INVESTMENT POTENTIAL OF THE DIGITAL MODERNIZATION OF AGRO-INDUSTRIAL COMPLEX OF THE KABARDINO-BALKAR REPUBLIC

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Annotation

Innovative digital technologies are a huge resource for economic growth, because they open up new opportunities for control and management of various processes through precision and automation. Digital transformation affects almost all spheres of activity, and it is also applicable to agriculture, which is characterized by technological diversity and labor-intensive economic processes.

Modern realities are such that the competitiveness of the industry, region, country directly depends on the level of their technological development. In this regard, the digitalization of the economy is a key driver of economic growth.

The article discusses the status and directions of modernization of agro-industrial complex of the Kabardino-Balkar Republic in the framework of the program "Digital economy" and the concept of "Scientific and technological development of the digital agriculture "Digital agriculture".

Keywords: agriculture, digital technologies, transformation, concept, strategy, region.

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In terms of food sanctions, from the point of view of food security of the country, an important factor of innovative development of agrarian sphere is the recognition of agriculture as a priority direction of development of economy of the Russian Federation [16].

Target the digital transformation of agriculture is the solution to many problems, among them: the growth of productivity; export orientated production; the increase in value of farms; the growth of industries; the formation of effective schemes of sales of agricultural products, integration with related industries; increase the prestige of working in agriculture.

According to the Ministry of agriculture "...the digitization of APK will increase the profitability of agricultural production due to point cost optimization and a more efficient allocation of available resources. Even according to preliminary estimates, a comprehensive introduction of digital technologies will reduce the costs of agricultural producers is not less than 23%" [1].

To date, the efficiency of traditional resources, such as the development of new lands, mechanization, to maintain competitiveness and growth of efficiency of agriculture has almost dried up. But the Russian agricultural sector has a growth potential and significant reserves of increase of efficiency (3-5 times), due to the introduction of modern digital technologies at different levels of agricultural production [17].

According to expert estimates, over the normal seasonal production cycle, the farmer in the limited time period forced to take at least 40 different solutions, each of which impact in varying degrees on the final result [2]. Global Opty shows that most of these solutions can be digitized, but the Russian reality is that the opportunities of digitalization are used to a very small extent. For example, the total amount of acreage in Russia is about 80 million hectares, with digital technologies of their processing are covered only 5-10% of this area [12].

In accordance with the Program "Digital economy of the Russian Federation" Russia is on the 41st place in readiness for the new digital economy, significantly lagging behind the ten leaders of the: USA, UK, Singapore, Norway, Netherlands, Finland, Sweden, Switzerland, Luxembourg and Japan [1].

The extremely low level of digitalization of the industry is evidenced by the fact that 1000 people employed in agriculture workers have no more than one ITspecialist, while the total number employed in the sector about 4.7 million people [15].

Analyze the overall trends of digitalization. Despite the fact that the introduction of digital technology is the main trend of the world economy in recent decades, the level of digitalization in different sectors of the economy varies widely (table 1).

Table 1. Comparative level of implementation of digital technologies in different sectors of the world economy (6 - high, 1 - low)

	The overall implementation of digital technologies	Asset management	Transaction	Business processes	Sales	Workflows
Information technology	6	6	5	5	6	6
Media	5	5	5	5	5	5

Finance and insurance	5	5	3	3	5	5
Wholesale trade	4	4	3	3	3	4
High technology	4	4	3	5	4	5
Oil and gas	4	1	4	3	4	4
Production of basic goods	2	3	3	4	4	2
Logistics	2	3	3	3	3	2
Construction	1	1	1	1	2	2
Agriculture	1	1	1	1	1	1

Industries - leaders, the level of digital transformation that is high enough, are IT, media, financial sector and insurance. Level of digitization in the real sector and logistics is significantly lower. Closes the list - agriculture.

A systematic approach to the introduction of digital technology into agriculture is a promising and important part of the strategy of development of agriculture of Russia.

The catalyst of evolution in agriculture can become the Internet of things – cyber-physical system for remote management of economic processes, agricultural machinery and tools, greenhouses, irrigation systems, etc. According to experts, the introduction of the Internet of things in agriculture by the year 2025 can give a huge economic effect – about 469 billion rubles [13].

Digital agriculture is a completely new way of organizing business processes based on the use of digital technologies (the Internet of things, robotics, artificial intelligence, big data Analytics, e-Commerce etc.), in the production of agricultural products and food, accompanied by a steady increase in labor productivity and a decrease in production costs.

