

# Application of Digital Technologies in the Sphere of Organic Production in the Agribusiness: Experience of the Chechen Republic

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## ABSTRACT

The agricultural production is a traditional area for the Chechen Republic and has a lot of experience. The article discusses the application of digital technologies in the sphere of organic production in agriculture. An analysis of the state and management of the organic production, as well as projects for the construction of new modern greenhouse complexes, was carried out on the example of the Chechen Republic. The advantages and benefits of using digital technologies in the economy in relation to the agricultural sector are shown, as well as the advantages of technologies for the organic production for sustainable development and protection of public health. Procedures and an algorithm for the use of digital information technologies was developed on the example of the development of the greenhouse industry in the Chechen Republic. An assessment of the prospects for the organic production within the framework of import substitution programs is given. **Keywords:** agro-industrial complex, greenhouses, organic production, project, digital technologies, Chechen Republic.

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## 1. INTRODUCTION

The digital economy is an integral part of the economy, where subject knowledge and nonmaterial production dominate - the main indicator characterizing the information society [3]. Digitalization determines the vector along which socio-economic systems at the micro, meso and macro levels will be developed in the long term, which requires a comprehensive study and analysis of digital transformation processes. At the same time, this transformation itself is closely related to the development trend of socio-economic systems and is widely implemented on its basis. This relation and the mechanism for its implementation remain insufficiently studied, which determines the need to develop tools for its identification, assessment, and management of socio-economic systems. Currently, the efforts of many Russian companies and executive authorities are specifically focused on the digitalization of key processes, and most perceive digitalization as a new cycle of automation and computerization. In this regard, it is necessary to distinguish digitalization and digital transformation from automation. Significant potential for using the digital economy exists in the implementation of environmentally oriented projects, including in the organic production in the agribusiness.

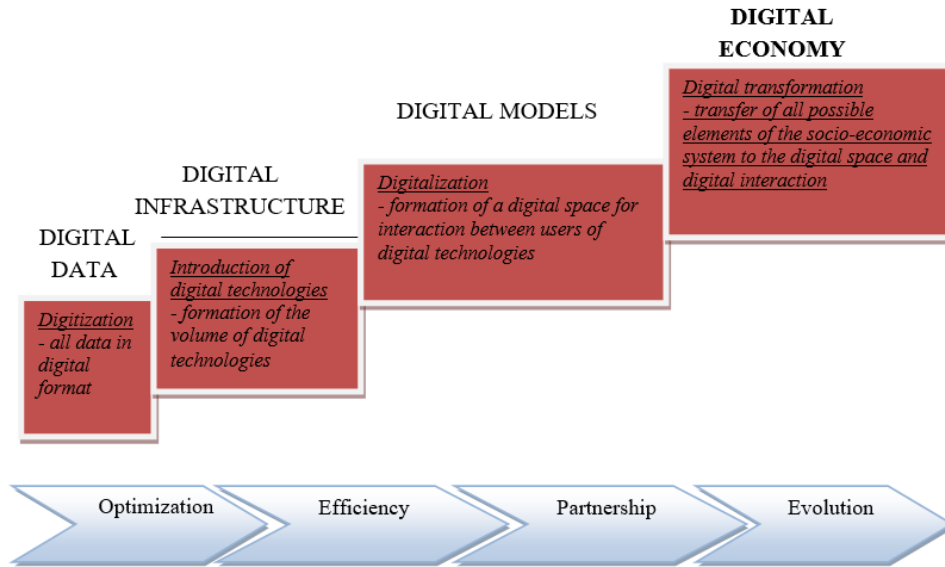
From this point of view, the methodology of project management and the digital economy has many

interrelations, especially in terms of managing environmentally oriented projects [1, 2, 6]. As a result, this approach is aimed at ecologization of the use of natural resources in the agribusiness as a whole [4]. The experience of using information technologies in the production of food from local raw materials as part of the implementation of projects for the industrial development of the Arctic is of considerable interest [5].

