>WHO</b> - United Nations World Health Organization)
<b>NCES</b> - National Center for Electronic Services	
<b>NLA</b> - Normative legal acts	
<b>OAC</b> - The Operational and Analytical Center under the Aegis of the President of the Republic of Belarus	

**«Smart City»** is a concept of a city that uses digital tools to improve the standard of living, quality of services and management efficiency while meeting the needs of present and future generations in all relevant aspects of life (UNDP manual).

**Digital platform** — a system of tools that supports the use of digital processes, resources and services by a significant number of subjects of the digital ecosystem and provides the possibility of their seamless interaction (Decision of the Supreme Eurasian Economic Council<sup>100</sup>);

**Digital transformation** is a manifestation of qualitative, revolutionary changes, which consist not only of individual digital transformations, but also of a fundamental change in the structure of the economy in the transfer of value-added centers to the sphere of building digital resources and end-to-end digital processes (Decision of the Supreme Eurasian Economic Council);

**Digital economy** — a part of the economy in which the processes of production, distribution, exchange and consumption have undergone digital transformations using information and communication technologies (Decision of the Supreme Eurasian Economic Council);

**Digital ecosystem** — an open sustainable system that includes the subjects of the digital ecosystem (physical, legal, virtual, etc.), as well as the communications and relations of these subjects in digital form based on digital platform services (Decision of the Supreme Eurasian Economic Council);

**Digitalization** is the introduction of modern digital technologies in various spheres of life and production.

**Digital transformation** — a set of measures aimed at transforming business processes in accordance with their digital model (Decision of the Supreme Eurasian Economic Council);

**GIS** is a geographic information system designed to create and edit electronic maps, solve specific applied problems and develop specialized GIS applications in the user environment (UNDP manual).

**LIS** is a land information system, which is a geographic information system with land cadastral content, the purpose of which is to maintain a reliable and up-to-date database on the state and use of land resources of the respective districts (cities), regions and the Republic of Belarus as a whole to ensure the solution of the tasks facing the land management service (UNDP manual).







---

<sup>100</sup> [Decision of the Supreme Eurasian Economic Council of October 11, 2017 N 12 “On the Main Directions for the Implementation of the Digital Agenda of the Eurasian Economic Union until 2025 / \[Electronic resource\] // ConsultantPlus: \[website\]. - \(accessed 18/07/2023\).](#)






## ANNEX 2






# Comparative analysis of the possible contribution of digitalization to the achievement of the global SDGs<sup>101</sup> and an assessment of the contribution of digitalization to local development obtained during the preparation of the review.




SDGs	The contribution of digitalization to achieving the SDGs		Assessing the contribution of digitalization to local development based on research obtained during the preparation of the review	
			Population estimate	Business valuation
SDG 1		More than 2 billion people in the world do not have bank accounts, while access to digital financial services helps people fight poverty. The Global Financial Inclusion Initiative is expanding access to digital financial services in developing countries.	Everyone has an account, practically Everyone uses payment cards.	Everyone has an account.
SDG 2		Improving the efficiency of agricultural practices through ICTs can help agricultural organizations and farmers increase profit while reducing energy consumption.	Haven't researched.	Haven't researched.
SDG 3		Direct interaction with patients, health informatics and telemedicine can have a significant impact on the implementation of prevention, diagnosis, treatment and rehabilitation.	Up to 30% of respondents note the importance of digitalization in improving healthcare.	Haven't researched.
SDG 4		The International Telecommunication Union (ITU) and the International Labor Organization (ILO) are leading the Digital Skills for Decent Jobs campaign, which aims to equip 5 million boys and girls with digital skills by 2030.	<ul style="list-style-type: none"> <li>• Rising demand for digital learning.</li> <li>• 92% of respondents seek to improve their level of education.</li> <li>• Online learning is actively developing.</li> <li>• Competencies in digitalization are declining from communication on social networks to working in Excel and programming.</li> <li>• Positive examples are the best motivator for learning, negative examples have the opposite effect.</li> </ul>	



<sup>101</sup> [Digital technologies to achieve the UN SDGs](#) / [Electronic resource] // ITU COUNCIL: [ site]. - (date circulation: 18.07.2023).

