NATIONAL RESEARCH UNIVERSITY

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DIGITAL TECHNOLOGIES IN THE AGRIFOOD SECTOR: KEY CHALLENGES IN RUSSIA

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„Digital transformation – towards sustainable food value chains in Eurasia“

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INTRODUCTION

- For the last 10-15 years, Russia has become one of the leading agricultural producers in the world market. It is supposed to increase export volume up to 625 mln Euro until 2025. This plan is impossible to realize without intensification of the existing agriculture, strict control over expenses and economic profitability and constant use of the most advanced technologies in digitalization

- Digital technologies have a significant impact on all segments of the economy, including the agri-food sector. The key benefits of applying digital technologies to the agri-food system are to achieve greater economic inclusiveness, to increase efficiency and stimulate innovation through reducing of transaction costs

- Russia is a country driven by large agrobusiness. Agroholdings use all kind of innovative digital technologies, but that’s not the same situation for the various stages of added value chains

- This research attempts to map the agricultural and food processing sector’s challenges in Russia from a " digital technologies" prospects

GLOBAL PRECONDITIONS FOR TRANSFORMATION

«Agriculture 4.0» – is fundamentally new stage of technological development based on the introduction of «smart» solutions (robotics, «precision» agriculture, IoT («Internet of things»)), biotechnologies, alternative technologies and raw materials sources

Prerequisites for digital transformation and trends in global agribusiness development

Information technologies and IT infrastructure

- Quantum computation
- Big data (BigData)
- Self-learning systems
- Internet of things (IoT)
- Blockchain

Robotics

20 | 09 / 11 — 10 mln / 18 mln robots

Nanotechnologies

- technologies for manipulating matter at the atomic, molecular, and supramolecular levels

- **Nanobiosensors** (NBS) - fast, easy-to-use and low-cost solutions that can detect various compounds with high sensitivity and specificity
- **Nanobionics** - experimental modification that allows you to create fast-growing plants, design artificial photosynthetic systems, give them new functions that are not provided by nature

