DIGITALIZATION OF THE AGRICULTURAL SECTOR OF ARMENIA AS A FAST PATH TO TECHNICAL PROGRESS

DOI: 10.52174/2579-2989_2022.6-20

Keywords: *digitalization, technical progress, savings, high productivity, smart agriculture, efficiency*

Samvel AVETISYAN

Doctor of Economics, Professor

In 1978, he graduated with honors from the department of Economics of Armenian Agricultural Institute. In 1990, he maintained his PhD thesis, in 2003 - his doctoral thesis, and in 2007, he was awarded a title of professor. In 1999, he was elected a deputy of the RA National Assembly. From 2002 to 2011 he worked as the first Deputy Minister of Agriculture. Since 2013, he has been working in the ASUE Research Center "Amberd" first as the head and coordinator of socialeconomic programs, then, in 2016, he was assigned to the position of the director of the Research Center Program "Research of National Competitiveness and Internationalization". He is an author of 150 research papers and 20 monographs:

https://orcid.org/0000-0002-3019-4075

Just two decades ago, it was hard to imagine that artificial intelligence could control not only technical processes, but also the growth and development of plant and animal organisms. Just two decades ago, a sensor system that controls the feeding, care and milking of cows, or automatic climate control equipment for greenhouse farms, was perceived as the last word in technical progress in agriculture. However, they are now perceived as general innovations in the digitalization of production, as new digital technologies control tractors and combines in the field without direct human intervention, assess the needs of plants for nutrients and water, and automatically carry out irrigation and fertilization operations. Moreover, artificial intelligence monitors animal health, plant diseases and pests and takes the necessary measures.

The paper highlights the current state of digitalization in the field of agriculture, the main directions of its development in Armenia and the importance of cooperation between the public and private sectors.

Digitalization is rapidly changing the possibilities of interaction within business processes, including all participants in the agri-food system, in every possible way smoothing out the factors that hinder the increase of production efficiency. The services will provide technical information that will help increase productivity, strengthen resilience and market access.

In addition, mobile technologies and Internet services can connect individual farmers with commodity distribution chains - thus opening up access to better seeds and fertilizers, which can significantly increase production and

enter market, directly presenting products to consumers, bypassing intermediaries. Indeed, the digitalization of the agro-industrial system is playing an increasingly important role in ensuring food security and strengthening livelihoods, especially in rural areas.

What does digitalization give to the agricultural sector?

The key task of the digital transformation of agriculture is to extract value from the collected big data about the internal and external environment. This is based on cloud platforms and big data solutions, as well as predictive analytics technologies and decision support systems.

The essence of digital agriculture is the collection and processing of data and the adoption of decisions based on them, which allows optimizing the processes of production and management of an agricultural enterprise. In this regard, several groups of digital solutions can be conditionally distinguished:

1. The most affordable and intuitively using systems. This group, in particular, includes tracking systems (various sensors), equipment control, including those based on mobile communications, satellite positioning, RFID technologies. A good example of their application is the control over the operation of agricultural machinery in terms of excluding its unauthorized use, fuel selection and compliance with optimal operating modes.

2. Systems that provide clear benefits in terms of cost minimization by delivering precise amounts of water, fertilizers, plant protection products and more. This is especially true for water-deficient regions, as well as in the context of an increase in the cost of chemicalization of agriculture. Drip irrigation systems, Variable Rate Application (VRA) technologies and a number of others are in demand in this category. There is also one of the areas of application of agricultural drones, which ensures the transportation of chemicals to specified points, including hard-to-reach places in the fields.

3. Integrated monitoring systems, as well as automation of production processes, requiring the use of special knowledge and equipment. Such technologies may include obtaining and processing images, including satellite and unmanned images, to determine temperature gradients, fertility, humidity and anomalies on farmland, greenhouse climate control, animal behavior control using the Internet of Things (IoT) technologies, AIoT applications and platforms. The combined use of detailed farmland monitoring data with VRA technologies provides hyper localization of plant care - down to the level of a single plant.