Consider some of the benefits of digital transformation for economic entities:

1. Process optimization. New technologies allow companies to automate simpler processes and eliminate intermediate steps in more complex processes. This increases the flexibility of companies that can now use their resources more efficiently.
2. New sources of income. With the advent of new technologies, new ways of making a profit are opened that were not available before.
3. Creation of a personalized and attractive service infrastructure. Customers today expect companies to listen to their feedback and address their specific needs. Modern technologies are so advanced that they can solve all these problems.

Enterprises and organizations, both in the agricultural sector and in other sectors of the economy, are rapidly replacing traditional interaction processes with digital ones, using the most modern technologies (Fig. 1):



**Figure 1** The digital transformation process

The Chechen Republic accumulated certain experience in the implementation and realization of projects for the development of branches of the agro-industrial sector, including protected ground, projects for the construction of new modern greenhouse complexes, using corporate digital solutions, which allows to form a decision-making mechanism for adjusting strategic management.

Over the past 20 years, the situation in the agro-industrial sector has improved significantly. Retaliatory sanctions to Russia (embargo) became a spur for the development of domestic agriculture, which has recently shown stable growth rates. Production volumes are increasing, import of food products is decreasing, new enterprises are opening, the attractiveness of many industries that prefer to work in the new conditions of the digital economy is increasing.

**2. METHODOLOGICAL STUDIES**

Table 1 shows some investment projects, implemented in the Chechen Republic, aimed at ensuring environmentally sustainable development in the agribusiness.

**Table 1** Investment projects to ensure sustainable development of the economy of the Chechen Republic in the digital environment

Project name	Initiator of the project	Objective of the project	Terms of project implementation
Construction of a greenhouse complex for growing vegetables and flowers on an area of 3 hectares with a capacity of 1,200 tons/year of protected ground vegetables (the Chechen Republic, Shelkovsk district, Chervlennaya station)	LLC "AGRO TEREK"	Effective use of the potential of the republic's resources using modern technologies.	is being implemented
Construction of a greenhouse complex for growing vegetables and flowers on an area of 10 hectares with a capacity of 4,800 tons/year of protected ground vegetables (the Chechen Republic, Shelkovsk district, Chervlennaya station)	Individual entrepreneur, head of peasant farming Abubakarova Zh. Ya.)	To make the Chechen Republic an attractive territory for investors, a territory, that is worthy of their trust, where new standards of quality of life will be created and which will be an example for other regions of Russia.	is planned
Construction of a complex of high-tech greenhouses on an area of 14.5 hectares with a capacity of 5,100 tons/year of protected ground vegetables (the Chechen Republic, Grozny district, v. Gikalo)	LLC "Agro-Invest"	The creation of a base for the development of plant growing, seed growing, processing industries will help solve the problem of employment and increase the level of income of the population of the republic.	is being implemented
A complex of high-tech greenhouses. The main activity is the growing of vegetables, melons, root crops and tubers, mushrooms and truffles (the Chechen Republic).	LLC "TK YugAgroHolding"	Raise significant financial resources to the agribusiness of the Chechen Republic and achieve high performance by providing agricultural producers in the region with modern means of production.	is being implemented

So, for example, LLC "TK YugAgroHolding", since 2015, has been implementing the largest investment project for the construction of high-tech greenhouse complexes. Two greenhouse complexes with a total area of 18 hectares and a capacity of 14 thousand tons of vegetable products per year were put into operation. The main activity of the company is the growing of vegetables, melons, root and tuber crops, mushrooms and truffles. The implementation of this investment project is carried out in three stages:

First stage. Construction of a greenhouse complex for growing vegetables and green products in the v. Alkhan-Churt on an area of 8.9 hectares, which was put into operation in 2017.

Second stage. Construction of a greenhouse complex for growing vegetables and green products in st. Petropavlovskaya on an area of 10 hectares, which was put into operation in 2019.

Third stage. By the end of 2020, it is planned to put into operation the greenhouse complex st. Petropavlovskaya on an area of 5 hectares.