INVESTMENT INTO THE DIGITAL INNOVATIONS IN AGRICULTURE

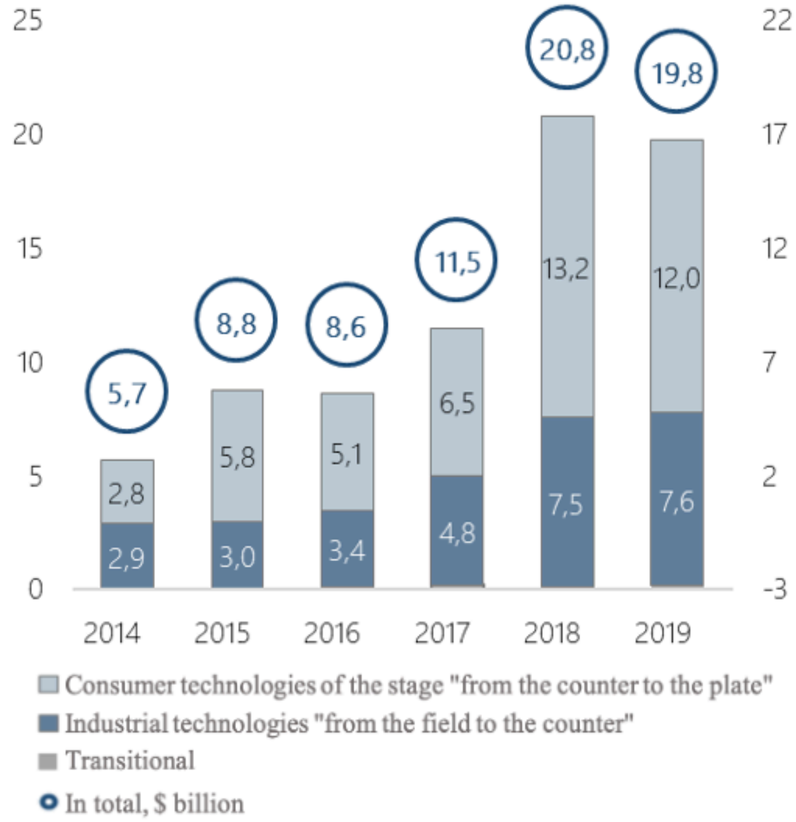
Key factors

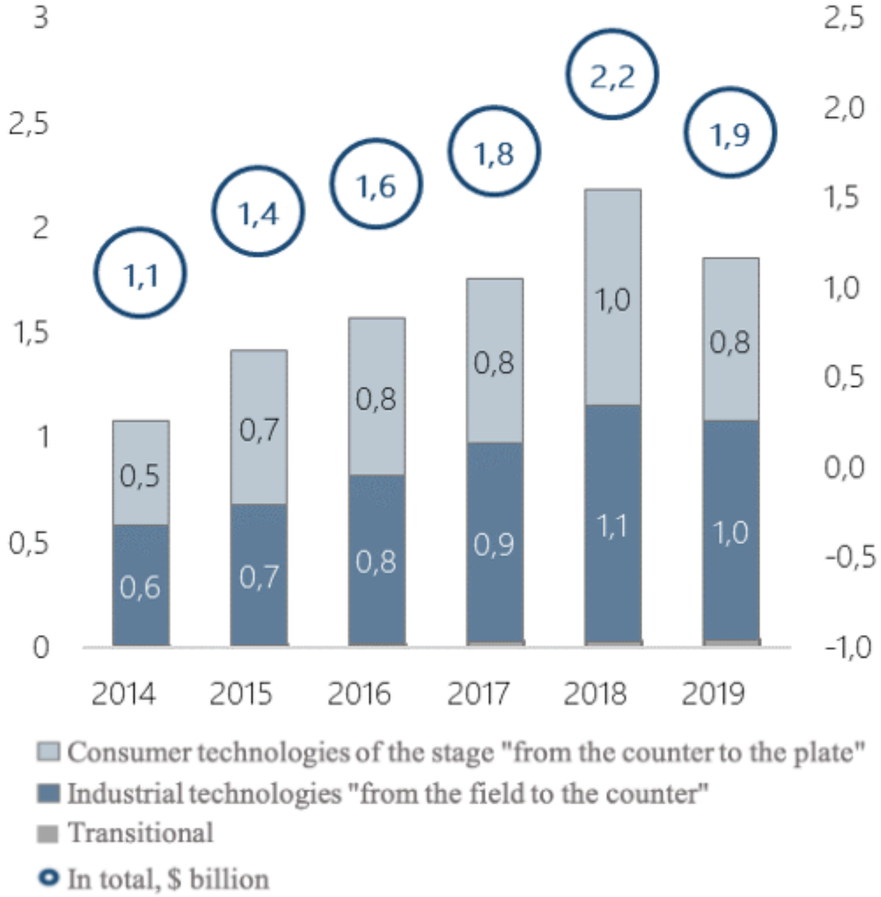
2019 | $20 billion, investment

1,9 thousands of deals

2014-2019 | $75,2 billion, investment

9,9 thousand transactions





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INVESTMENT INTO THE DIGITAL INNOVATIONS IN AGRICULTURE

Structure of global investments in Agtech 4.0. (2019)

	billion USD	Number of transactions	Average weighted ($ mln/transaction)	Median ($ mln/transaction)
"from counter to plate" (downstream)	12,0	707	17,0	
Ready-made food delivery Services from restaurants	2,4	57	42,1	3,4
Online services for delivering products from online stores	3,9	235	16,6	3,4
Restaurant and retail technologies (in store)	1,9	214	8,9	1,4
Services for the delivery of semi-finished products	0,3	90	3,7	1,1
Home and kitchen technologies	0,3	55	5,2	0,8
Cloud retail technologies	3,2	56	57,1	2,6
"from farm to counter" (upstream)	7,6	1 108	6,8	
Agrobiotechnologies	1,1	122	9,0	3,0
Processing and logistics technologies	2,1	283	7,4	3,0
Farm management technologies	0,9	205	4,3	1,5
E-Commerce platforms for agribusiness	0,8	104	7,6	1,5
Bioenergy and biomaterials	0,8	95	8,1	3,5
New farming systems	0,7	75	9,9	2,4
Innovative food	1,0	158	6,3	3,0
Robots and equipment	0,2	66	2,7	2,0
Transitional (downstream + upstream)	0,2	38	6,4	
Transitional	0,2	38	6,4	