SDGs		The contribution of digitalization to achieving the SDGs	Assessing the contribution of digitalization to local development based on research obtained during the preparation of the review	
			Population estimate	Business valuation
SDG 5		To narrow the digital gender divide, ITU members organize an annual International Girls in ICT Day to encourage more women and girls to get involved in science, technology, engineering and mathematics (STEM). The EQUALS global partnership promotes gender balance in the technology sector.	<ul style="list-style-type: none"> <li>The absence of a pronounced inequality between men and women in the field of digital development has been established.</li> </ul>	
SDG 6		New and emerging digital technologies are facilitating the smart management of water and sanitation. The ITU Focus Group on Smart Sustainable Cities monitors key trends in smart water management in cities, including ICT for wastewater management.	<ul style="list-style-type: none"> <li>More than 40% of respondents.</li> <li>There is no understanding of the possibilities of “smart” water management.</li> </ul>	
SDG 7		ICT will be needed to reduce global emissions, develop renewable energy, create smart grids and cities, electrify transport and develop sustainable economies and societies.	<ul style="list-style-type: none"> <li>Up to 40% of respondents report on the possibilities of «smart» energy management.</li> <li>About 20% of respondents note that «smart» management of housing and communal services will contribute to less consumption of natural resources and environmental protection.</li> <li>There is a partial understanding of the possibilities of «smart» energy management.</li> </ul>	
SDG 8		The ITU Digital Innovation Framework helps countries, cities, other communities and systems to accelerate their digital transformation, stimulate ICT-centric innovative entrepreneurship and promote the dynamism of small and medium-sized enterprises (SMEs).	<ul style="list-style-type: none"> <li>More than 70% of respondents note the contribution of digitalization to the development of the Ministry of Railways and the employment of the population.</li> <li>More than 60% of respondents note the impact of digitalization on changing the labor market.</li> <li>In rural areas, atypical types of employment practically do not develop (website development, blogging, etc.).</li> </ul>	Digitalization contributes to: <ul style="list-style-type: none"> <li>Interaction with clients.</li> <li>Growing social and environmental responsibility.</li> <li>Cooperation with local authorities.</li> <li>96% of local entrepreneurs already see the importance of digitalization for their development.</li> </ul>
SDG 9		Much of ITU's work is directly focused on improving the scope and quality of ICT infrastructure (communications networks), including in underserved remote and rural areas.	<ul style="list-style-type: none"> <li>More than 95% of respondents note the availability of digital infrastructure.</li> <li>More than 80% of respondents use the Internet constantly (always connected).</li> </ul>	

SDGs		The contribution of digitalization to achieving the SDGs	Assessing the contribution of digitalization to local development based on research obtained during the preparation of the review	
			Population estimate	Business valuation
SDG 10		Развитие ИКТ способствует сокращению неравенства внутри стран, сообществ и целевых групп, а также между ними, расширяя доступ к технологиям и знаниям для уязвимых слоев общества.	<p>The risk of a digital divide is rising. Risk groups include:</p> <ul style="list-style-type: none"> <li>• People aged 46 and older, pensioners and people with disabilities, regardless of gender.</li> <li>• Residents of rural areas in comparison with urbanized areas.</li> </ul>	<p>In addition to the risks indicated for the population, in business, the risk of the digital divide should be highlighted for:</p> <ul style="list-style-type: none"> <li>• Self-employed and micro business (up to 5 people).</li> <li>• Business with low profit (lack of funds for development).</li> </ul>
SDG 11		The Digital Transformation for People-Centered Cities project created a platform for urban communities to share knowledge, identify policy needs and develop vital international standards that support the digital transformation of cities.	The smart city platform has been created. Residents and organizations do not acknowledge the benefits of these platforms.	
SDG 12		Electronic waste, including waste generated by ICTs, is on the rise worldwide. ITU has formed a coalition to prepare the Global E-Waste Monitor and strengthen collaboration to tackle the global issue of waste electrical and electronic equipment.	<ul style="list-style-type: none"> <li>• Less than 15% of respondents say that digitalization helps to manage waste.</li> </ul>	
SDG 13		Digital tools enable increasingly sophisticated climate change modeling systems. International cooperation in the field of standardization contributes to the reduction of energy consumption for ICT products and services.	There is an understanding by the respondents of the importance of maintaining the environment. From 20 to 40% note the possible impact of digitalization on environmental protection. However, they do not understand or do not see the possibilities of using digitalization to manage processes that affect the environment.	
SDG 14		ICT is widely used to monitor the changing marine environment (sea currents, glacier conditions), sensor networks and chips are used to protect endangered animals, etc.	Haven't researched.	Haven't researched.

SDGs		The contribution of digitalization to achieving the SDGs	Assessing the contribution of digitalization to local development based on research obtained during the preparation of the review	
			Population estimate	Business valuation
SDG 15		ICT can be used to study and protect populations of wild animals, soil and vegetation cover and monitor the state of natural landscape complexes.	There is an understanding by the respondents of the importance of preserving the environment. From 20 to 40% note the possible impact of digitalization on environmental protection. However, they do not understand or do not see the possibilities of using digitalization to manage processes that affect the environment.	
SDG 16		E-government services help to improve relations between citizens and the state and improve the efficiency of public service delivery, empower citizens through their work on smart sustainable cities	From 30 to 50% of respondents in different cases noted the significance of the impact of digitalization in obtaining public services.	
SDG 17		Public-private partnerships are the key to spreading ICTs to all countries, people and communities. Partnerships are required to build the physical infrastructure needed to deliver Internet services to hard-to-reach areas and vulnerable populations.	Up to 30% of respondents note the importance of the contribution of digitalization to strengthening public-private partnerships. From 30 to 60% of respondents note the importance of digitalization for the participation of various target groups in local development.	



