The Use of the Digital Supply Chain Tool in the Real Sector of the Economy

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***Abstract*— As everyone knows, the developed countries of the world are quite actively using digital technologies in their supply chain system. Thanks to the rise of technology, supply chain is also becoming more visible. It has allowed for data transparency to expand and thus, affecting the way organizations have the ability to gain visibility on real-time issues about their supply chain networks. This combination has made it possible for supply chain to become more powerful and accessible. The changes in demands and economy along with the rise of technology has made all the difference. This expansion is driving change for faster results and flow, thus the rise of digitalization has become a major contributor of the supply chain market. Based on the available data, we can say that the main share of digital technologies in the developed world is used in the supply chain sector. However, over the past 10 years, digital technologies have also begun to be used in strategically important sectors of the economy, such as the production, processing and sale of products. Moreover, the level of digitalization of some technological supply chain processes reaches 80% or higher. In Russian practice, there are a number of legal acts that promote the development of digital technologies in the real sector of the economy. In addition, the directions and even measures of state support are outlined. This article describes the authors' vision of the state of digitalization in the agro-industrial complex of Russia, the problems that exist, areas of improvement, risks and threats that authorities and commercial organizations will face when implementing digital technologies. Based on world practice, the study provides data indicating the positive role of digital technologies: increasing the profitability of production, saving costs, increasing production indicators. The study shows the main breakthrough technological platforms on which the development of digital technologies in agricultural production will be based.**

***Keywords*—** *digital technologies, supply chain, digital economy, cost savings, production efficiency.*

1. Introduction

According to all-Russian agricultural census 2016, the country had 36.1 thousand agricultural organizations, including 7.6 thousand large, 24.3 thousand small, 4.2 thousand agricultural enterprises and non-agricultural organizations; 174.8 thousand peasant farms and individual entrepreneurs; 23.5 million personal subsidiary plots and other individual farms of citizens, including 15.1 million in rural areas; 75.9 thousand non-commercial associations of citizens, including 67.3 thousand horticultural, 2.8 thousand gardening and 5.8 thousand country ones [1-5].

Employment in agriculture, forestry, hunting and fish farming amounted to 4976.5 thousand people in 2018 (6.9% of the employed in the entire economy). The gross added value created in agriculture, forestry, hunting and fish farming at current prices in 2018 is 3248 billion rubles (3.5%). Export revenue in 2018 is $ 24.9 billion [6, 7].

In terms of arable land area, Russia ranks 3rd place in the world (116 million hectares, the first is for the United States, the second - for India). With the potential to introduce land into circulation, Russia is increasing grain yields, showing the highest growth since 2000: the yield has increased by almost 60 %. However, a number of indicators Russia lag far behind leading economies, grain yields are lower than the yields in the USA and Germany by 3-4 times, the value of agricultural production per worker is 22 times lower than in the US. At the same time, the developed countries of the world use more modern technologies, including digital ones, which can reduce the costs associated with production and sales. In agriculture in Russia, there is a need to introduce digital technologies [8-12].

2. Materials and methods

A Digital Supply Chain (DSC) is a smart, value-driven, efficient process to generate new forms of revenue and business value for organizations and leverage new approaches with novel technological and analytical methods. DSC is not about whether goods

International Journal of Supply Chain Management
IJSCM, ISSN: 2050-7399 (Online), 2051-3771 (Print)

and services are digital or physical; it is about how supply chain processes are managed with a wide variety of innovative technologies, e.g. Unmanned aerial vehicles[13], cloud computing[14], and Internet of Things[15], among others [16-20]. The paper used system, comparative, economic and mathematical, and other research methods that allowed revealing the topic under study to a sufficient extent. The use of the system method allowed giving a comprehensive assessment of the digital economy tools in the real sector. The comparative method in this study allowed comparing the equipment of different organizational-legal forms of the digital economy tools and also giving a comparative description of personnel potential of the digital economy by major sectors of the economy. The economic and mathematical method made it possible to make an expert assessment of the development of the real sector of the economy using the tools of the digital economy. The used materials were published works of research institutions of the Russian Academy of Sciences, data from higher educational institutions, statistical materials at the federal and regional levels, and other proven analytical materials that allowed to make reliable calculations, analysis and expert assessment of the development of the real sector of the Russian economy using digital economy tools.