In recent years there has been increasing investment in innovative agro startup (figure 1).

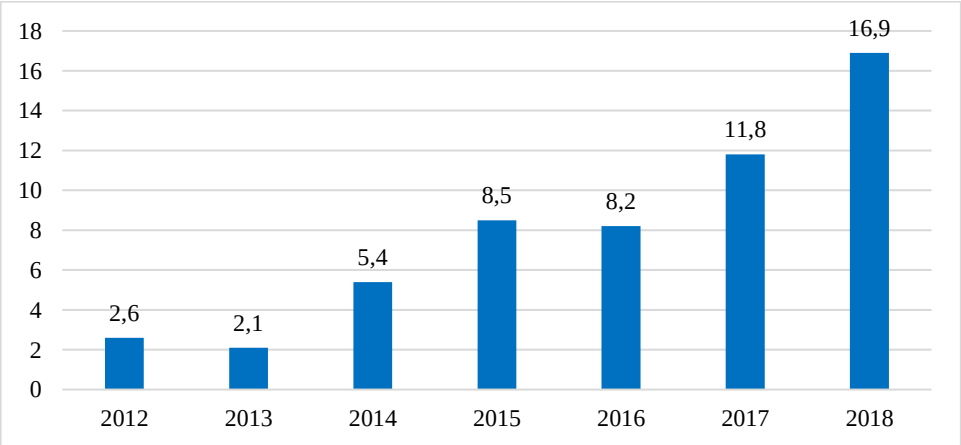

Figure 1. The dynamics of the global investments in innovation agro startup, billion.

Investing in digital agriculture is in the following key areas (table 2).

Table 2. Key directions of investments in digital agriculture

No.	Key areas of investment	Technology

1.	Biotechnology	genetic engineering; microbiological technology; the health of animals and plants; breeding
2.	Innovative products	artificial meat; alternative sources of protein; new ingredients for food products; 3D printing food
3.	Bioenergy and biomaterials	new raw materials for biofuel production; new processing technology; a new generation of biomaterials: genetically modified silk, etc.; pharmaceuticals new biological and biologically active additives; enzyme technology
4.	E-Commerce	online trade in foodstuffs; delivery network; universal electronic trading platform
5.	Agrotechnics	the system of Autonomous driving; robotic agrotechnics; software to control fertility; satellite and aerial monitoring; agronomic drones
6.	The modern farm	vertical urban farm. protein insects; algae as agriculture; new technologies in hydroponics
7.	Management, IoT, etc.	sensors for gathering agronomic information; big data for agriculture; artificial intelligence system for the adoption of industry solutions; block chain for controlling the origin of organic food
8.	Restaurants, services, online delivery, etc.	services online purchase and delivery of food; services cooking, focused solely on service delivery; the individualization of meals: formation recipes based on the individual characteristics of the consumer; system minimize food waste

In the structure of investments in digital agriculture fast growth areas such as investing in biotechnology and production of innovative food products (figure 2) [7].

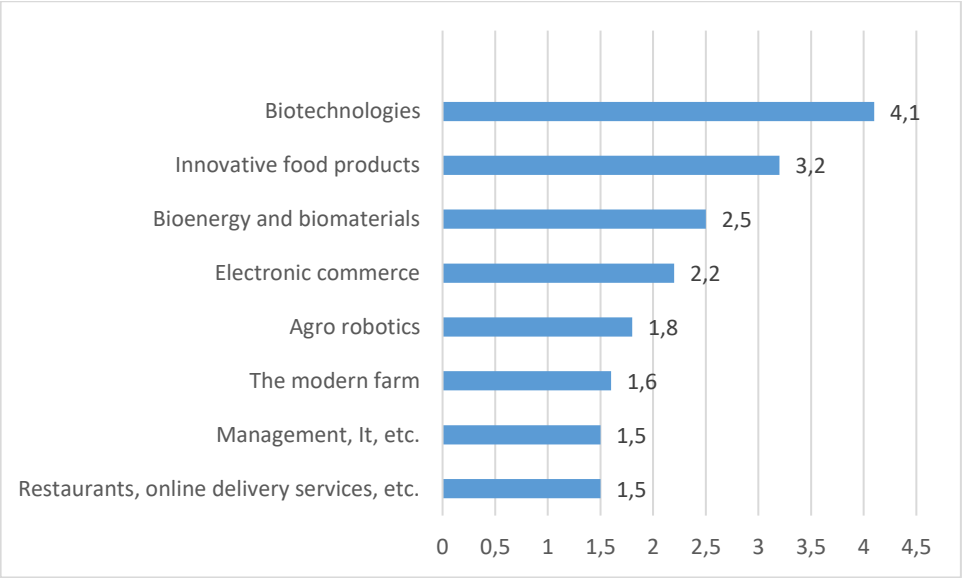

Figure 2. Structure of investments in digital agriculture in 2018, %.