4. Automated and robotic equipment, including unmanned equipment for processing farmland, both of a traditional layout with the possibility of direct human control, and fully automated equipment with only remote access. In this context, it should be noted that the market for unmanned equipment, which began to develop from drones (unmanned aerial vehicles, UAVs), is currently increasingly covering traditional areas of activity in agriculture[1].

According to the findings of scientists, enterprises' investment in digital technologies is positively correlated with the employment of high-skilled workers and negatively correlated with the employment of low-skilled workers. As low-skilled jobs are threatened in the long term, governments are faced with the need to provide opportunities for lifelong learning and retraining. Given the current level of technological capabilities and the ability of enterprises to successfully integrate them into existing business models, digital transformation at this stage will mainly contribute to the replacement of individual tasks, not entire jobs. Automation is mostly about simple and repetitive tasks, enabling people to pay more attention to creative tasks and devote more time to developing their talents.

A sustainable digital infrastructure, combined with digital literacy, can help close

[1] https://e-cis.info/news/566/103332/

the urban-rural divide. Inclusive sustainable development is achievable if women, rural populations and the elderly are given appropriate digital skills. In order to avoid capitalizing on the opportunities of digitalization only for certain groups of the population, it is important to ensure a multi-stakeholder approach that links the development of inclusive digitalization with the 2030 Agenda for Sustainable Development.

The use of sensor equipment (field sensors, sensors for monitoring the condition of industrial premises, agricultural equipment and machinery, livestock health monitoring sensors, etc.) allows a large number of agricultural enterprises to move to continuous collection and analysis of information and integrate three levels of monitoring of agricultural systems (ground, air and space) on the level of individual farms, regions and countries.

Digital technologies contribute to reducing the environmental burden of agriculture, increase the efficiency of the use of natural resources, forming the basis of the ESG strategy (Environmental, Social, and Corporate Governance, ESG. - Ed.), which probably does not exclude the development agenda of the agricultural sector in our country.

It is worth emphasizing that even with the existing difficulties with the infrastructure that can ensure the full use of digital equipment, large and medium-sized businesses are making efforts for digital transformation, because in the context of a pandemic or changing consumer preferences, the development of a green economy, digital, artificial intelligence help solve these problems by analyzing marketing preferences, ensuring ordering and delivery of products, as well as being responsible for the quality and safety of raw materials and products, including reducing carbon footprint costs.

Let's list the 10 most widely used digital technologies in the field of agriculture[2]:

1. Robotics: Those who associate farming with bucolic country living might not realize that the new generation of farmworkers doesn't aspire to pick fruit, pick up animals or do many of the common backbreaking tasks associated with farming. Robots now milk cows, pick strawberries and cut up carcasses in processing plants. Robotics in farming represents a global market of over $5 billion and is projected to double in the next five years.

2. IoT and Sensors: The ability to track produce and live animals, detect health issues and evaluate the environment inside the farm or the uptake of moisture from the soil in real time is of huge value in addressing the major challenges of climate/sustainability, animal welfare and tracking in the food supply chain. The explosion of IoT devices in other industries (46 billion devices are connected) could pale in comparison to the opportunities represented in agriculture, already an $11.4 billion market.

3. Artificial Intelligence (AI): Many careers in food and farming rely upon learning by doing, rather than explicit knowledge transfer. This creates real challenges, such as how to avoid human error, misunderstandings and cognitive bias. AI may sound the death knell for extension agents, farming experts, consultants and professional expertise, but, more likely, it will alter how those professions function. More accurate data will be available faster but will still need interpretation. As an example, consider how AI has changed the healthcare industry: jobs have been changed but not replaced.

4. 3-D Printers: The ability of 3-D printers to repair machinery, print food or even make a prosthetic for a valuable animal provides a clear advantage to farms worldwide. It is even clearer in times of disrupted supply chains (e.g., Covid-19) or in regions of the world with their own distribution challenges (e.g., Africa). 3-D printing on the farm and in the food supply chain creates real efficiencies and savings.