3. Results

It is substantial for manufacturing industries to enforce and seek out new strategies regarding supply chain management to endure within the current competitive and capricious business climate which is critical. We try to underlie a policy for manufacturers to connect all operational issues related to the supply chain. The methodology for statistical observation of digital technologies has not been developed in Russia at the moment, so we will use the data from the all-Russian agricultural census of 2016. In 2016, 2.0% of agricultural organizations were provided with robots in dairy farming. 0.5% of farms and 5.4% of agricultural organizations are provided with precision driving systems and remote quality control of technological processes (table 1). While in the United States, this figure reaches 60 %, in the European Union and even higher - 80 %. In the leading countries of the world, the implementation rate of agrochemical soil analysis is 98%, crop monitoring, maps, GPS navigation is more than 80%, and differentiated fertilization is 68%. At the same time, according to experts, using digital technologies, it is possible to increase the yield of agricultural crops by 70%, including accurate fertilization by 18%, accurate seeding by 13%, minimizing soil compaction by 13%, accurate irrigation by 10%, accurate spraying by 4%, field monitoring and data management by 12%.

Table 1 – The percentage of agricultural organizations, peasant farms (PF), personal subsidiary plots (PSP) and non-profit associations of citizens provided with ICT facilities

	Agricultural organizations (in % of the total number of agricultural organizations)	PF and individual entrepreneurs (in % of the total number of PF and individual entrepreneurs)	PSP (in % of the total number of PSP)	Non-profit associations of citizens (in % of the total number)
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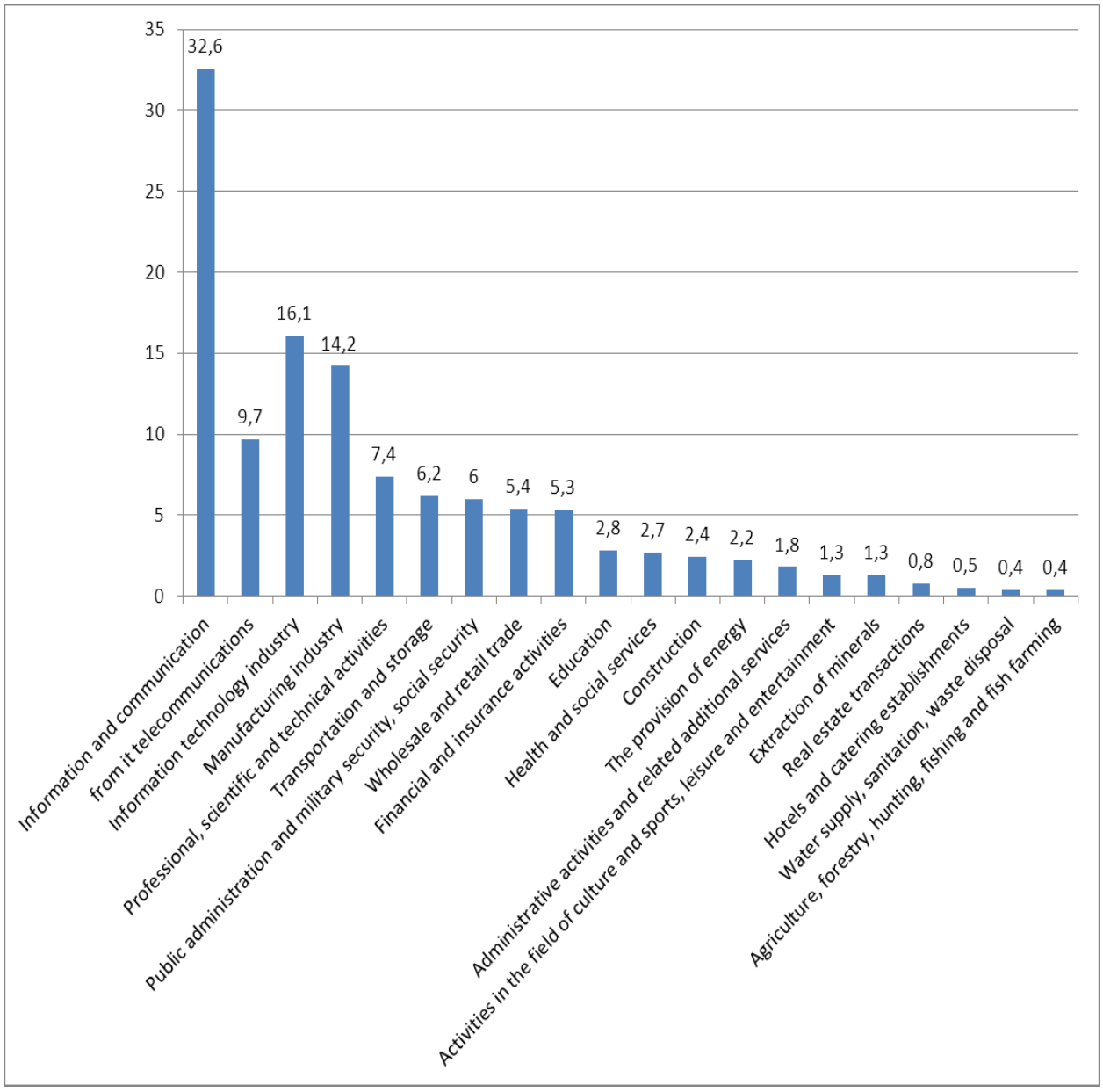
Intraproductive fixed-line telephone service	8,5	X	X	X
Internet connection	47,6	17,9	22,8	X
Mobile communication	X	X	76,0	X
Precision driving system and remote quality control of technological processes	5,4	0,5	X	X
Provision of robots in dairy farming	2,0	-	X	X