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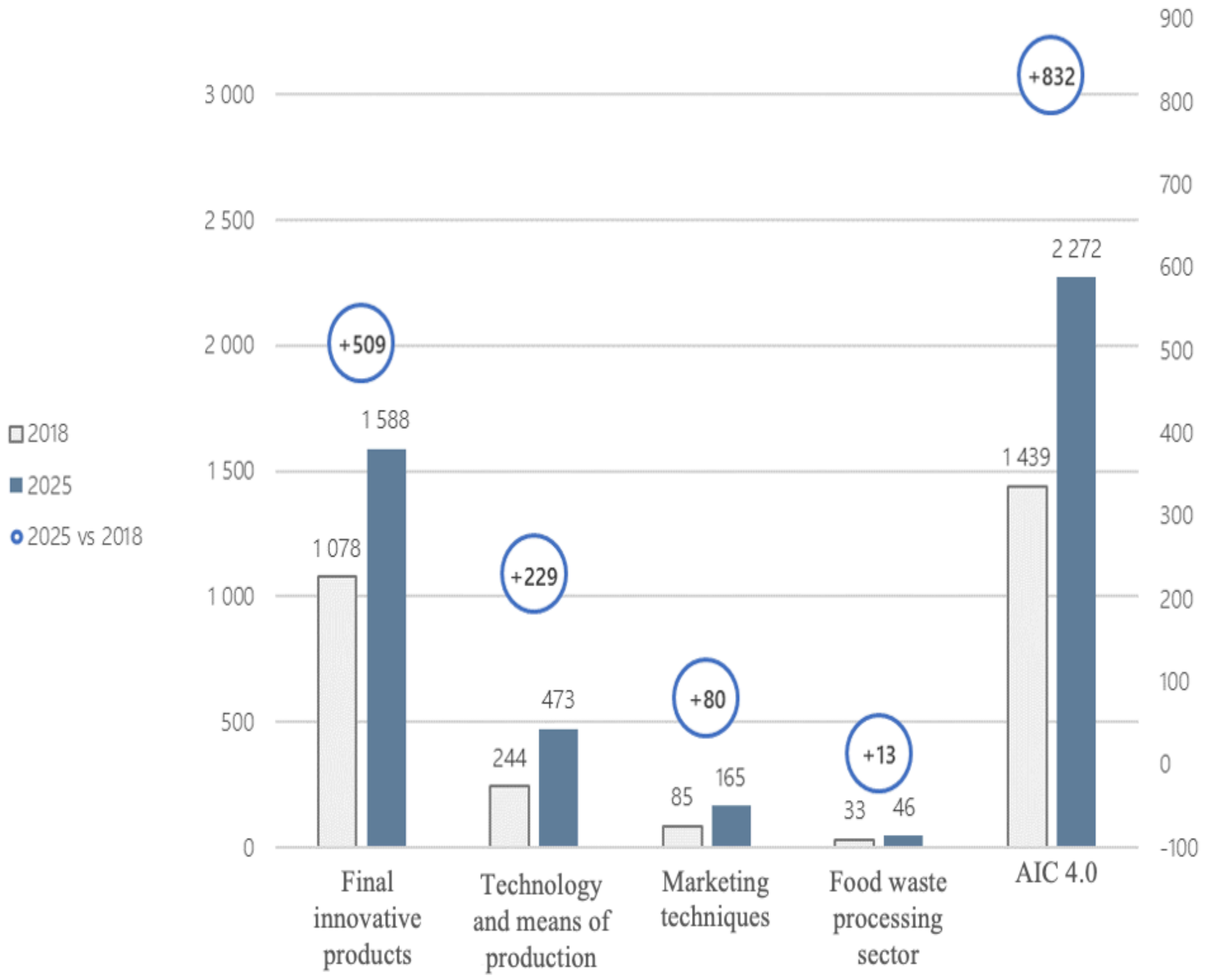
FORECAST OF THE AGRIBUSINESS MARKETS 4.0.