5. Drones: Already surveying 20 million

[2] https://www.forbes.com/sites/forbestechcouncil/2022/04/26/10-digital-technologies-that-are-transforming-agriculture/?sh=39bf74a87baf

hectares of China's cotton crop, the ability of drones to go where humans can't and see things not readily observed from the ground creates real insights into pest protection, fertilizer and herbicide application, irrigation and harvest timing.

6. Extended Reality and the Metaverse: Human vision is limited to visible light, and XR can let us see a broader spectrum. This can be valuable in managing crops, animals and food production and has the potential for improving health and food safety practices.

7. Virtual Reality (VR): The ability of VR to teach students about the inner workings of animals (without vivisection) and how plants grow—or simply to be able to visit farms—is an extraordinary opportunity for students and consumers alike to engage with farming. Successful examples include the use of VR in Glasgow University for cows, the Australian poultry industry, North Carolina swine farmers and even McDonald's U.K. consumers.

8. Blockchain: Both the most exciting and the most misunderstood technology (using the same technology as Bitcoin), blockchain can create transparency in a sector that has often failed to capture consumer confidence. Blockchain represents an opportunity for the food industry to regain its high ground. For example, Canadian companies in the beer supply chain, Walmart's global food chain and the FDA see blockchain as a tool to address consumer concerns about provenance and food safety.

9. Data Analytics: The world will store 175 zettabytes of data by 2025. Data is often described as the "new oil," which is ironic, as many countries that are rich in oil haven't necessarily become wealthy as a result. It is assumed that the future capturing, controlling (or protecting) and processing of data will justify the high valuations of AdTech startups. Believing that data will be the savior of farming is a pipedream, but the power of data analytics can unleash meaningful new insights for farmers and food producers.

10. Cloud Connectivity: Cloud-based computing services use real-time connections to the internet to offer more flexible resources and economies of scale than available with conventional server-based or even edge options. The requirement for connectivity-especially 5G-represents a genuine challenge when many farms aren't connected at all yet. Governments understand that if farming is to be revolutionized, addressing connectivity is essential. Without it, the rural-urban divide will be exacerbated.

Advanced technologies in Armenia

The process of introduction of e-governance in Armenia began in the 90s. In 2008, the Government of the Republic of Armenia adopted an Action Plan aimed at developing an electronic management system. As a result, a number of initiatives have been implemented, including the Electronic Governance Tool System (www.e-gov.am) with more than 20 online services. The platform integrates real estate (www.e-cadastre.am), government payments (www.e-payments.am), electronic registration of organizations (www.e-register.am), electronic filing of tax returns (file-online.taxservice.am) electronic systems, a single platform for electronic requests (www.e-request.am). There are also other systems that serve the processes of obtaining building permits (www.e-permits.am) and the unified electronic register of licenses of the RA (www.e-license.am), the platform of the National Human Rights Strategy e-rights.am[3].

The technologies that make it possible to make the transition to the digital transformation of agriculture are remote sensing of the earth using satellite systems to form electronic maps of fields and the use of UAVs with multispectral and hyperspectral cameras for remote monitoring of the state of fields, soil fertility, the ecological situation, crop growth, and determining the vegetation index, early diagnosis of plant diseases, irrigation management, etc. In Armenia,

[3] https://www.arlis.am/documentview.aspx?docID=149957

positive dynamics in the field of digitalization are observed, in particular, after 2017 in connection with the development and adoption of the "Agenda of digital transformation of Armenia until 2030". This is a document that defines the main directions and goals of the country's digital transformation, which includes three main stages: "digital leap", "digital acceleration" and "development based on digitalization". It should be noted that Armenia actively attracts relevant international organizations to develop projects and roadmaps on such promising issues of the digital economy as digital agriculture. In developing a strategy in this area, Armenia is actively cooperating with FAO[4].

