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## **MODEL OF SUSTAINABLE SOCIO-ECONOMIC DEVELOPMENT: IMPLEMENTATION THROUGH THE POTENTIAL OF ICT AT REGIONAL LEVEL ASSESSMENT**

**Abstract.** *The study provides theoretical substantiation of sustainable socio-economic development model with realization of human potential, and its practical implementation through the assessment of Information and Communication Technologies (ICT) potential at regional level within three areas: access, use and skills.*

**Key words:** *strategy, digitalization, ICT, human potential, economic growth, GRP.*

Currently, information technology (IT) is the main digital tool that allows successfully implement and effectively use the most diverse resources of society and the state. The creation of a system of information resources in the state is the most important strategic factor in the development of both the economy and the social sphere [1]. Thus, the sustainable development of the state should be based on human potential as the basis for its development and the potential of information and communication technologies as the main driver of digitalization.

The methodological provisions of this article are based on the postulate that the sustainable development of the state with the realization of human potential in the context of digitalization can only be realized through the development of ICT potential, including at the regional level.

The novelty of the study lies in the creation of a model that assumes the unity of the political economic laws of sustainable development and economic growth, built on the principles and tools for implementing economic policy, taking into account the needs, economic incentives of a person, means of realizing human life, innovative factors of socio-economic transformation, as well as in assessing the most important in the context of digitalization of the factor of sustainable development – the potential of ICT based on the regions of the Republic of Belarus.

The nature of potential development in the field of ICT is determined by Digital Agenda of the Eurasian Economic Union until 2025 [2], Concept of Information Security of the Republic of Belarus [3], Strategy “Science and Technology: 2018–2040” [4] and many others.

The results of the generalization of theoretical approaches to modeling sustainable socio-economic development are presented in Table 1.

**Table 1. Systematization of theoretical approaches to modeling sustainable socio-economic development**

Theoretical approach	Research value
Morris Altman	interesting in highlighting the institutional parameters of economic growth, as well as substantiating the importance of working conditions and labor relations, innovations, taking into account existing technologies.
Amartya Sen	valuable justification of the socio-economic well-being of society, in the center of which the personality is considered, the fact that the well-being of society is not limited to economic.
M. Lavoie, Engelbert Stockhammer, Servaas Storm	it is concluded that in large economic regions with high intra-regional trade, the implementation of a pro-labor macroeconomic policy contributes to the growth of GDP and the level of employment of the population. In a profit-oriented macroeconomic policy, significant economic growth and an increase in employment are possible with an increase in wages.

Theoretical approach	Research value
Paul J.J. Welfens	considered the principle of economies of scale applicable to innovative industries; the principle of intense price competition in the market of high-tech products, as there is international outsourcing, as well as foreign direct investment in the production of technologically intensive components.
Mundell-Fleming Model	valuable in revealing the dependence of current real income on current real wages, the expected future wage rate, the degree of use of fixed capital. It is substantiated that the higher the level of wages in relation to the interest rate of fixed capital, the faster the replacement of labor through capital.
Vladimir Gimpelson	characterizes that implementation of highly qualified human capital is possible to the full extent, if, according to the created educational labor supply, the economy creates a sufficient number of qualified jobs to absorb the supply.
P. Diamond, E. Maskin, D. Mortensen, J. Stigler	The model is notable for substantiating the coexistence of the processes of creating and eliminating jobs, the dependence of the level of wages of an employee not only on the quality of professional and qualification characteristics, but also on the labor market.
Source: compiled by the authors based on data [5]	

The author's model of socio-economic sustainable development with the realization of human potential reflects the progressive achievement of goals and the definition of conditions for implementation through the characteristics of stages and tasks.

The first stage is the satisfaction of human needs to ensure social equality, the growth of the welfare of the population, the innovative reproduction process of the population through a comparative analysis of the employment structure of the able-bodied population in accordance with the requirements of the sustainable development of the national economic system.

The second stage is the growth of the gross domestic product, where the implementation of the policy tools for the innovative development of the economy, export policy, and the system of production and social needs of a person are defined as the objectives of its achievement.

The third stage is the formation of employment in the system of sustainable development of the national economy, where the achievement objectives are justified: identifying indicators of demand for innovative labor, taking into account the needs of traditional industries and innovative sectors of the economy, export policy, as well as identifying indicators of the supply of labor resources from among the able-bodied population.

The fourth stage is the use of consolidated social mechanisms in the implementation of the state social policy to ensure the professional employment of the population as the basic basis for its well-being through the fulfilment of tasks: creating a model of institutional interaction between the healthcare system, the system of social protection and social security of the population.

The active process of digitalization is closely related to the training of specialists in the ICT industry and, accordingly, to the development of human potential [6, p. 548].

