

Process of structural-digital transformations in rural territories and agricultural sector

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Abstract — The present-day conditions objectively provide for implementing the requirements of digital economy. The study presents the main directions of forming and developing digital economy of agribusiness industry and rural areas, worked out on the principles of system and indicative approaches, and project management.

Keywords — digital agriculture, digitalization of agribusiness industry, rural areas

I. INTRODUCTION

In current economic environment, a key role in many areas of activity is played by information and communication technologies, which are an integral part of digital economy [4].

In most studies, the present-day territorial economic system has been considered as a complex and multi-aspect object of great structural transformations taking place in the context of new requirements of digital economy [1].

The goal of structural-digital transformations is to achieve sustainable economic growth on the basis of its harmonious structure and to continuously improve the efficiency of the main economic processes in the framework of developed digital infrastructure [1].

An increase in the flow of information, quantity and quality of analyzing methods is the main driving force for transforming managerial mechanisms and models forecasting the development of agribusiness industry and rural areas [14].

Basic components of economic digitalization are put into three groups: a) data collecting and analytical processing (the necessity to understand the reason of doing it); b) formation of demands (active IT development transforms consumer behavior); c) managing the digital data and economic needs interaction (forecasting, planning, organizing, executing, controlling and coordinating actions). Thus, ideally, there should be a unified system of managing socio-economic development on the basis of information-analytical data integrating to work out the development vectors [5]. Ease of Use.

II. RESEARCH METHODOLOGY

The aim of the paper is to study the key aspects in defining a digital system (exchange of knowledge, technology, economic entities), i.e. to determine principles, methods of forming a single information space and information infrastructure, taking into account the needs of the state, business, and society.

The authors use general economic methods, as well as a monographic survey of various sources to study the essence of the concept "digital economy".

The problem under consideration is theoretical and methodical in nature, and implementing digitalization programs is very likely to strengthen practical significance of studying the experience to organize and manage digital economy.

Directions for further studying structural and digital transformation as a factor in the innovative development of the territorial economic system are to justify sources of financing to implement projects and programs aimed at the total use of digital technologies in economic management, to ensure parity in relations among the territorial subsystem entities, and to plan innovative development programs for territorial economic system taking into account its structural composition [1].

III. THE RESULTS OF THE STUDY

All external changes and internal processes of rural development are considered as interrelated elements of economic evolution [15].

In order to effectively regulate the agricultural economy, it is necessary to create an effective system for developing indicators, making use of the principle of priority as regards the needs and interests of the society development [12].

When choosing indicators, the qualitative assessment of the territory development priorities is very important alongside with the quantitative assessment, [9].

When developing indicators in the management process, it is necessary to rank the indicators by priority [10].

The system of sustainable development indicators within the framework of regional and global goals is based on international standards, and in solving local problems of sustainable development of a specific territory, it is possible to develop their own systems of indicators (coordinating them with national standards and norms).

Managing sustainable development of rural territories in time and space is associated with working out models to follow the dynamics of indicators changes.

Prospective characteristics of rural development are determined on the basis of modeling general indicative criteria of the economic, social and cognitive components.

IV. DISCUSSION OF THE RESULTS

To harmoniously implement all possible areas of digitalization, it is necessary to create certain conditions: firstly, to create a regulatory framework adequate to the requirements of digital economy; secondly, to develop and implement a system of stimulators for using digital technologies at various levels of management; thirdly, to create a digital platform that will make it possible to concentrate the resources necessary for digitalization, as well as systematize and harmonize the activities of a particular sector and the territorial economic system as a whole.

Creating a digital platform of the agro-industrial complex involves increasing the efficiency of organizing and managing agricultural production as a result of the large-scale introduction of digital technologies (creating and developing infrastructural, organizational, financial and other conditions).

Creating a digital platform is proposed to be carried out in several stages:

- stage 1 – to form a center of competence (create an expert group, define strategic goals, basic principles and mechanisms of functioning);
- stage 2 – to provide technical and technological support for the functioning of the digital platform on the basis of the results of the previous stage and in parallel with it;
- stage 3 – to determine the architecture of the platform (structural elements, functions, nature of interaction);
- stage 4 – to provide functioning of the platform and to develop it further (to increase the scale due to the commercial interest of real and potential participants).