A number of target indicators of Armenia's Digitalization Strategy, which are directly related to the digitalization of rural areas and agriculture, deserve attention. The most important of them are the following events planned to do until 2025:

- 80% of the RA urban and rural settlements will be provided with broadband and high-quality Internet connection and access to state digital services. (Now that figure is about 40%);
- the government will eliminate the need to visit state and local self-government bodies for the purpose of receiving services;
- the state and local self-government bodies will communicate with legal entities exclusively electronically, and citizens - primarily electronically;
- the government will exclude the cases of requesting documents and information from a citizen, if such documents are already available in any electronic information database[5].

Several digital technologies actively used in different countries can be of serious interest and can be successfully applied in Armenia as well. The following digital technologies and experiences of knowledge-based companies are most applicable:

- "Exact Farming" is a platform that brings together digital agronomy solutions for agricultural producers, producers and sellers of fertilizers, agrochemicals and seeds, financial institutions and other participants in the agricultural industry and allows them to effectively manage agribusiness, make timely decisions, reduce risks and increase transparency in interaction with each other.
- "Agrotronik" - agronomic services (precision farming, positioning of equipment, harvesting and tillage, work at night based on video systems, etc.), produced by Rostselmash Group of Companies.
- "Cognitive Technologies" – an agronomic service (precision farming, equipment positioning, soil harvesting and cultivation, work at night based on video systems, etc.).
- "AgroMon"- a mobile application and a web service for farm management. Organization of crop inspections, season planning, field work management, data exchange with the team, seed producers, crop protection products and distributors.
- "SmartAGRO" is an enterprise management system with a built-in agroanalytics module which automates up to 90% of the business processes of an agricultural enterprise.
- Cloud service from OOO "Geomir": the history of the field for the management of agricultural enterprises.
- "NeuroPlant" is an assistant for collecting, storing and operational analytical processing of data in order to support decision making using AI.
- "SkyScout"- a unified system for managing the agronomic service of agricultural enterprises- provides a complete picture of crop health based on data collected both manually and automatically. It helps make housekeeping decisions.
- "DigitalAgro" is a platform that brings together digital agronomy solutions for

[4] https://eabr.org/upload/iblock/551/EABR_Digital_Potential_06_2019.pdf
[5] https://www.arlis.am/documentview.aspx?docID=149957

agricultural producers, producers and sellers of fertilizers, agrochemicals and seeds, financial institutions and other participants in the agricultural industry and allows them to effectively manage agribusiness, make timely decisions, reduce risks and increase transparency in interaction with each other.

- "Agrosignal" - a platform and mobile application for the efficient operation of all departments of enterprises at each stage of field work, from crop rotation planning and the formation of an annual budget to monitoring the operation of equipment and employees and accounting for finished products, accounting for transport work, maintaining operational plans and shift schedules, creating individual and group reports, linking information about the transported cargo.
- "CenterProgramSystem" - an information solution in the field of agro-industrial business management.
- "Green Growth" is a real-time yield mapping platform.
- "Polydon Agro" - a mobile application with up-to-date product information and a mixing calculator.
- "Own farming" - a service from Rosselkhozbank with an emphasis on e-commerce. It allows you to buy seeds, fertilizers, plant protection products, agricultural chemistry and even agricultural machinery. In addition to goods, services can also be obtained here.
- "Avrora Robotics" is developing an integrated unmanned control system for a tractor (Agrobot).
- "Magrotech" is a company that collects information about field characteristics and provides yield forecasts based on a mathematical model.
- LLC "Assistagro" - the use of UAVs for the collection, storage and operational analytical processing of data in order to support decision-making using AI.
- LLC "Kaipos" is a manufacturer of weather monitoring systems, plant disease models, irrigation optimization systems and technology for identifying harmful objects.

In agriculture, the universal software 1C, Microsoft, SAP and "Corporation Galaxy" (Galaxy ERP) is also used.

Above, we have listed the achievements in the main areas of digitalization of agriculture. Due to economic, technical and organizational reasons, it is not very realistic to apply all of them in Armenia, so we present a number of technologies that are most available and in demand in our conditions, the implementation of which will bring great benefits.