The practical implementation of this model in the context of digitalization is possible through the influence of factors that accelerate the socio-economic development of the state and its regions, primarily through strengthening the potential of information and communication technologies. In this regard, the authors assessed the ICT potential of the regions of the Republic of Belarus in three areas: ICT-access, ICT-use and ICT-access.

Table 2 presents the indicators for assessing ICT-access, as well as their values for the regions of the Republic of Belarus in 2018 and 2020.

**Table 2. Indicators for assessing ICT-access by regions of the Republic of Belarus in 2018 and 2020**

Indicator	Indicator value by region					
	Brest	Gomel	Mogilev	Grodno	Vitebsk	Minsk
1. Access of population to the Internet (percent of total population of corresponding group), %						
2018	75,3	82,2	82,8	82,6	80,3	77,5
2020	80,7	86,1	82,8	85,5	85,2	79,5
2. The share of organizations (percent of total number of organizations with access to the Internet) with a high data transfer rate (30.1 Mb/s and above), %						
2018	23,3	22,6	24,9	27,1	28,2	29,4
2020	38,8	40,2	35,7	42,3	39,4	40,9
3. Number of students of general secondary education programmes per personal computer, people						
2018	18	15	16	11	15	13
2020	17	15	15	10	13	13
4. Volume indices of data transmission services						
2018	120,1	112,1	117,1	121,1	119	121,8
2020	114,4	113,4	111,6	112,8	114,1	110,4

Source: compiled by the authors based on data from the National Statistical Committee of the Republic of Belarus

The data presented in the table indicate that there is some differentiation of indicators by regions of the Republic of Belarus, although not so significant. Gomel, Grodno and Vitebsk regions are the leaders in terms of population access to the Internet. In terms of the share of organizations with a high data transfer rate, the positions of the Grodno and Minsk regions are the strongest, while the weakest positions are in the Mogilev region. In terms of number of students of general secondary education programmes per personal computer, the Brest region is also in the lead, as well as in terms of the index of the physical volume of data transmission services.

Thus, it can be noted, firstly, the absence of a single leader in the entire set of indicators, and secondly, a significant change in the positions of regions in terms of indicators in 2020 compared to 2018. Table 3 presents indicators characterizing ICT-use.

**Table 3. Indicators for assessing ICT-use by regions of the Republic of Belarus in 2018 and 2020**

Indicator	Indicator value by region					
	Brest	Gomel	Mogilev	Grodno	Vitebsk	Minsk
1. Share of organizations using the Internet, %						
2018	98,6	97,5	97,8	98,8	98,7	97,6
2020	100	99,1	99,7	98,8	99	99,5
2. Internet users (percent of total population) with a high data transfer rate (30.1 Mb/s and above), %						
2018	75,3	79	78,7	78,3	69	74,4
2020	80,7	86,1	82,8	85,5	85,2	79,5
3. Users completely satisfied with the quality of Internet services (percent of the total), %						
2018	38,4	42,5	50	51,1	52,1	48,9
2020	33	41,6	48,4	62,6	47,2	39,2

Indicator	Indicator value by region					
	Brest	Gomel	Mogilev	Grodno	Vitebsk	Minsk
4. The share of employees who used personal computers with access to the Internet in the headcount of employees of organizations that used personal computers, %						
2018	70,1	65,8	70,9	71,7	71,9	76,5
2020	73,4	65,7	74,4	73,2	77,1	78,2

Source: compiled by the authors based on data from the National Statistical Committee of the Republic of Belarus

The most significant differentiation is observed in terms of users completely satisfied with the quality of Internet services. For other indicators, the difference is not so significant.

Thus, with an unconditional increase in the level of ICT-use in the regions of the Republic of Belarus, there is a decrease in satisfaction with the quality of Internet services.

A special role for the informatization of the economy in conjunction with human capital is played by the development of ICT-skills [7, p. 156]. At the same time, the number of indicators in the ICT skills group is limited due to insufficient coverage of statistical data.

Information for the analysis of indicators of this group is presented in Table 4.

**Table 4. Indicators for assessing ICT-skills by regions of the Republic of Belarus in 2018 and 2020**

Indicator	Indicator value by region					
	Brest	Gomel	Mogilev	Grodno	Vitebsk	Minsk
1. Share of people employed by the type of economic activity "Information and Communication", %						
2018	6,1	7,1	4,7	5,2	5,3	5,5
2020	5,6	6,5	4,2	5,1	4,8	6
2. Number of ICT sector organizations						
2018	263	283	194	224	214	436
2020	262	293	179	232	214	440

Source: compiled by the authors based on data from the National Statistical Committee of the Republic of Belarus

The most obvious is the advantage of the Minsk region in terms of the number of ICT sector organizations, which allows this region to most actively form ICT skills. Significantly inferior to other regions in this indicator Mogilev region.