The average deal size similar to the dynamics structure of investments in digital agriculture (figure 3) [7].

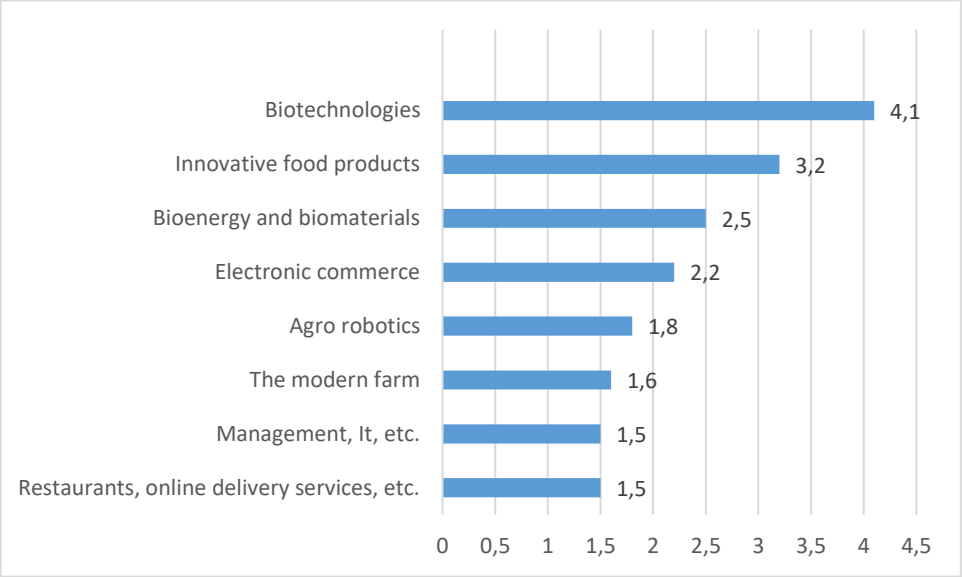

Figure 3. The average size of transactions, million dollars

The significant potential of digitalization and its influence on global economic processes cause the need for regulation of digital transformation.

In 2017, the Russian Government adopted a program "Digital economy of the Russian Federation. The concept of digitalization of agriculture of Russia consists of a number of important events [10]:

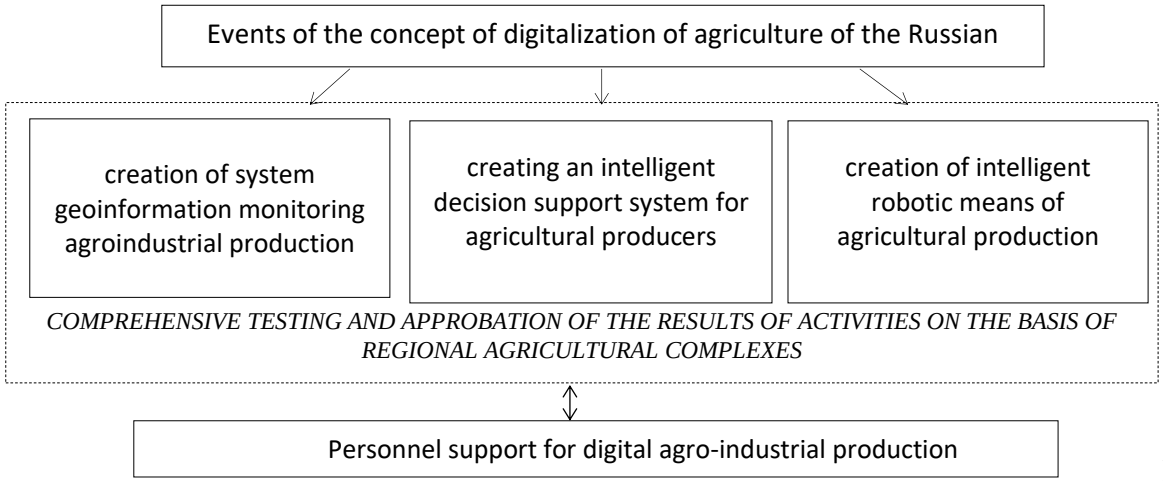

Figure 4. Concepts of digitalization of the Russian Federation

At the end of 2018 was developed by the subprogram "Digital agriculture". The subroutine contains objectives and priority areas the introduction of digital technology. Also, the program lists the main activities and specific activities: the data collection and processing, monitoring and development of application software in livestock and crop production, optimization of internal process, focused information platform, standard processing and transmission of data in contrast to agencies, market analysis, digital forms of training and advanced training of specialists, advising, providing an effective data infrastructure, and government support of Russian research and development.