The main problems that prevent the introduction of digital technologies in supply chain are:

- The lack of financial resources for the purchase and implementation of information and communication technologies (ICT) in the majority of agricultural producers. As a rule, such technologies are able to acquire large integrated formations - holdings. Farms and agricultural organizations created on the basis of reorganized collective farms and state farms do not have this opportunity.
- Personnel shortage of specialists in the field of information technology. In Russia, 1.6 million people are employed in the ICT sector, only 0.4% of them are engaged in agriculture. At the same time, their average monthly salary was 28699 rubles in 2018, which is about 15-20 times lower than in developed countries.



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According to the Ministry of Agriculture of Russia, today there are half as many IT specialists working in agriculture in Russia as in countries with a traditionally developed agro-industrial sector. At the moment, Russian agro-industrial production needs about 90 thousand IT specialists. In addition, some experts highlight another very important but scarce position: "We are sorely lacking both digital leaders and digital entrepreneurs who understand how to implement digital transformation. After all, we do not need programmers, but we need people who understand how digital technologies in supply chain can change traditional processes. Unfortunately, there are very few top-level managers who understand what the introduction of digital technology entails. Therefore, training digital leaders, that is, "brainwashing" in a good sense of the word for the first leaders –whether it is business, government or the non-profit sector – is one of the most serious tasks".

- Insufficient development of digital infrastructure in rural areas, especially in the "rural backwoods". Despite the fact that radical changes are taking place in this area, digital inequality between urban and rural areas is maintained. This is due, among other things, to the failed implementation of the Federal target program "Social development of the village until 2018 and for the period up to 2020", which was not funded, according to the measures planned in it. A significant part of the burden of this program fell on the shoulders of regional budgets and extra-budgetary sources, which did not contribute to the effectiveness of this program (table 2). It is very important that the program activities related to digital transformation of supply chain are largely funded from the Federal budget. The Federal Executive authorities should also take care of organizational

issues. Otherwise, program activities related to digital transformation will be doomed to failure.

Table 2 – Resource support of the Federal target program "Sustainable development of rural territories for 2015-2018 and for the period up to 2020", billion rubles

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- Imperfection of legal regulation of information technology development in the agro-industrial complex. Issues of development of the state information support system in the field of agriculture are regulated by the same Article 17 of the Federal law "On the development of agriculture", adopted in 2016. However, this article needs to be changed, as it does not take into account the current conditions in which agricultural producers will have to use digital technologies in supply chain.

To change the current situation, it is necessary to implement six main directions of digital transformation of agriculture and scientific and technological development in the field of "smart agriculture". In the developed countries of the world, these directions have been implemented and have shown their high efficiency. In the subjects of the Russian Federation, it is planned to introduce a cycle of digital technologies of supply chain that facilitate the production and management process: "Smart agricultural enterprise", "Smart land use", "Smart field", "Smart garden", "Smart greenhouse", and "Smart farm". These technologies are based on modern competitive technologies, methods, algorithms and samples of systems and devices, that is, the introduction of information technologies for evaluating the effectiveness of agricultural policy, forecasting and regulating agrifood markets at the federal and regional levels of agribusiness management.

"Smart agricultural enterprise" involves the creation of a full-cycle end-to-end intelligent decision support system for managers of agricultural enterprises: from modeling investment and technological strategy for a particular project through monitoring the implementation of decisions and technological operations, to adaptive rescheduling in the event of unforeseen circumstances and evaluating the result. To do this, a database of methods, algorithms, technologies and systems will be created to determine automatically the most appropriate management goals of interconnected chains of technological, managerial, and commercial operations of an agricultural enterprise, taking into account scenario forecasts of its main activities in various external conditions.