The implementation of these stages will result in forming a digital platform in the agro-industrial sector of the territory economy, the innovative development which is a necessary and sufficient condition for implementing structural transformations of the sectoral (sectoral) type.

The digital platform will make it possible for all its participants, namely, authorities, business, scientific and educational institutions, etc., to adapt their activities to the requirements of the present-day context and quickly make effective management decisions in the interests of the region development [5].

The agri-food sector of the socio-economic system determines territorial identity, which requires substantiating the prospects for structural and digital transformation of this segment.

The main advantages of introducing digital agriculture are [7] possibility to exchange information and possibility for agricultural producers to have an access to it, formation of effective food markets by increasing information accessibility and transparency of markets; reduction of links in the intermediary chain; decreasing risks by reducing uncertainty in making managerial decisions, increasing readiness for climate changes, and natural disasters; increasing investments into innovative developments, digital infrastructure, and human capital.

To improve the result-oriented regulating the agro-industrial complex formation and development, it is necessary to analyze and evaluate the current state of organizational and economic potential and forecast organizational, economic, organizational and managerial impacts on the level of its development (identify priority goals in the development of individual elements of potential, calculate the parameters of the necessary resources provision, methods and terms of their achievement).

We should note that in Russia the proportion of agricultural producers using digital technologies in production is very low, which affects the growth of crop yields, animal productivity and, ultimately, labor productivity in the industry [11]. Russia's transition to the digital economy and digital agriculture is constrained by a number of factors: low level of the economy sectors and agriculture digitization; lack of business understanding of the economy and agriculture digitalization benefits; insufficient development of domestic technologies in automation and digitalization; lack of qualified personnel; limited financial resources; insufficient enterprises costs for innovative development and research.

The classification of factors affecting the development of rural territories is the basis for factor forecasting changes in the resulting and indicatively established indicators for developing forms, methods and tools of managing the development of this system [12].

Forecasting the development of production and social infrastructure of rural areas makes it possible to objectively choose the optimal scenario for changing organizational and economic potential of rural areas on the basis of implementing indicative planning and forecasting tools [13].

V. CONCLUSIONS

The methodology of adaptive forecasting territorial development indicators significantly expands capabilities of operational identification of problem areas in the development of the territory, thereby increasing the effectiveness of managerial influences in implementing socio-economic policies [3].

The most important property of sustainable development indicators is their scientific validity.

At present theoretically and practically, there exist two main approaches in forming indicators of sustainable development: forming systems of individual indicators and forming integrated indicators.

Indicator systems can be considered according to their popularity and their importance in forming the concept of sustainable development.

Integrated indicators are convenient for making complex decisions in the field of territorial development. Integral indicators of sustainable development are essentially analogs of GDP, GNP (measuring the state of the economy) [6].

An indicative economic management mechanism, a system of interrelated and interdependent economic and market elements and directions make it possible to regulate the activity of agricultural organizations of the territory in the context of unstable economy, provided that proactive measures, adjustments to the tactics and strategy of the territory and an individual organization are taken in advance [12].

To determine necessary scientifically based guidelines (indicators) an indicative system should be developed for a certain period of time in the context of implementing interrelated elements of general economic evolution [15].

For a more complete description of sustainable development, it is necessary to revise and currently adjust the economic indicators being used at the moment (production and consumption volume) [15].

The next high-priority indicators in the group of substantiating economic indicators should be indicators with the efficient resource use [15].

Social indicators of sustainable development are considered as tools to ensure action towards restoring environmental sustainability, ensuring security and sustainability of the population [15].

Indicative designing implemented in organizing and managing production is advisory in nature, takes the form of a project for developing rural areas and providing a balance of interests of business, state, and society [15].

In modern conditions of rural economy development it is recommended to build the indicative economic mechanism of development management from the following blocks:

- firstly, forming the land fund, fixed assets on the basis of property shares and outside funds (national contributions, state loans); forming a workforce strategy, considering the creation of a knowledge bank and training their own personnel [15];

- secondly, managing motivational processes and forming corporate social responsibility in improving the population welfare;

- thirdly, the aggregate state-market responsibility implies mutual relations among organizations, equivalent relations among industries, and organizations of rural areas.