1. In the field of viticulture, Armenia can cooperate with the French company "VitiBot".

"VitiBot" is a French industrial company, on the market of autonomous and electric vineyards robots. The company accompanies the winegrowers in the improvement of their vineyards with the latest technological solutions. "VitiBot" reconciles contemporary environmental and economic issues by offering a driverless solution. Finally, our vineyards robots ensure greater hygiene and safety for workers in the vineyards.

"VitiBot" has created a universal platform to accommodate a large number of smart and power tools. The company's objective is to place the technological breakthrough called Bakus in the context of sustainable viticulture. Reducing the use of phytosanitary products, preserving the environment and biodiversity, increasing the safety of operators and the shortage of skilled labor are major contemporary issues in viticulture. Bakus, the viticultural robot, is able to meet these challenges in a sustainable way. The possibility to mount electric tools (innovations of our own creation) but also passive tools already owned by the operators allows to suppress the use of herbicides. Autonomous movement in the vineyard allows the operator to supervise the robot using a simple smartphone and to dedicate it to more noble tasks, in complete safety. Finally, the innovative technologies make it possible to plan many other applications in the vineyard (spraying with recuperator panels, new tools)

without major transformations of the robot.

Bakus is a 100% electric and autonomous monorang vineyard straddle. It performs most of the soil working tasks in the vineyard, under the supervision of an operator, in order to reduce or even eliminate the use of phytosanitary products. The robot works in total autonomy in the plot. Its 100% electric propulsion allows it to cross vines with difficult slopes (up to 45°) and complicated inclines (>20°). It works very quietly and in respect of its environment[6].

2. The experience of the Israeli meteorological data forecasting robot is very useful for greenhouse farms. Growponics Ltd. has developed an inspection and data collection robot for greenhouses and farming applications. The robot is rail mounted, battery powered, and equipped with a powerful camera and other sensors. Remote connection capabilities enable it to monitor the greenhouse from anywhere. The robot analyses the imagery and sensor measurements from strategic points in the greenhouses, and provides vital information to the farmer that optimizes plant growth and yield. Advanced data analysis using artificial intelligence (AI) can yield priceless information on any predicament in the field that requires attention, based on minute changes in growth rate, colour composition, or other parameters. The success of the innovative DCR will be demonstrated by improving the yield.

The robot makes use of an electric motor, powered by a chargeable battery, to drive on a rail, and take readings from any point on the rail. A combination of precision mechanics and image analysis endow the robot with the ability to repeatably pinpoint an exact location on the rail and take a series of pictures from the same point of view, enabling the accumulation of valuable data. The analysed images are crossed with sensor readings and other parameters in the database, and enable AI guided conclusion drawing out of the gathered big data. Machine learning is advanced through the contribution of expert agronomists and engineers, in order to train the system to identify core issues in the greenhouses, such as pest and disease identification, growth conditions deviation and equipment failure. The farmer receives a full report of the greenhouse status, troubleshooting instructions and improvement recommendations. The overall impact achieves a thorough optimization of plant growth[7].

3. Artificial Intelligence for modern livestock management.

Inspired by the hardworking farmers who feed the world, Serket is developing a sensor-free artificial intelligence that uses camera vision to enhance farm productivity and promote the health of individual animals. By monitoring changes in animal behaviour in real time, it enables farmers to pin-point sick livestock and intervene immediately. With Serket, farmers can minimize antibiotics usage, reduce feeding costs, and lower mortality rates to animal welfare and raise healthier livestock. Serket addresses key problems faced by the EU livestock sector:

1) the need to control contagious diseases and epidemics;
2) the need to reduce antibiotic use and zinc-oxide in livestock management;
3) the need for Decision Support Systems to improve livestock health; and
4) the requirement to comply with Council Directive 2008/120/EC on animal welfare;
5) The expectation of the alignment with SDG of UN that challenges are facing globally-Zero hunger, Good Health and Well-being, Decent Work and Economic Growth and Industry, Innovation and Infrastructure.