Based on foreign practice, the use of digital technologies in supply chain production can contribute to the reduction of:

- irrigation costs by 15% due to saving 20-30% of water;
- rental payments and taxes by 30%;
- the cost of maintaining the machine and tractor fleet and fleet by 15%, by reducing depreciation charges by 10-20%;
- fertilizer costs by 15 % due to increasing the efficiency of their use by 10-20%;
- the cost of seeding material by 10-15% by increasing the accuracy of seeding by 5-15%;
- the cost of plant protection products by 5-10% due to focused and timely application.

In practice, in crop farms in developed countries, this saves at least 10% of production costs (depending on the crop) and increases yields by at least 10%.

The situation is similar in animal husbandry. It is possible to reduce costs by using digital technologies:

- by 40% on feed due to their more efficient use and a 15% reduction in the production cycle;
- by 30% on labor remuneration due to a 10-20% reduction in the number of employees;
- by 7% on transportation costs due to efficient automation and accounting;
- by 5-10% on veterinary care due to timely and focused use of medicines and detection of diseases at the initial stages.

Together, the use of digital technologies in supply chain helps to reduce production costs by 15-20%, reduce the number of mortality by 15%, and increase the number of livestock by 10%.

The next digital technology designed to make agriculture more efficient is "Smart land use". It involves the creation and implementation of an intelligent system for planning and optimizing agricultural landscapes and land use in agricultural production at different levels of generalization (field, farm, and municipality, subject of the Russian Federation, country, and foreign territories), operating on the basis of digital, remote, geoinformational technologies and computer modeling methods. For this

purpose, automated planning systems for optimal (adaptive landscape) land use in agriculture will be created, including:
- block for collecting, updating and storing data on the state of land;
- block for monitoring the state and use of land;
- block for multi-purpose assessment of land suitability and potential yield modeling;
- block of forecasting of productivity of agricultural crops;
- block for planning the placement of agricultural land and sowing of individual crops, design of digital adaptive landscape systems of agriculture and agricultural technologies, their feasibility study;
- block of cadastral evaluation of land plots and their collateral value.
In addition, networks of competence centers will be created to implement adaptive landscape land use systems, as well as professional development and training for competence center personnel.
Due to the introduction of a smart land use system:
1. The percentage of land users who have implemented an intelligent planning system and GIS for optimizing agricultural landscapes – up to 50% in 2024;
2. The number of competence centers for implementing adaptive landscape systems in digital format is up to 1.5 million hectares, the number of employees of competence centers is up to 50;
3. Costs of agricultural organizations for the services of competence centers - from 500 to 1000 rubles/ha within the existing costs for R & D and consulting (in 2017 prices);
4. Increasing the profitability of agricultural organizations (effective hectare) – up to 50% of profitability;
5. The number of specialists who have completed training and advanced training – up to 1.5 thousand specialists by 2024.
The smart field platform is very important for Russian producers. It provides for stable growth of crop production through the introduction of digital technologies in supply chain for collecting, processing and using an array of data on the state of soils, plants and the environment.
This direction can be implemented using exclusively domestic competitive technologies in the following areas:
- field collection of Big Data, monitoring of field lands and crops of ultra-high detail;
- data transfers taking into account the specifics of Russian field crop production;
- development of algorithms for making managerial decisions in agricultural production based on Big Data processing;
- robotic means of reducing limiting factors of productivity of field crop production;
- promotion and development of precision farming technologies.
The implementation of this platform will allow:
- increasing the productivity of field crop production by 20% by introducing means to reduce the influence of limiting factors of plant productivity;
- developing global coverage of agricultural territories of the Russian Federation with a network connection taking into account the specifics of field crop production;
- develop and implement robotic technologies in field crop production;
- make the transition to intelligent plant productivity management..
The Smart garden platform is important from the point of view of import substitution. Here it is necessary to develop an intelligent technical system that analyzes automatically information about the state of the garden's agrobiocenosis, makes management decisions and implements them using robotic technical tools.
This is one of the insufficiently developed technologies. Its successful implementation will require:
- development of digital systems for collecting and analyzing data on the state of soils, plants and the environment using cloud and Internet of things technologies;
- development of an information system and technical means for monitoring and promptly obtaining data on changes in the state of the garden and the environment (sensors for monitoring parameters of the agrobiosystem, weather stations, samplers, UAVs (unmanned aerial vehicles), and others);
- development of unified means of data transmission taking into account the specifics of horticulture;
- development of system software that allows to manage automatically the collection and analysis of information from sensors, its analysis and systematization, decision-making on the management of technological processes and the implementation of feedback with technical means for the implementation of control actions;
- development of machine technologies with the use of robotic (including unmanned) technical means for the implementation of control actions in the digital gardening system in automatic mode.
If the above tasks are completed, it is possible to have by 2025:
− at least 90% of the area of agricultural perennial plantings in digitized form in a single geographic information system;
− at least 70% of the area of industrial gardens, which must be provided with means of collecting data on the state of soils, plants and the environment;
− at least 50% of the area of industrial gardens, which must be covered by a data transmission network to ensure the collection of Big Data and the introduction of Internet of things technologies in fruit growing;
− at least 70% of mobile hardware can be equipped with monitoring systems and integrated into a single geographic information system;
− at least 20% of technical equipment can be robotic, working in autonomous mode without human participation.
At the same time, in addition to improving product quality, the yield of fruit crops will increase by 20-30%,