Structure of growth of agro-industrial complex 4.0. in the world (2025F), billion USD



Source: consensus forecast of InAgRes HSE

The key drivers of growth will be:

- Final innovative products of the agro-industrial complex: the largest segment - $1.6 trillion by 2025 (+509 billion, which will provide 62% of the total increase in the agro-industrial complex 4.0).
- Technology and tools for production Agrotech 4.0: the fastest growing segment - $230 billion (CAGR 10%), which will provide a 29% total increase in agro-industrial complex 4.0.
- Marketing solutions (online platform for delivery of food products) will add about $80 billion or 10% increase Agrotech 4.0 on the background demographic and socio-cultural changes.
- Food waste processing sector: will show an increase of 13 billion USD (2% of the increase).

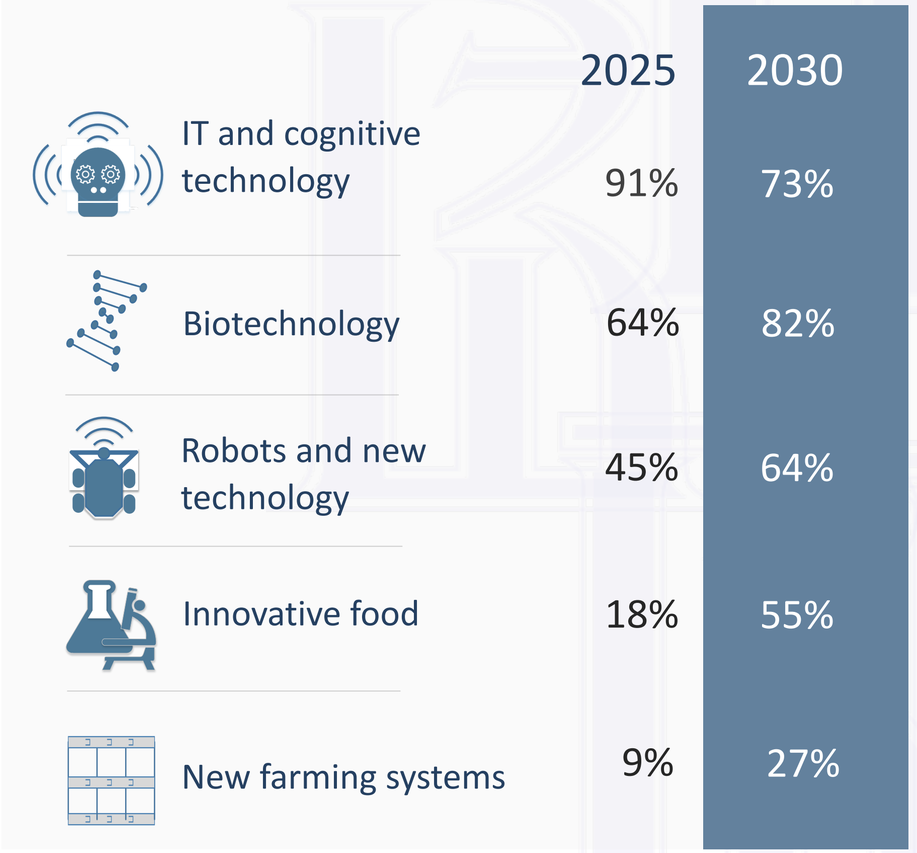
MOST PROMISING MARKET SEGMENTS IN RUSSIA

Key vectors of further technological development of the agro-industrial complex

- **Strengthening fundamental base for productivity growth**
  bases for genetic breeding indices, technologies for animal and plant breeding and genetic potential
- **Implementation of digital technologies and cross-platform solutions in the agricultural sector**
  lag behind the leading countries in labor productivity, food losses
- **Support of the closed farming systems development that are independent of external agro-climatic and biological factors**
  factor of seasonality, fresh, safe and affordable high-value products
- **Development of the agro-industrial waste processing sector**
  situation in the sphere of their formation, utilization