Sustainable development indicators should be coordinated with the strategic goals of the socio-economic development of the constituent entities of the Federation until 2020. They are grouped into key, basic and additional (table 1) [9].

TABLE I. SUSTAINABILITY INDICATORS

Key Indicators
GRP per capita, thousand rubles / people.
GRP energy intensity / thousand rubles
Index of physical wear of fixed assets,%
Volume of investment in fixed assets from all sources of financing, including investments by structure (industry, agriculture, transport and communications, construction, trade),% of GRP
Output of products and services by small business
The share of shipped innovative products in the total volume of shipped industrial products,%
Human Development Index
Budget expenses per capita, thousand rubles / people
The registered unemployment rate,%
True savings, million rubles
Total pollution per GRP unit, thousand tons / million rub.
The amount of unprocessed production and consumption waste, thousand tons
Additional indicators
Volume of paid services per capita, thousand rubles / people
The coefficient of fixed assets renewal,%
The share of employees in small enterprises related to the economically active population of the region,%
Agricultural production per capita, thousand rubles / people
Real disposable financial income of the population,%
Purchasing capacity of population financial income and wages, (financial income; wages)
Poverty rate,%
Number of recorded crimes per 10,000 of the population
The average age of the population Per 1000 people of the population
The average age of the population, years
Natural population growth, people per 1000 people
Life expectancy, years: men, women
Infant mortality, people per 1000 births
Neoplasms per 10,000 people
The share of people employed in the economy having higher vocational education,%
The area of specially protected natural territories, thousand ha
Investments in fixed assets aimed at protecting the environment and rational use of natural resources, thousand rubles
Natural capital, million rubles
Air emissions, total - thousand tons
Contaminated water collection, total - mln. m
Specific indicators
Use of calculated cutting area,%
Depletion of oil reserves, million tons

The economic mechanism of indicative regulation makes it possible to: quickly and effectively select new production and commercial areas; assess the prospects of possible additional income; make non-standard decisions in standard and especially uncertain situations; evaluate innovative changes as regards the effect and the final result of the activity; anticipate risks and manage them on the basis of operational analyzing information.

In Table 2 a differentiated approach to using certain indicators was determined in accordance with the goals set for the possible economic growth quality [10].

TABLE II. INDICATORS OF THE ECONOMIC GROWTH QUALITY

Problems	Indicators
1. Economic growth	Per capita income Fixed investment True savings
2. Economy restructuring	Share of investments in high value-added industries (quality of investments) The proportion of innovative industries in the economy structure The proportion of small business in the production of GRP The share of investments in environmental protection and the rational use of natural resources
3. Natural resource intensity	Energy consumption Mineral Depletion Amount of toxic waste Greenhouse gases Damage to the future economy Natural capital
4. Technological level	Depreciation of fixed assets Fixed assets renewal rate Technological investment
5. Fiscal capacity	The actual amount of budgetary and extra-budgetary funds allocated for maintaining social and industrial infrastructure for 1 person (or financing socio-economic development of the region per capita)
6. Material equality	Gini coefficient Poverty rate
7. Workforce wellbeing	Occupational morbidity rate Human Development Index
8. Employment	Unemployment

To solve the problem of digitalization of the agro-industrial complex and agricultural production, it is important to take into account the negative trends in the development of agriculture in the context of “great” challenges and economic sanctions.

In modern studies of the territorial socio-economic system, in the context of forming and developing digital economy, there appeared directions that need theoretical and methodological reflection.

The structural-digital transformation is focused on using digital technologies in three types of relations: a) relations between the subjects of the territorial economy interested in its development (business, government, population, scientific and educational institutions, trade unions); b) relations as regards industry affiliation; c) relations as regards types of economic activity which belong to a certain technological structure.

Implementing digital economy and its development will require the corresponding state of the original, analogue economy: the database of the analogue economy and the database of the digital economy must be interoperable [16].

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