and costs will decrease by about 30% (mainly due to the optimal use of consumables). In addition, the role of the human factor in the production of fruit products will be reduced, and the environmental component of production will be improved.

Building a digital supply chain involves the introduction of information technologies in all areas of government activity at various levels. One of the key areas is the creation and practical application of a set of software and hardware solutions and robotic intelligent technologies for growing agricultural plants in closed systems – "Smart greenhouses", which reduce production costs and increase productivity. The practical application of these technologies allows solving comprehensively a number of existing and new problems of processing large amounts of data in the digital supply chain and helping overcome most technological barriers.

In this direction, it is necessary to develop a modern integrated and complete "Smart greenhouse" technology based on the use of the Internet of things for food production in order to reduce costs for existing complexes without significant financial investments in their technical re-equipment, as well as the design of innovative facilities.

Ensuring stable growth of crop production in protected soil, obtaining highly competitive substrates and fertilizers, domestic innovative systems (microclimate, lighting, efficient energy supply, universal module, nutrition, autonomy, etc.) for closed soil, quality control of products, raw materials and food, reducing the energy intensity of production and increasing the nutritional value of vegetables are important for agricultural producers in Russia.

Similar to the Smart garden platform, the development of this platform is at an early stage and will require a lot of effort to develop: intelligent products in the field of bioengineering and closed plant growing systems; automated systems for collecting, analyzing data, as well as remote control of greenhouses using wireless sensors, microelectronic complexes with digital format for processing and transmitting signals; wireless platforms for collecting, transmitting, processing and visualizing data from industrial devices of the Internet of things for greenhouses; methods and algorithms for analyzing large data sets for intelligent greenhouse management, monitoring and forecasting crop yields in greenhouses.

In addition to the above, it is necessary to develop an organizational mechanism for interaction with business in terms of updating educational programs, improving the skills of teachers, creating a center of opportunities for startups in the field of Internet of things technologies and smart greenhouses for agriculture. Although, as an option, in this direction, agricultural universities can form modular platforms "Smart garden" or "Smart greenhouse" that do not have a large-scale production goal. The main goal will be to train new technologies, retrain personnel, and conduct research to improve these platforms. Similar model productions can be made on other platforms.

Thanks to the implementation of the Smart greenhouse platform, it is possible to achieve the following indicators:

- the number of results of intellectual activity - more than 20 units.;
- the number of patent applications submitted based on research and development results is not less than 20;
- the number of events (to demonstrate and promote the results and achievements of science) in which the organization will participate and provide results - at least 3 per year.
- the number of hectares for "Smart greenhouses" in 2023 is 500;
- the share of vegetables grown in protected ground is more than 45%;
- the profitability of products from "Smart greenhouses" is more than 45%.

At the same time, production costs will be reduced by at least 15%, and the needs of population for vegetables by 70% will be met through the implementation of the Smart greenhouse platform.

The next important platform that affects the interests of dairy cattle is "Smart farm". In the future, a similar platform will appear in the pig and poultry industry.

The forecast for the development of the agricultural robot market in the period 2017-2026 showed that the market volume of dairy farm robotics in 2023 will reach 504 billion rubles. Currently, tens of thousands of milking robots are installed in the world. The estimated volume of this market is about 120 billion rubles.

It is possible to increase the level of production and consumption of dairy products in Russia through the introduction of new technologies in agriculture. In particular, it is necessary to develop farms with automated management systems, the parameters of which change depending on the microclimate and the condition of animals on farms. Only in such farms it is possible to improve the quality of milk to the "extra" class and ensure a stable increase in milk productivity of animals.