Key technologies in Russian agricultural sector *

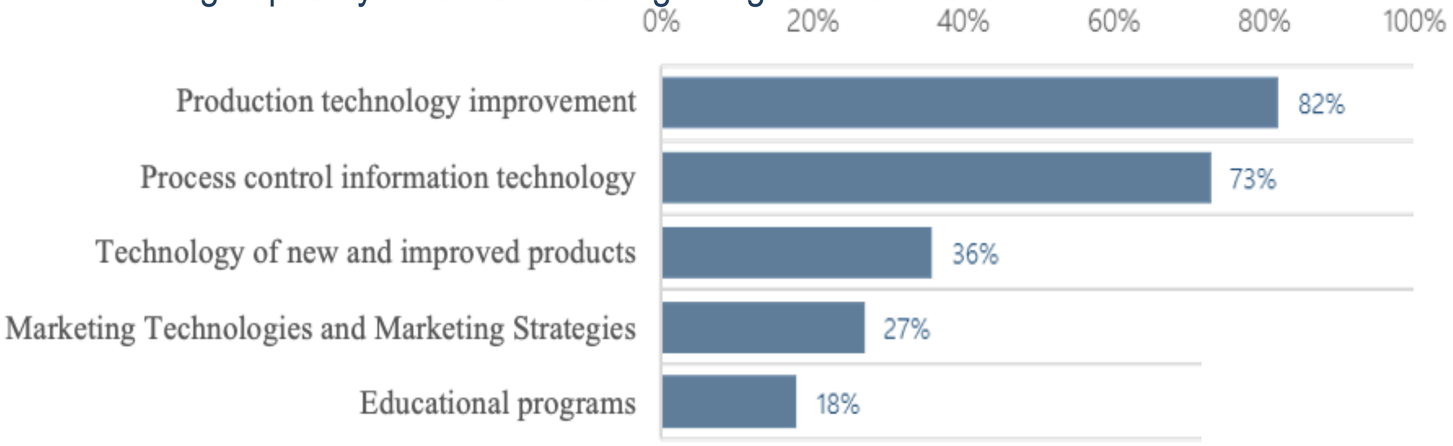
EXPERTS' OPINIONS



*According to the results of the expert survey

PLANNING HORIZON AND KEY TRENDS

Rating of priority areas for investing in digital innovations



The study of various aspects of innovation activity in the agro-industrial complex was carried out in the framework of an expert survey conducted by the Institute of Agricultural Research in February and March 2020.

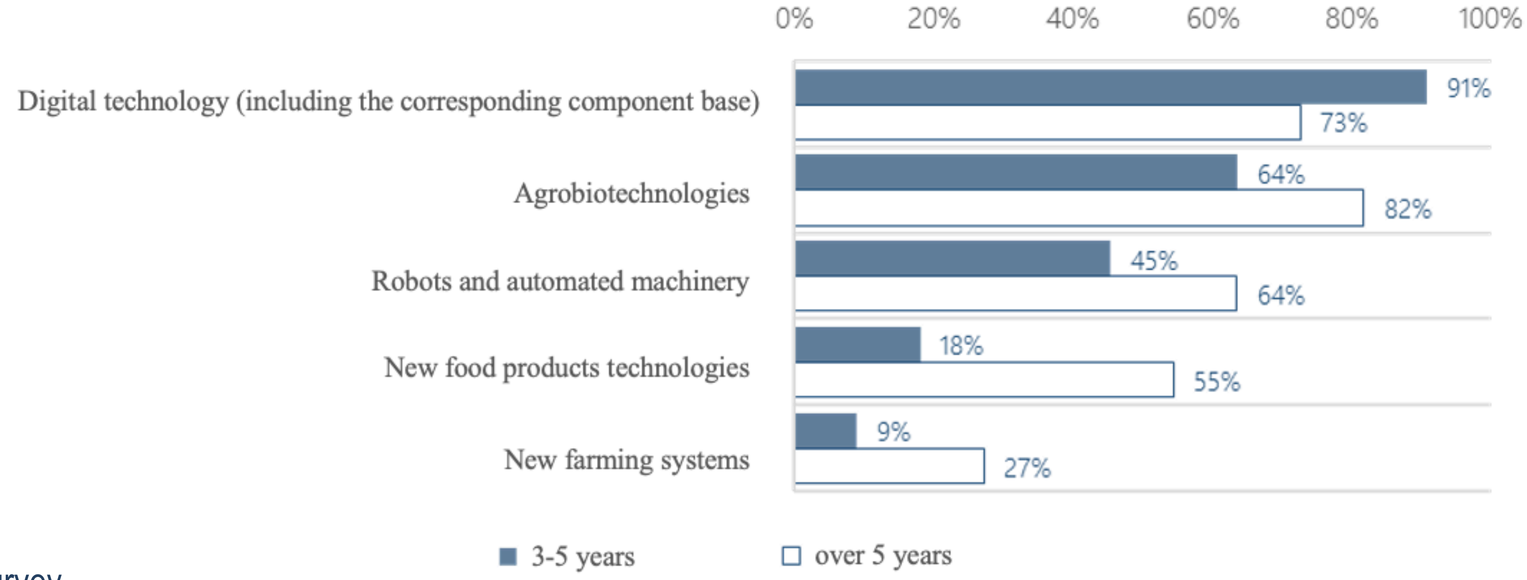
The expert survey was conducted by in-depth interviews on 4 key topics.