## APPENDIX 3

### List of legal acts and technical legal acts in the field of digitalization in the Republic of Belarus

- ▶ Law of the Republic of Belarus dated 10.11.2008 N 455-Z “On information, informatization, information protection
- ▶ Law of the Republic of Belarus dated December 28, 2009, N 113-3 «On electronic document and electronic digital signature»
- ▶ Law of the Republic of Belarus dated 08.01.2016 No. 96-Z “On Amendments and Additions to Certain Laws of the Republic of Belarus on State Registration of Real Estate, Rights to It and Transactions Therewith”
- ▶ Law of the Republic of Belarus dated December 13, 2022 No. 227-Z “On the settlement of insolvency”
- ▶ Law of the Republic of Belarus dated June 1, 2022 No. 175-3 “On the protection of personal data”
- ▶ Decree of the President of the Republic of Belarus of 01.02.2010 N 60 «On measures to improve the use of the national segment of the Internet»
- ▶ Decree of the President of the Republic of Belarus of September 30, 2010, N 515 «On some measures for the development of a data transmission network in the Republic of Belarus»
- ▶ Decree of the President of the Republic of Belarus of October 25, 2011, N 486 «On some measures to ensure the security of critical informatization objects»
- ▶ Decree of the President of the Republic of Belarus dated 08.11.2011 No. 515 “On some issues of the development of the information society in the Republic of Belarus”
- ▶ Decree of the President of the Republic of Belarus dated 02.12.2013 N 531 “On Certain Issues of Informatization”
- ▶ Decree of the President of the Republic of Belarus of December 22, 2014, N 612 «On public procurement in the fields of informatization, information and communication technologies and telecommunications»
- ▶ Decree of the President of the Republic of Belarus dated December 15, 2016 No. 466 “On Approval of the Program of Social and Economic Development of the Republic of Belarus for 2016–2020”
- ▶ Decree of the President of the Republic of Belarus dated April 12, 2019 No. 145 «On the establishment of the educational institution «National Children’s Technopark»
- ▶ Decree of the President of the Republic of Belarus dated May 27, 2019 No. 197 “On scientific, technical and innovative activities”

- ▶ Decree of the President of the Republic of Belarus dated January 16, 2020 No. 13 “On the Republican Fund for Universal Communication and Informatization Service”
- ▶ Decree of the President of the Republic of Belarus dated May 7, 2020 No. 156 “On priority areas of scientific, technical and innovative activities for 2021–2025”
- ▶ Decree of the President of the Republic of Belarus dated September 15, 2021 No. 348 “On the State Program for Innovative Development of the Republic of Belarus for 2021–2025”
- ▶ Decree of the President of the Republic of Belarus dated February 14, 2022 No. 48 “On the register of addresses (identifiers) of virtual wallets and features of cryptocurrency circulation”
- ▶ Decree of the President of the Republic of Belarus dated April 7, 2022 No. 136 “On the public administration body in the field of digital development and informatization issues”
- ▶ Decree of the President of May 31, 2022 No. 188 «On the expansion of the use of information and communication technologies by state organizations «
- ▶ Decree of the President of the Republic of Belarus dated February 14, 2023 No. 40 “On Cyber Security”
- ▶ Decree of the President of the Republic of Belarus dated April 12, 2023 No. 102 “On the development of the Hi-Tech Park”
- ▶ Decree of the President of the Republic of Belarus dated September 22, 2005 No. 12 «On the Hi-Tech Park»
- ▶ Decree of the President of the Republic of Belarus dated December 21, 2017 No. 8 «On the development of the digital economy»
- ▶ Decree of the Council of Ministers of the Republic of Belarus dated December 27, 2002 No. 1819 “On the State Informatization Program for 2003-2005 and for the period up to 2010 “Electronic Belarus”
- ▶ Decree of the Council of Ministers of the Republic of Belarus dated February 10, 2007, N 175 “On approval of the Regulations on the operation of computer clubs and Internet cafes”
- ▶ Decree of the Council of Ministers of the Republic of Belarus of May 14, 2007, N 579 “On Certain Issues of the Ministry of Communications and Informatization”
- ▶ Decree of the Council of Ministers of the Republic of Belarus dated May 26, 2009, N 673 “On some measures to implement the Law of the Republic of Belarus “On Information, Informatization and Information Protection” and on the invalidation of some resolutions of the Council of Ministers of the Republic of Belarus”
- ▶ Decree of the Ministry of Communications and Informatization of the Republic of Belarus of March 19, 2010, N 4 «On the delegation of certain powers of the Ministry of Communications and Informatization of the Republic of Belarus»
- ▶ Decree of the Council of Ministers of the Republic of Belarus dated April 29, 2010, N 645 «On some issues of Internet sites of state bodies and organizations, and recognizing as invalid the decision of the Council of Ministers of the Republic of Belarus dated February 11, 2006, N 192»

