THE IMPORTANCE OF USING THE ELEMENTS OF "INTELLIGENT AGRICULTURE" IN THE PRODUCTION OF AGRICULTURAL PRODUCTS

Alikulov D. *– student of TSAU*

Annotation: The agriculture industry is an integral part of our global economy and society, providing food, fiber, and other essential products. As the world's population continues to grow, the demand for agricultural products is increasing at an unprecedented rate. To meet this demand sustainably, the industry must embrace innovative practices such as intelligent agriculture.

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Diversification of production, as well as improvement of land and water relations by applying elements of "smart agriculture" to the sector, creation of a favorable agribusiness environment and a high added value chain, support for the development of cooperative relations, wide introduction of market mechanisms, information and communication technologies to the sector, as well as , it will be necessary to effectively use the achievements of science and increase the potential of personnel.

Food security depends on a wide range of socio-economic, demographic and environmental factors and is one of the main components of the country's development. The national food security policy is developed and implemented on the four components of food security (availability of food, ability to purchase it, its use and its sustainability).

Population growth, increased demand for land, water and energy resources, as well as climate change are the main factors affecting food security. According to experts, during the season (within a limited period of time), the farmer needs to take decisions on more than 40 different issues that directly affect the economy of production, which is the object of digitalization. Directions of digitized systems. In the field of "Intelligent agriculture" covering the scientific and technical cycle of the complete innovative complex and the introduction of digitized system categories, there are the following main directions of digitization of agriculture and scientific and technological development: "Digitalized technologies in the management of the

agro-industrial complex", "Smart farming", "Smart field" ", "Smart Garden", "Smart Greenhouse", "Smart Farm".

The management of the agro-industrial complex is based on modern competitive technologies, methods, algorithms and systems, as well as equipment for the introduction of information technologies, evaluation of the effectiveness of agrarian policy, forecasting and regulation of the food market [3]. Let's look at some areas of these digitized systems: Smart farming. "Smart farming" is automated data collection, analysis, updating of soil and land resources status data, development of recommendations on optimal (landscape-adaptive) location of agricultural crops, distribution of land areas, use of crop rotation, agro-technologies of crop cultivation, land automated assessment of areas (including cadastre), control and monitoring of land and water use and the operation and efficiency of the adaptive-landscape farming system. Planning and optimization of agro-landscapes at different levels of agricultural production operating on the basis of digital, remote, geo-information technologies and methods of computer modeling, development and implementation of intelligent systems of land use. The introduction of technological solutions in the direction of "smart farming" includes the following:

- use of an automated planning system for the use of agricultural land;

- a system of collecting, updating and storing information on the state of land;

- monitoring of land condition and use, targeted assessment of land suitability and modeling system of potential productivity;

- the system of forecasting the productivity of agricultural crops;

- the system of distribution of agricultural arable land and planning of some types of crops;

- digital adaptive-landscape and agrotechnologies of farming, design system of technical and economic justification; adaptive-landscape system of land use, network of authorized centers for training and professional development of specialists.

Smart field. "Smart field" is to ensure the sustainable growth of agricultural products through the introduction of digital technologies, analysis and systematic application of information about soil, environment and plants.

The introduction of technological solutions in the direction of "Smart field" includes the following:

- development of highly accurate data collection and analysis tools on soil, plant and environment conditions using Internet technologies;

- development of integrated means of sending information based on the characteristics of national field plant science;

- development of an algorithm for monitoring soil, plant and environmental conditions based on the productivity of scientific theory for data analysis and management decisions;

- development of robotic technologies for plant science, which ensure the reduction of limiting factors affecting plant productivity.

A smart garden. "Smart garden" is a robotic, driverless machine, consisting of an intellectual system that prepares, implements and controls all technological processes of growing horticultural products using aggregates. Such a system provides analysis of soil and climate conditions based on data, determines the optimal crops for cultivation, intelligent use of organic and mineral fertilizers, preventive measures against pests and diseases, and economic calculation of production profitability and the demand of the population of the region (country, region). Development of an intelligent technical system that provides automatic analysis of data on the state of garden agrobiocenosis, making management decisions and implementing them with robotic technical means.

The implementation of "Smart Garden" technological solutions includes the following:

- extremely high-precision information on the condition of soil, plants and the environment using Internet technologies development of data collection and analysis tools;

- development of information systems and technical tools for rapid acquisition and monitoring of information on changes in the state of the garden and the environment (sensors that control indicators of the agrobiosystem, sampling devices, drones, etc.);

- development of integrated means of sending information based on national horticultural characteristics, etc.

Smart greenhouse. "Smart greenhouse" is an autonomous, robotic and protected against external influences agricultural object that minimizes the participation of operators, agronomists, engineers to the maximum extent for the cultivation of horticultural products in automatic mode.

The system optimizes the economy of the facility, taking into account cost and consumption activities, agro-ecological evaluation of plant hybrids and varieties, soil analysis, etc., using digital technologies (artificial intelligence, Internet networks, etc.) and follows environmental and sanitary-hygienic regulations.

The establishment of a digital economy implies the introduction of information technologies into all spheres of state activity at various levels:

- development and implementation of total software solutions and robotic intelligent technologies in a closed system that reduce production costs and increase productivity;

- to comprehensively solve the existing and new tasks of the analysis of large volumes of data of the mentioned technologies in the digital economy;

- development and implementation of modern and complete greenhouse technologies based on the use of internet networks (a device leading from a protected network to sensors and an analytical system);

- The introduction of "smart" greenhouse technological solutions includes the following:

- development of intellectual products in the field of bioengineering and plant cultivation in a closed system;

- development of an automated system of remote control of greenhouses using data collection, analysis and digital microelectronic complex of wireless sensor, signal processing and transmission;

- development of a wireless platform for data collection, processing and visualization using Internet industrial equipment for greenhouse farms;

- analysis of large amounts of data for intelligent management of greenhouses, development of methods and algorithms for monitoring and forecasting the productivity of agricultural crops in greenhouse farms;

- Liaising with businesses on educational programs, teacher training, agricultural internet networks and the creation of enabling centers for start-ups in the Smart Greenhouse sector.

A smart farm. "Smart farm" is a fully autonomous, robotic agricultural facility designed to care for farm animals in a fully automated mode that does not require human intervention (operator, breeder, veterinarian, etc.).

On the basis of such analyses, the farm decides on the need to cultivate what types and breeds of agricultural animals (specified quality and quantity indicators). The implementation of "Smart Farm" technological solutions implies the following:

- creation of sensor systems for identification of the physiological state of agricultural animals, technology for monitoring the number of cattle;

- automated technology and equipment for audit work with analysis and presentation of data in electronic form; - equipment and devices that detect fat, muscle and bone tissues by the bioelectrical impedance method; - use of non-contact remote equipment, technologies, etc. in controlling animal movements. Also, by applying the elements of "smart agriculture" in the cultivation of agricultural

products, it is possible to achieve food security supply and export development, to provide the population with high-quality and safe food products.

In conclusion, the use of intelligent agriculture in the production of agricultural products is of utmost importance. As the global population continues to rise, meeting the ever-increasing demand for food in a sustainable manner becomes crucial. By optimizing resource efficiency, enabling proactive decision-making, enhancing productivity, and promoting sustainability, intelligent agriculture serves as a promising solution for the challenges faced by the agriculture industry. It is imperative for farmers, policymakers, and stakeholders to embrace these advancements and actively support the adoption of intelligent agriculture practices for a thriving and sustainable future.

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