23 representatives of the real sector took part in the discussions:

- ✓ producers of crop and livestock products
- ✓ means of production (fertilizers, feed additives and plant protection products)
- ✓ industry associations.

The majority of respondents are senior managers or business owners, people who determine the company's development strategy.

Rating of the impact of key technologies and trends



Source: InAgRes HSE, according to the results of the expert survey

KEY BARRIERS TO THE INDUSTRY INNOVATIVE TRANSFORMATION*

INNOVATIVE ACTIVITY OF BUSINESS *

2018 | 16,1% food industry | 5,4% agriculture | 18,5% industrial production in general

91% Imperfect legal framework with an emphasis on the bureaucratic nature of the problems

largely outdated and contradictory, but rapidly changing and insufficiently developed legislation; inaction of officials, their unwillingness to understand new issues, lagging in decision-making

82% Lack of dialogue between business and science

The set of factors: both objective-low level of equipment of research institutes, lack of personnel and competencies, and subjective - different vision of goals and results.

Business often cannot formulate a task understandable to the science, scientists presents their developments by the language that is not clear to business

73% Inefficiency of the technology transfer support system

existing support measures are aimed at the conventional path of agribusiness development and are not focused on breakthrough and truly innovative areas such as digital technologies

SHARE OF INNOVATIVE PRODUCTS (RUSSTAT)*

2018 | 5,7% food industry | 1,9% agriculture

2014 | 5,0%

2016 | 1,4%

*According to the results of the expert survey

CONCLUSIONS

- As one of the world's largest agricultural powers Russia lags far behind its competitors in terms of investment in digitalization of agrotech. The most important problem, however, is not so much the lack of state funding as the effectiveness of the existing institutional environment for investment in IT in agrotech.

- Despite the positive trends in the growth of innovative activity of domestic producers, the Russian agro-industrial complex is quite far behind not only the leading countries, but also the average indicators for industrial production in the Russian Federation.

- At the same time, investments in research and development and, consequently, their importance in the overall cost structure remain at a fairly low level. Meanwhile, changes in the structure of the innovative assortment itself are positive, indicating a shift in manufacturers' priorities from the development of existing markets to the development of new niches and introduction of new products for sales markets with a use of digital solutions.

- The results of an expert survey show a high interest of industry representatives in the transition to a new technological stage, readiness to invest in innovations and form PPPs in the scientific and technical spheres.

- In real practice it mainly focuses on the catch - up model of innovation implementation, looking for the commercial technologies that have already been widely tested in the world and guided by the desire to maintain already achieved positions. The choice of such a strategy is due to the instability of the business environment, difficulties to forecast the situation, and, consequently, short planning horizons: «we just do not dare to «play long term».

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Thank you for your attention

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