It is expected that the subprograms "Digital agriculture" will take place in 2 stages [2]:

the first (2019-2021.) the implementation of pilot projects aimed at stimulating farmers to the introduction of digital technology: "Smart farm", "Smart stock", "Smart field", "Smart greenhouse, Smart stock, Smart processing, "Effective hectares", "Effective head", etc.

the second (2022-2024 years) - the active phase of the investment company agro-industrial complex. The main task of this stage is to encourage private and institutional investors to invest in digital technologies in agriculture.

For the last five years, investment in fixed capital in agriculture of Russia increased by 1.48 times (table 3) [6].

Table 3. Investments in fixed capital in agriculture for economic activity in Russia, 2018 (in current prices; billion rubles)

Activities	2014	2015	2016	2017	2018
Just	524,3	518,8	623,4	705,5	777,0
of them:					
crop and animal production, hunting and related services to these industries	492,5	483,6	582,6	651,4	707,7
forestry and logging	16,6	20,8	20,7	25,4	31,1
fishing and fish farming	15,2	14,4	20,1	28,7	38,2

The bulk of investments in fixed capital in agriculture accounts for crops and livestock – 91%, accounting for 4% of investments in fixed capital in the Russian Federation.

More than half of investments is own funds of agricultural enterprises. Moreover,

investments in crops, livestock, hunting at the expense of budgetary funds comprise a small amount (15262,2 of 214931,8 billion RUB). 88,4% are private funds (table 4) [6].

Table 4. Investments in fixed capital in agriculture of the Russian Federation on sources 2018 (in actually operating prices; billion rubles)

Activities	Own resources	The resources involved	of them budget financing	including	
				The Federal budget	the budgets of the constituent entities of the Russian Federation
agriculture, forestry, hunting, fishing and fish farming	259078,9	228305,2	16732,7	9857,3	5608,8
of them:					
crop and animal production, hunting and related services to these industries	226542,2	214931,8	15262,2	9383,5	4675,2
forestry and logging	13859,3	6453,0	1274,4	324,6	899,6
fishing and fish farming	18677,4	6920,4	196,2	149,2	34,0

In 2017, the volume of investments in the digitalization of agriculture of Russia was insignificant - 0,2% (0.85 billion rubles) of the total volume of investments in information technologies [14]. Investments in the Russian agricultural sector in 2018 rose by 22.9%, for comparison, state support for the sector for 2018 increased by only 3% [18].

Digital transformation of agriculture seems attractive for investors. The main reasons for increased interest of investors to agriculture experts believe the increase in demand for domestic agricultural products against the background of trends of import substitution, growth in profitability, and the software state support for agriculture.

The most attractive for investors of large projects in the segment of production of vegetables and fruits, with a payback period of three to five years and the proposed investment in the range of 50 to 200 million rubles. In this direction to date has funded 100 projects with a total investment of 350 billion rubles. The interest of investors caused by the processing of agricultural products (26%), livestock (25%), poultry (16%), crop (16%), greenhouse (15%) and fish farming (12%). Unattractive for investors production of food and veterinary (3%) [10].

Assessment of the processes of digitalization of the agricultural sector of a particular region must begin with the analysis of indicators of development. Agricultural production in 2000 is quite stable, indicators of production show an increase every year (table 5) [9].

Table 5. Agricultural production CBD (in farms of all categories; in current prices, million rubles)

	2000	2005	2010	2015	2016	2017	2018
Agricultural products - just	7749,6	13581,1	24136,0	37856,6	42347,7	45570,2	46890,5

in percent to previous year (in comparable prices)	108,4	92,7	110,0	104,3	104,9	104,7	101,8
including:							
crop	4210,9	7459,5	13628,2	19476,0	22914,0	24745,7	25342,6
in percent to the previous year	109,7	90,8	112,7	105,1	108,6	107,9	102,5
livestock	3538,7	6121,6	10507,8	18380,6	19433,7	20824,6	21547,9
in percent to the previous year	106,8	95,4	106,9	103,3	101,0	101,0	101,1

In the agro-industrial complex of the Republic there are more than 50 large enterprises, in General, in the structure of farms there is no significant prevalence of any form of agricultural organization constitute 32.2%, households - 36.3 percent, the peasant (farmer) farms and individual entrepreneurs is 31.5%. [9]

In the framework of the Investment strategy of Kabardino-Balkar Republic until 2040, approved by the Government resolution of Kabardino-Balkar Republic from 24.08.2018, No. 500-RP is planned to implement in the agro-industrial complex of the Republic of number of investment projects (table 6) [19].