It is necessary to develop technical and technological solutions for creating a new generation of dairy farms based on intelligent digital technologies, which will ensure: the creation of digital supply chain that ensure the independence and competitiveness of the domestic livestock sector; attracting investment; creating and implementing technologies to increase the milk productivity of animals up to 13,000 liters/year; reducing the incidence of cows with mastitis, reducing the cost of antibiotics; creating and implementing technologies for autonomous production, energy efficiency and energy mobility; creating safe and high-quality functional food products.

This in turn will allow:

- reducing the incidence of mastitis by 70%;
- increasing the quality of dairy products by more than 40%;

- increasing the profitability of products from "Smart farms" by more than 40%.

At the same time, when implementing the mentioned above "smart" platforms, there is a risk associated to a large extent with the high costs of acquiring and implementing digital technologies, as well as the lack of coordination and motivation in the transition to digital technologies.

One of the major barriers to the widespread adoption of digital technologies is often the need for a synchronous transition to work with them at once by a whole group of companies that form cooperative chains. This can apply to the introduction of unified document management standards, digital design and modeling, and the Internet of things. If only one company switches to the new technology, the efficiency of its investments is sharply reduced compared to the effect that is achieved when a significant number of cooperative entities simultaneously switch to it. To some extent, the state could help solve this problem.

The abstractness of the organizational structure and specific activities related to digital transformations puts their implementation in the risky category.

4. Results

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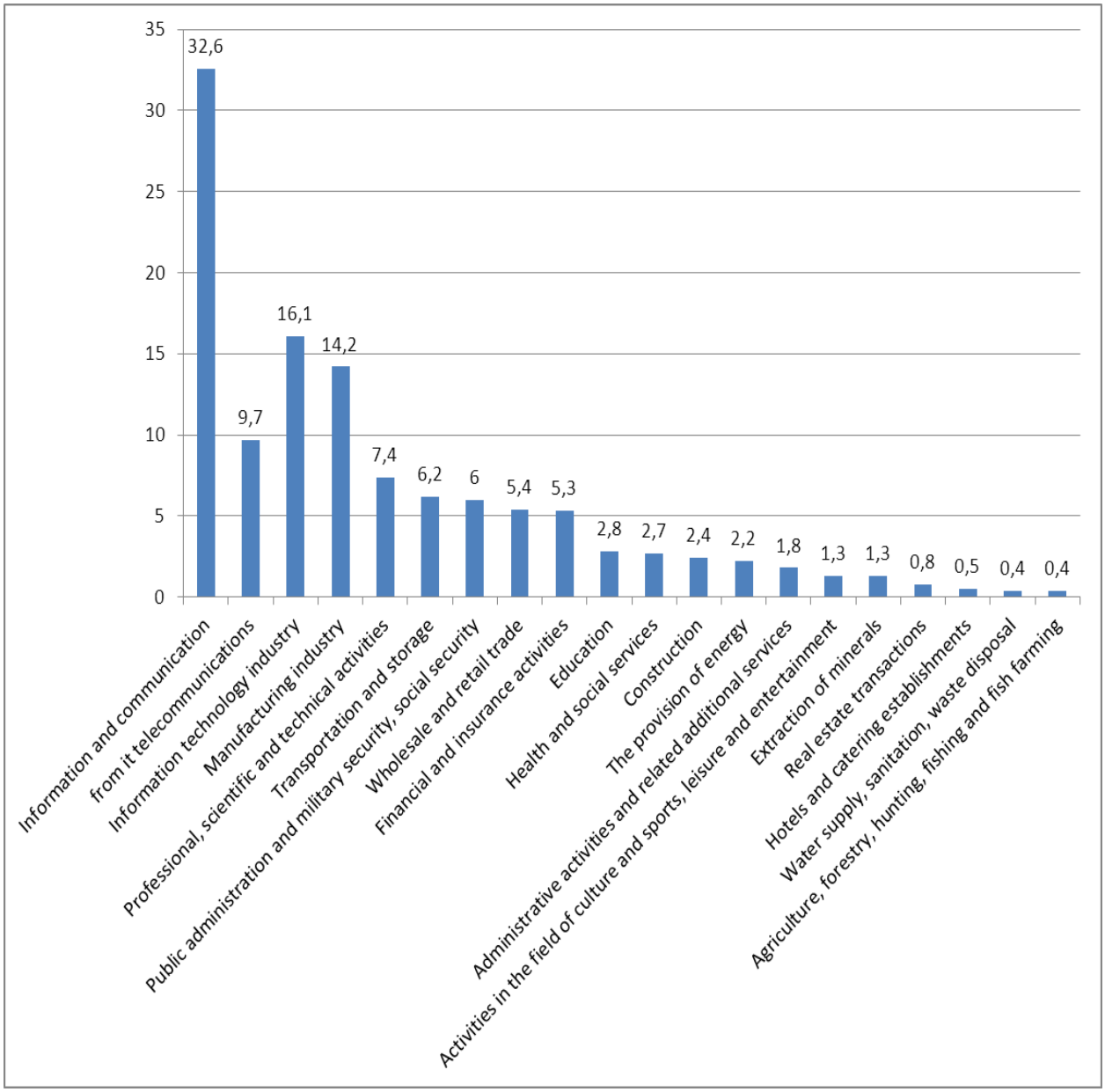