A modern complex for growing vegetables and green products in the v. Alkhan-Churt on an area of 8.9 hectares was put into operation in 2017. Cumulative investment for the construction of the first stage amounted to 2.342 billion rubles, including: borrowed funds - 1.756 billion rubles, own costs - 586.058 million rubles. Over the past 2019, the yield of vegetables was 5,730 tons.

At the end of the 1st half of 2020, almost 3.5 thousand tons of tomatoes were harvested. The second stage with a total area of more than 10 hectares in st. Petropavlovskaya, Grozny district, was launched in 2019. The introduction of new areas allowed to create over 200 new job sites and an increase in the volume of production. Cumulative investment for the construction of the second stage amounted to 2.357 billion rubles, including: borrowed funds - 1.768 billion rubles, own funds - 589.4 million rubles. The first yield was in May 2019, in general, over the past year, 3.6 thousand tons of cucumbers were harvested. In May of this year, on two production blocks on an area of 3.78 hectares, tomatoes of the Merlis variety were planted, the first yield is expected at the end of September. By the end of 2020, it is planned to harvest more than 3 thousand tons of tomatoes.

### **3. RESULTS OF THE STUDY**

Greenhouse vegetable production is an important part of the agribusiness of our country, providing good nutrition to the population outside the season, when most other sources of vitamins are absent. In the last decade, soil has become the most attractive direction in the greenhouse business. We decided to move in groove with the involvement of Dutch specialists and advanced technology. Five years ago, with getting the support of the head of the Chechen Republic, the company began implementing large-scale projects.

Two years later, the first stage of a greenhouse complex for growing tomatoes was launched in the village of Alkhan-Churt in the suburb of Grozny. In 2019, in the

stanitsa of Petropavlovskaya, Grozny district of the republic, a second greenhouse was launched, the main direction of which is the growing of cucumbers. Both complexes are located on lands with a total area of 18.9 hectares and have a capacity of 14 thousand tons of vegetable products per year. The latest technologies were applied in the construction, a complete supply of metal structures and equipment on a turnkey basis was made by "HortilifeBV" and "AmmerlaanConstructionBV" companies, the Netherlands. Own 110/10 kV transformer substation, 110 kV personal power line, 18.33 km long, was built. All service lines, including reserve ones, were brought, wells with the device of water towers were drilled.

For high crop yield, our factories use the most modern dutch technologies: growing photocultures using drip watering, as well as the use of curtain systems, supplementary lighting and evaporative humidification. It is these decisions in the greenhouse business that guarantee high yields. To date, the main assortment of production: hybrid tomato of the Merlis variety, short-fruited and medium-fruited lumpy cucumber of the Dutch varieties Björn and Svyatogor.

Growing of vegetables indoors (protected ground area under glass) is one of the most intensive forms of agriculture, which allows to harvest a high yield from one unit of area almost all year round.

The specific conditions of the protected ground area under glass create favorable conditions for the mass development of pests. For example, plants of cucumbers and tomatoes in greenhouses are largely inhabited by harmful organisms: tomato moth, greenhouse whitefly, various species of aphids, thrips, red spiders. For their biological suppression, entomophages with a wide range of feeds are used. One of them is the predatory macrolophus bug. Tomato moth, greenhouse whitefly, various types of aphids (tomato, cucumber, eggplant, pepper and decorative flowers) and ornamental flower crops (rose, chrysanthemum) become victims of the Macrolophus bug in greenhouses.

Considering the length of the period of development of the entomophage, it is advisable to plant it at the first signs of the appearance of the pest. Distillation is carried out at the rate of 0.25-1 individual per 1 m<sup>2</sup> at an average and high density of pests of agricultural crops. Planting takes place early in the morning or in the evening in an isolated location. Use in clear sunny weather should be avoided. The efficiency of using an entomophage increases when combined with other entomophages. Among the advantages of using this approach: a long-term protective effect with a stable population of the entomophage, the ability to control the population of many phytophages that are resistant to low temperatures.