Table 6. Investment projects planned in the framework of the investment strategy until 2040 in the agro-industrial complex of the Kabardino-Balkar Republic

No. p/p	Name of project	Stand., million.
1	The construction of the robotic livestock farm dairy 1,000 head	800
2	Construction of a canning plant for tomato paste production with a capacity of 33.5 thousand tons per year	2000
3	Construction of a breeding and seed-growing center for the production of corn seeds, winter wheat, winter rape, peas and sunflower with a capacity of 10 thousand tons and an Elevator for 14 thousand tons per year	669,9
4	Construction of the first phase of the greenhouse complex on the area of 10 hectares	1595
5	The construction of an industrial complex consisting of a feed mill with a capacity of 120,000 tons per year and silo for 60,000 tons of storage	1573
6	The construction of a modern fruit storage capacity of 5 thousand tons	270
7	The construction of a modern fruit storage capacity of 5 thousand tons	300
8	The modernized construction of modern fruit storage refrigerating capacity of 9 thousand tons	300
9	Modernization of production facilities for processing milk whey and	1250

	cheese production	
10	Bookmark super intensive garden on an area of 50 hectares and the construction of fruit storage for 8.5 thousand tons	400
11	Tab intensive garden on an area of 62 hectares and the construction of fruit storage for 5 thousand tons	300
12	The construction of fruit storage 5.1 thousand tons	132
13	Construction of a fruit storage facility 2.56 thousand tons laying an intensive garden area of 30.5 hectares	199,4

The list of investment projects shows that investments in digital transformation of agriculture of Kabardino-Balkar Republic are virtually absent, and not subject to statistical accounting.

In the Republic a lot of factors hindering investment in the digitalization of agriculture, the main factor - the lack of qualified personnel, insufficient training in the field of information security, the lack of scientific research related to the development of advanced information technologies and the low level of implementation of their own development. A major obstacle to digitization, technological transformation of industries of economy of the Republic is the fact that a significant portion of young people fluent in digital technology, travels abroad in search of decent work. Remains age population that does not use even the existing domestic electronic technology sufficiently. Statistics show that the level of digital literacy of the population in Kabardino-Balkar is 74.5%, and technical equipment – approximately 66% of the population access the Internet – 58,5%. These are the lowest figures across the country [3].

Meanwhile, the introduction of technologies in the industry required the creativity of youth, which should be integrated in this chain, studying the best foreign practices, to develop and implement its own technological development.

Among the ongoing in the field of digital economy projects in the country mainly in greenhouses, but it is poorly developed processing and no need financial assistance to farmers.

However, the agro-industrial complex of the Republic has considerable potential, it is quite attractive for investors willing to invest.

But this requires appropriate changes in the legal, institutional and infrastructural aspects, to realize that only through cooperation of investors with the state and municipal governments.

Summarizing, we can say that the main problems of implementation of digital agriculture in the Republic are:

forced use of expensive foreign technologies and the absence or weak development of domestic science-based system solutions, reference platforms, taking into account regional peculiarities;

the disunity of scientific institutions, educational institutions, design organizations, specializing in the development of digital technologies among themselves and with agricultural producers;

the lack of adequate personnel support the processes of introduction of new technologies in agroindustrial complex of the region;

the imperfection of the methods and curriculum focused on the agricultural sector and weak development of specialized national training centers.

Element in the modernization of agro-industrial complex of the Kabardino-Balkar Republic can become the interdisciplinary research project "Digitalization of agricultural production in Kabardino-Balkar Republic for the period till 2025", designed for the introduction of digital technologies in the agro-industrial production with the participation of state bodies, local authorities, business, scientific and educational institutions of the Republic.

The project could be the starting point of the digital transformation of agriculture, which in turn will lead to increased productivity in agriculture and maximizing the profits of enterprises in the sector as a consequence of the increase in the contribution of agriculture to the economy of the Republic.

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