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4. Increasing the profitability of agricultural organizations (effective hectare) – up to 50% of profitability;
5. The number of specialists who have completed training and advanced training – up to 1.5 thousand specialists by 2024.
The smart field platform is very important for Russian producers. It provides for stable growth of crop production through the introduction of digital technologies in supply chain for collecting, processing and using an array of data on the state of soils, plants and the environment.
This direction can be implemented using exclusively domestic competitive technologies in the following areas:
- field collection of Big Data, monitoring of field lands and crops of ultra-high detail;
- data transfers taking into account the specifics of Russian field crop production;
- development of algorithms for making managerial decisions in agricultural production based on Big Data processing;
- robotic means of reducing limiting factors of productivity of field crop production;
- promotion and development of precision farming technologies.

The implementation of this platform will allow:
- increasing the productivity of field crop production by 20% by introducing means to reduce the influence of limiting factors of plant productivity;
- developing global coverage of agricultural territories of the Russian Federation with a network connection taking into account the specifics of field crop production;
- develop and implement robotic technologies in field crop production;
- make the transition to intelligent plant productivity management..
The Smart garden platform is important from the point of view of import substitution. Here it is necessary to develop an intelligent technical system that analyzes automatically information about the state of the garden's agrobiocenosis, makes management decisions and implements them using robotic technical tools.
This is one of the insufficiently developed technologies. Its successful implementation will require:
- development of digital systems for collecting and analyzing data on the state of soils, plants and the environment using cloud and Internet of things technologies;
- development of an information system and technical means for monitoring and promptly obtaining data on changes in the state of the garden and the environment (sensors for monitoring parameters of the agrobiosystem, weather stations, samplers, UAVs (unmanned aerial vehicles), and others);
- development of unified means of data transmission taking into account the specifics of horticulture;
- development of system software that allows to manage automatically the collection and analysis of information from sensors, its analysis and systematization, decision-making on the management of technological processes and the implementation of feedback with technical means for the implementation of control actions;
- development of machine technologies with the use of robotic (including unmanned) technical means for the implementation of control actions in the digital gardening system in automatic mode.
If the above tasks are completed, it is possible to have by 2025:
− at least 90% of the area of agricultural perennial plantings in digitized form in a single geographic information system;
− at least 70% of the area of industrial gardens, which must be provided with means of collecting data on the state of soils, plants and the environment;
− at least 50% of the area of industrial gardens, which must be covered by a data transmission network to ensure the collection of Big Data and the introduction of Internet of things technologies in fruit growing;
− at least 70% of mobile hardware can be equipped with monitoring systems and integrated into a single geographic information system;
− at least 20% of technical equipment can be robotic, working in autonomous mode without human participation.

At the same time, in addition to improving product quality, the yield of fruit crops will increase by 20-30%, and costs will decrease by about 30% (mainly due to the optimal use of consumables). In addition, the role of the human factor in the production of fruit products will be reduced, and the environmental component of production will be improved.

Building a digital supply chain involves the introduction of information technologies in all areas of government activity at various levels. One of the key areas is the creation and practical application of a set of software and hardware solutions and robotic intelligent technologies for growing agricultural plants in closed systems – "Smart greenhouses", which reduce production costs and increase productivity. The practical application of these technologies allows solving comprehensively a number of existing and new problems of processing large amounts of data in the digital supply chain and helping overcome most technological barriers.

In this direction, it is necessary to develop a modern integrated and complete "Smart greenhouse" technology based on the use of the Internet of things for food production in order to reduce costs for existing complexes without significant financial investments in their technical re-equipment, as well as the design of innovative facilities.

Ensuring stable growth of crop production in protected soil, obtaining highly competitive substrates and fertilizers, domestic innovative systems (microclimate, lighting, efficient energy supply, universal module, nutrition, autonomy, etc.) for closed soil, quality control of products, raw materials and food, reducing the energy intensity of production and increasing the nutritional value of vegetables are important for agricultural producers in Russia.