Table 5 presents the results of calculating the multivariate average of the components of the ICT-potential of the regions of the Republic of Belarus based on the data of 2018 and 2020.

**Table 5. Results of calculating the multidimensional average for ICT-components of the potential of the regions of the Republic of Belarus based on the data of 2018 and 2020**

Indicator	Indicator value by region					
	Brest	Gomel	Mogilev	Grodno	Vitebsk	Minsk
1. ICT-access						
2018	0,925663	0,88289	0,926248	0,895381	0,93669	0,92164
2020	0,964347	0,95712	0,91751	0,908894	0,925517	0,908781
2. ICT-use						
2018	0,90656	0,91912	0,968535	0,977597	0,954488	0,967435
2020	0,871407	0,884526	0,924902	0,9796	0,935398	0,899266

Indicator	Indicator value by region					
	Brest	Gomel	Mogilev	Grodno	Vitebsk	Minsk
3. ICT-skills						
2018	0,742297	0,843003	0,564	0,632595	0,63172	0,894449
2020	0,740545	0,84954	0,539915	0,668445	0,62525	0,962307
Integral indicator						
2018	0,857589	0,88068	0,819594	0,835185	0,840966	0,927841
2020	0,858766	0,897062	0,794109	0,852313	0,828722	0,923451
Region rank in 2018	3	2	6	5	4	1
Region rank in 2020	3	2	6	4	5	1

Source: compiled by the authors based on data from the National Statistical Committee of the Republic of Belarus

As the analysis showed, the highest level of ICT-potential is noted in the Minsk region, where a significant part of information and communication resources is concentrated. Nevertheless, there is a slight decrease in the integral indicator of the ICT-potential in the Minsk region in 2020 compared to 2018. Mogilev region demonstrates the weakest position, especially in terms of ICT-skills. In addition, the value of the integral indicator for the region decreased in 2020 compared to 2018. So, the analysis made it possible to identify two regions that need to make serious efforts to strengthen their ICT-potential: Mogilev and Vitebsk regions.

The model of socio-economic sustainable development presented in the article with the realization of human potential is distinguished by the fact that, along with dialectical unity, it ensures the growth of gross domestic product and the achievement of socio-economic indicators of human life. In light of the fact that many authors note the impact of information technology on economic growth [8s, p. 688], we consider our results from the position of their influence on the main economic indicator characterizing the level of economic development of the region - the gross regional product.

In order to identify the relationship between ICT-potential and the level of gross regional product, we compare the results of ranking the regions of the Republic of Belarus in terms of their ICT-potential with the results of ranking the regions in terms of the gross regional product, presenting them in Table 6.

**Table 6. The results of ranking the regions of the Republic of Belarus by the level of their ICT potential and by the level of GRP in 2018 and 2020**

Indicator	Indicator value by region					
	Brest	Gomel	Mogilev	Grodno	Vitebsk	Minsk
ICT-potential level in 2018	0,857589	0,88068	0,819594	0,835185	0,840966	0,927841
Rank of the region in terms of ICT-potential in 2018	3	2	6	5	4	1
ICT-potential level in 2020	0,858766	0,897062	0,794109	0,852313	0,828722	0,923451
Rank of the region in terms of ICT-potential in 2020	3	2	6	4	5	1
Gross regional product in 2018, mln BYN	11520,5	12304,3	8458,7	10070,3	9073,5	18056,0
Rank of the region in terms of gross regional product in 2018	3	2	6	4	5	1
Gross regional product in 2020, mln BYN	13938,9	15193,4	9744,7	11879,8	11756,3	21884,7
Rank of the region in terms of gross regional product in 2020	3	2	6	4	5	1

Source: authors' calculations based on data from the National Statistical Committee of the Republic of Belarus

The conducted studies testify to the absolute coincidence of the positions of the regions of the Republic of Belarus in terms of their ICT-potential and GRP. The results of the analysis demonstrate the relationship between these two indicators. Undoubtedly, this hypothesis needs more serious evidence, however, already at this stage, it can be assumed that there is a connection between the studied indicators and a fairly high degree of influence of the ICT-potential on the level of the gross regional product. In this regard, we believe that the development and implementation in practice of methods for assessing the impact of informatization on the development of the regional economy makes it possible to form priorities in choosing factors to increase their competitiveness.

Recognizing the importance of this provision, we can conclude that it is necessary to increase the potential of the regions of the Republic of Belarus in the field of ICT, which will ensure their sustainable socio-economic development, while achieving the goals set within the proposed model of socio-economic sustainable development with the realization of human potential.

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