During storage and transportation of products, direct sunlight can be avoided, use immediately or within 18 hours from receipt, stored in the dark at a temperature of 6-10° C, and also make sure, that long-term storage of the predator (more than 4-5 days) is not allowed.

Among the "green" technologies in the agribusiness, it is also possible to note bumblebee pollination for obtaining

high yields of greenhouse vegetables is used in the greenhouse complex. Bumblebees help increase both yield and product quality. Bumblebees have a number of advantages over bees, which makes their choice more rational in some cases.

It should be noted that due to effective pollination, bumblebees are able to increase the yield of tomatoes by 25-30%. In plastic film greenhouses, bumblebees can be more efficient than bees, and on cucumber, as they continue to work even in underlighting conditions and at more extreme temperatures. The use of bumblebees for pollination of crops in protected ground area under glass has a number of advantages: high-quality pollination, reduced manual labor, increased yield, improved fruit quality.

#### **4. DISCUSSION OF RESULTS**

Proposals for the creation of 14 industrial parks in the Chechen Republic in the period from 2019 to 2021 were sent to the Ministry of Economic Development of the Russian Federation for consideration, including:

- 6 agro-industrial parks (“Construction of objects of an agro-industrial park in the Leninsky district of Grozny”;
- "Halal agro-industrial park "Achkhoy-Martanovsky”;
- agro-industrial park of the Urus-Martan district;
- agro-industrial logistics park in the Shelkovsk municipal district;
- agro-industrial park in the Nadterechny municipal district;
- agro-industrial logistics park in Gudermes);
- 5 industrial parks;
- 2 multifunctional parks;
- 1 technopark.

In order to implement these projects on creation a pool of industrial (agro-industrial) parks on the territory of the Chechen Republic, it is necessary to provide funding from the republican budget of measures for the design and survey works, state expert review of project documentation, as well as the development of business planning documents (business plan, financial model, concept of creation and development of the object), including the agro-industrial park "Kurchaloevsky" in the Kurchaloyevsky municipal district, for the preparation of documents for which it is necessary to allocate 29.3 million rubles this year for the development of design and estimate documentation and 1 million rubles - for the development of a business plan, financial model and park concept. The development of these documents was completed in 2018.

In 2020, agricultural producers of the republic were given state support in the form of subsidies in the amount of 264.3 million rubles, as well as 25 grants for the amount of 35.3 million rubles, of which 21 grants for the “Support of Beginning Farmers” in the amount of 21.2 million rubles and 4 grants for "Development of family livestock farms

on the basis of peasant farmings" in the amount of 14.04 million rubles. Thus, the measures, being developed in the Chechen Republic, to use digital technologies and financing of these projects in the amount of 29.3 million rubles ensure sustainable development of economy of the republic in the agribusiness, which will allow increasing the volume of agricultural production to 41.7 billion rubles.

Currently, work on the formation of a modern agro-industrial complex, capable of producing food in volumes and quality, that meet internationally accepted standards and norms, continues through the implementation of the following measures: lend-lease to more efficient business executives of property complexes and lands, assigned to the State Unitary Enterprise of the Ministry of Agriculture of the Chechen Republic, which will allow to increase the utilization coefficient of tilled land from 61.6% to 90% by 2020; organizational and financial assistance to the development of small businesses in the countryside, through the creation of institutions to support small businesses; creation of favorable conditions for the sale of products of local producers; development of agricultural production in the mountainous part of the republic. An increase in agricultural production is also expected as part of the implementation of measures of the state program "Development of agriculture and regulation of markets for agricultural products, raw materials and food in the Chechen Republic for 2014-2020", which will ensure sustainable growth of organic food products within the framework of import substitution, which include the construction of greenhouse and livestock complexes. It should be taken into account, that along with the use of budgetary funds and funds of enterprises that use natural resources, an important source of financing of projects in the field of "green" economy is the banking sector [7].

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