Our technical approach used and applied is based on 2 key fundamental points: 1. To use Artificial Intelligence - the evidence-based method with the greatest potential for improving animal health - to

[6] https://www.fao.org/3/cb6098en/cb6098en.pdf
[7] Digital Excellence in Agriculture in Europe and Central Asia. Good practices in the field of digital griculture, p. 61.

track individual pigs' behavior and correlate it with health status. We use behavior-recognition technology to identify potentially problematic animal behavior and alert farmers, who then intervene appropriately. We use ordinary security-camera video streams, with noninvasive or expensive hardware required. Our livestock management tool provides a 24/7 live stream of animals' health status. Based on the latest deep-learning technology for multi-object detection and tracking, Feedmaster's proprietary AI algorithm detects behavioral pattern anomalies in drinking, eating, movement, and aggression levels. The algorithm associates the anomalies with diseases or other problems, warns the operator, and suggests solutions. 2. To combine the data with a series of feeding trials that will verify the impact of nutrition and drug interventions on pig health - with the goal of reducing antibiotic use[8].

4. For the purpose of digitizing the irrigation system, the German GS mobile app - good practice for sustainable irrigation scheduling can be guaranteed. The app 'GS mobile' transfers the irrigation method "Geisenheim Irrigation Scheduling" (GS) into a practical decision support system for efficient, sustainable irrigation in open field vegetable production. This supports vegetable growers in making efficient and sustainable irrigation decisions in a simple and objective way. It is based on an online, server- and GPS-supported application. Special emphasis is placed on the usability and thus the applicability of this approach. This was achieved through intensive cooperation and feedback within the consortium of science, practice, consulting and programmers. The integration of farm-specific requirements represents an innovation in the field of DSS for irrigation in vegetable production, which can significantly contribute to a higher acceptance and implementation.

The smartphone-supported application of GS for vegetable crops makes it possible to monitor the current water status of the crops from any device connected to the internet and to receive timely irrigation recommendations. In doing so, the decision support goes beyond previously known formats such as a so-called "traffic light system". In addition to a clear, simple and distinct recommendation through modeling, individual decisions based on practitioners' own expertise also find influence in the algorithm. This makes the specific requirements of DSS for irrigation in practice visible and tangible, which in turn potentiates their use in vegetable production and thus supports sustainable management for the future. Many intensive vegetable production systems in Europe do not meet the requirements of the EU Nitrate Directive or of the EU Water Framework for good ecological water status. The application of 'GS mobile' will appreciably assist in the implementation of these regulations, which requires that many vegetable growers must adopt management practices that improve water use efficiency[9].

We have mentioned several examples of digitalization of various sectors of agricultural production. However, the progress of high technologies is very fast, and digitalization is increasingly putting forward new solutions. Therefore, these issues should become the object of state support and, especially with the help of venture funds, contribute to the introduction of digital technologies.

[8] Digital Excellence in Agriculture in Europe and Central Asia. Good practices in the field of digital griculture, p. 84.
[9] Digital Excellence in Agriculture in Europe and Central Asia. Good practices in the field of digital griculture, p. 95.

REFERENCES

1. Digital Excellence in Agriculture in Europe and Central Asia, Good Practices in the Field of Digital Agriculture Stocktaking Report; FAO, 2021.
2. ITU and FAO. 2020. Status of Digital Agriculture in 18 Countries of Europe and Central Asia. Geneva, Switzerland.
3. Realizing Armenia's High-Tech Potential; January 2020, World Bank Group.
4. National Pathway, for Food Systems Transformation in Support of the 2030 Agenda; the Republic Of Armenia
5. https://e-cis.info/news/566/103332/
6. https://www.forbes.com/sites/forbestech-council/2022/04/26/10-digital-technologies-that-are-transforming-agriculture/?sh=39bf74a87baf
7. https://www.arlis.am/documentview.aspx?docID=19957
8. https://eabr.org/upload/iblock/551/EABR_Digital_Potential_06_2019.pdf
9. https://www.fao.org/3/cb6098en/cb6098en.pdf
10. https://www.arlis.am/documentview.aspx?docID=149957

Սամվել ԱՎԵՏԻՍՅԱՆ
«Ամբերդ» հետազոտական կենտրոնի ավագ փորձագետ, ՀՊՏՀ տնտեսագիտության դոկտոր, պրոֆեսոր