- ▶ Decree of the Council of Ministers of the Republic of Belarus dated March 28, 2011 No. 384 «National program for the accelerated development of services in the field of information and communication technologies for 2011-2015»
- ▶ Decree of the Ministry of Communications and Informatization of the Republic of Belarus of January 16, 2015, N 2 «On approval of the Instructions on the procedure for maintaining a register of activities in the field of informatization»
- ▶ Decree of the Ministry of Communications and Informatization of the Republic of Belarus of January 16, 2015, N 3 «On approval of the Regulations on a single organizer of public procurement procedures in the fields of informatization, information and communication technologies and telecommunications»
- ▶ Decree of the State Committee for Science and Technology of the Republic of Belarus, the Ministry of Communications and Informatization of the Republic of Belarus dated January 16, 2015, N 2/4 «On the establishment of a standard form of terms of reference for the event of the state informatization program and its subprograms»
- ▶ Decree of the Council of Ministers of the Republic of Belarus of March 23, 2016, No. 235 “On the State Program for the Development of the Digital Economy and the Information Society for 2016–2020”
- ▶ Decree of the Ministry of Communications and Informatization of the Republic of Belarus dated May 13, 2016, N 5 “On the list of measures in the field of informatization”
- ▶ Decree of the Ministry of Communications and Informatization of the Republic of Belarus of February 15, 2017, N 3 «On the conditions for inclusion in state programs of activities in the field of informatization»
- ▶ Decree of the Presidium of the National Academy of Sciences of Belarus of February 26, 2018 No. 17 “On Approval of the Strategy “Science and Technology: 2018–2040”
- ▶ Decree of the Council of Ministers of the Republic of Belarus dated February 28, 2018 No. 167 “On the establishment of the Council for the Development of the Digital Economy” Resolution of the Security Council of the Republic of Belarus dated March 18, 2019 No. 1 “On the Concept of Information Security of the Republic of Belarus”
- ▶ Decree of the Council of Ministers of the Republic of Belarus dated April 24, 2020 No. 254 «On the introduction of electronic passport systems»
- ▶ Decree of the Council of Ministers of the Republic of Belarus dated February 1, 2021 No. 59 “State Program “Agricultural Business for 2021-2025”
- ▶ Decree of the Ministry of Natural Resources and Environmental Protection of April 15, 2020 «Strategy for scientific, technical and innovative development in the field of environmental protection and sustainable use of natural resources 2021-2025»
- ▶ Decree of the Council of Ministers of the Republic of Belarus dated February 2, 2021 No. 66 «On the State Program «Digital Development of Belarus» for 2021-2025»
- ▶ Order of the Operational and Analytical Center under the President of the Republic of Belarus dated February 26, 2015, N 16 “On Certain Issues of Domain Name Registration”

- ▶ Decision of the Presidium of the Council of Ministers dated 03.11.2015 No. 26 «Strategy for the development of informatization in the Republic of Belarus for 2016-2022»
- ▶ Decision of the Supreme Eurasian Economic Council dated October 11, 2017 No. 12 «On the Main Directions for the Implementation of the Digital Agenda of the Eurasian Economic Union until 2025»
- ▶ The concept of digital transformation of processes in the education system of the Republic of Belarus for 2019–2025.

#### **TECHNICAL REGULATIONS::**

- ▶ TR 2013/027/BY, BY “Information Technologies. Means of Information Protection. Information Security: Technical Regulations of the Republic of Belarus»
- ▶ TR 2013/027/BY “Information Technologies. Means of Information Protection.
- ▶ Information Security»
- ▶ TR 2018/024/BY “Telecommunication Facilities. Safety».

#### **TECHNICAL CODES OF PRACTICE:**

- ▶ TCP 223-2020 (33160) «Organization of Call Centers Using Standard Technologies».

#### **STATE STANDARDS OF THE REPUBLIC OF BELARUS (STB, GOST) AND ENTERPRISE STANDARDS:**

- ▶ STB 34.101.78-2019 “Information Technology and Security. Public Key Infrastructure Profile»
- ▶ STB 34.101.81-2019 “Information Technology and Security. Service Protocols
- ▶ Data Assurance»
- ▶ STB 2583-2020 “Digital Transformation. Terms and Definitions»
- ▶ STB 34.101.31-2020 “Information Technology and Security. Encryption and Integrity Control Algorithms».