Similar to the Smart garden platform, the development of this platform is at an early stage and will require a lot of effort to develop: intelligent products in the field of bioengineering and closed plant growing systems; automated systems for collecting, analyzing data, as well as remote control of greenhouses using wireless sensors, microelectronic complexes with digital format for processing and transmitting signals; wireless platforms for collecting, transmitting, processing and visualizing data from industrial devices of the Internet of things for greenhouses; methods and algorithms for analyzing large data sets for intelligent greenhouse management, monitoring and forecasting crop yields in greenhouses.

In addition to the above, it is necessary to develop an organizational mechanism for interaction with business in terms of updating educational programs, improving the skills of teachers, creating a center of opportunities for startups in the field of Internet of things technologies and smart greenhouses for agriculture. Although, as an option, in this direction, agricultural universities can form modular platforms "Smart garden" or "Smart greenhouse" that do not have a large-scale production goal. The main goal will be to train new technologies, retrain personnel, and conduct research to improve these platforms. Similar model productions can be made on other platforms.

Thanks to the implementation of the Smart greenhouse platform, it is possible to achieve the following indicators:

- the number of results of intellectual activity - more than 20 units.;
- the number of patent applications submitted based on research and development results is not less than 20;
- the number of events (to demonstrate and promote the results and achievements of science) in which the organization will participate and provide results - at least 3 per year.
- the number of hectares for "Smart greenhouses" in 2023 is 500;
- the share of vegetables grown in protected ground is more than 45%;
- the profitability of products from "Smart greenhouses" is more than 45%.

At the same time, production costs will be reduced by at least 15%, and the needs of population for vegetables by 70% will be met through the implementation of the Smart greenhouse platform.

The next important platform that affects the interests of dairy cattle is "Smart farm". In the future, a similar platform will appear in the pig and poultry industry.

The forecast for the development of the agricultural robot market in the period 2017-2026 showed that the market volume of dairy farm robotics in 2023 will reach 504 billion rubles. Currently, tens of thousands of milking robots are installed in the world. The estimated volume of this market is about 120 billion rubles.

It is possible to increase the level of production and consumption of dairy products in Russia through the introduction of new technologies in agriculture. In particular, it is necessary to develop farms with automated management systems, the parameters of which change depending on the microclimate and the condition of animals on farms. Only in such farms it is possible to improve the quality of milk to the "extra" class and ensure a stable increase in milk productivity of animals.

It is necessary to develop technical and technological solutions for creating a new generation of dairy farms based on intelligent digital technologies, which will ensure: the creation of digital supply chain that ensure the independence and competitiveness of the domestic livestock sector; attracting investment; creating and implementing technologies to increase the milk productivity of animals up to 13,000 liters/year; reducing the incidence of cows with mastitis, reducing the cost of antibiotics; creating and implementing technologies for autonomous production, energy efficiency and energy mobility; creating safe and high-quality functional food products.

This in turn will allow:

- reducing the incidence of mastitis by 70%;
- increasing the quality of dairy products by more than 40%;

- increasing the profitability of products from "Smart farms" by more than 40%.

At the same time, when implementing the mentioned above "smart" platforms, there is a risk associated to a large extent with the high costs of acquiring and implementing digital technologies, as well as the lack of coordination and motivation in the transition to digital technologies.

One of the major barriers to the widespread adoption of digital technologies is often the need for a synchronous transition to work with them at once by a whole group of companies that form cooperative chains. This can apply to the introduction of unified document management standards, digital design and modeling, and the Internet of things. If only one company switches to the new technology, the efficiency of its investments is sharply reduced compared to the effect that is achieved when a significant number of cooperative entities simultaneously switch to it. To some extent, the state could help solve this problem.

The abstractness of the organizational structure and specific activities related to digital transformations puts their implementation in the risky category.

5. Conclusions

As the world experience shows, the success of digital transformations largely depends on a well-built organizational mechanism that can motivate organizations to implement digital technologies. In addition, an important problem around the world, including in developed countries, is the personnel issue. Very multidisciplinary specialists from Russia work in developed countries of the world, which indicates not only their high qualifications, but also the shortage of specialists in the field of information technology.

In connection with the foregoing, the Federal Executive bodies must:

- build a motivating organizational mechanism for implementing digital technologies;
- allocate significant amounts of state support for the creation and implementation of new domestic digital technologies;
- create a digital supply chain management system at the federal level;
- allocate funds for the training of specialized specialists, creating conditions for their training;
- allocate state support for the purchase of new domestic digital technologies partially compensating for the costs of organizations.

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