ԱԳՐԱՐԱՅԻՆ ՔԱՂԱՔԱԿԱՆՈՒԹՅՈՒՆ

ՀԱՅԱՍՏԱՆԻ ԱԳՐԱՐԱՅԻՆ ՈԼՈՐՏԻ ԹՎԱՅՆԱՑՈՒՄԸ ՈՐՊԵՍ ՏԵԽՆԻԿԱԿԱՆ ԱՌԱՋԸՆԹԱՑԻ ԱՐԱԳԸՆԹԱՑ ՃԱՆԱՊԱՐՀ

Ընդամենը երկու տասնամյակ առաջ դժվար էր պատկերացնել, որ արհեստական բանականությունը կարող է կառավարել ոչ միայն տեխնիկական գործընթացները, այլև բուսական ու կենդանական օրգանիզմների աճն ու զարգացումը: Ընդամենը երկու տասնամյակ առաջ կովերի կերակրումը, խնամքը և կիթը կառավարող սենսորային համակարգը կամ ջերմատնային տնտեսությունների միկրոկլիման ավտոմատ կերպով կարգավորող սարքավորումներն ընկալվում էին որպես գյուղատնտեսության մեջ տեխնիկական առաջընթացի վերջին խոսք: Սակայն, ներկայում դրանք արտադրության թվայնացմանը միտված սովորական նորամուծություններ են, քանի որ նոր թվային տեխնոլոգիաները, առանց մարդու անմիջական միջամտության, կառավարում են դաշտում աշխատող տրակտորներն ու կոմբայնները, գնահատում սննդարար տարրերի ու ջրի նկատմամբ բույսերի պահանջը և ավտոմատ կերպով իրականացնում ոռոգման ու պարարտացման գործողություններ: Ավելին, արհեստական բանականությունը հետևում է կենդանիների առողջությանը, բույսերի հիվանդություններին ու վնասատուներին և անհրաժեշտ միջոցներ ձեռնարկում այդ ուղղությամբ:

Հոդվածում լուսաբանվում է գյուղատնտեսության ոլորտի թվայնացման ներկա վիճակը, շեշտադրվում են Հայաստանում դրա զարգացման հիմնական ուղղությունները և պետական ու մասնավոր հատվածի համագործակցության կարևորությունը:

Հիմնաբառեր. *թվայնացում, տեխնիկական առաջընթաց, խնայողություն, բարձր արտադրողականություն, խելացի գյուղատնտեսություն, արդյունավետություն*

Самвел АВЕТИСЯН
Старший эксперт исследовательского центра «Амберд», АГЭУ,
доктор экономических наук, профессор

АГРАРНАЯ ПОЛИТИКА

ЦИФРОВИЗАЦИЯ АГРАРНОГО СЕКТОРА АРМЕНИИ КАК БЫСТРЫЙ ПУТЬ ТЕХНИЧЕСКОГО ПРОГРЕССА

Всего два десятилетия назад трудно было представить, что искусственный интеллект может управлять не только техническими процессами, но и ростом и развитием растительных и животных организмов. Всего два десятилетия назад сенсорная система, контролирующая кормление, уход и доение коров, или аппаратура автоматического регулирования микроклимата тепличных хозяйств воспринималась как последнее слово технического прогресса в сельском хозяйстве. Однако сейчас они воспринимаются как общие инновации в цифровизации производства, поскольку новые цифровые технологии управляют тракторами и комбайнами в поле без непосредственного вмешательства человека, оценивают потребности растений в питательных веществах и воде, автоматически осуществляют операции полива и внесения удобрений. Более того, искусственный интеллект следит за здоровьем животных, болезнями растений и вредителями и принимает необходимые меры.

В данной статье освещается современное состояние цифровизации в сфере сельского хозяйства, подчеркиваются основные направления его развития в Армении и важность сотрудничества государственного и частного секторов.

Ключевые слова: *цифровизация, технический прогресс, экономия, высокая производительность, умное сельское хозяйство, эффективность*