



THE NEED FOR INFORMATION AND COMMUNICATION TECHNOLOGIES IN AGRICULTURE

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Received: 7 th August 2025	The article examines the use and development of information technologies (hereinafter referred to as IT) in agriculture in Uzbekistan. Agriculture is a long and complex business, requiring large financial investments.
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The introduction of new technologies and the digital transformation of farms are largely determining the efficiency and competitiveness of agribusiness around the world. Changes have already affected production, sales planning and distribution channels, and now more smart technologies are emerging that can radically change the processes that farmers are accustomed to.

For a long time, agriculture has not been an attractive business for investors due to its long production cycle, exposure to natural hazards and high crop losses during cultivation, harvesting and storage, the inability to automate biological processes, and the lack of breakthroughs in increasing productivity and innovation. The use of IT in agriculture has been largely limited to the use of computers and software for financial management and tracking commercial transactions. More recently, farmers have begun to use digital technologies to track crops, livestock and various elements of the agricultural process.

As technologies developed and technology companies turned their attention to agriculture, together with their partners, they began to focus on

agriculture using smart devices (devices and sensors that measure the parameters of communication between soil, plants, microflora, as well as communication channels between them, etc.) that transmit and process the current parameters of each object and its environment, and external partners. Thanks to the integration of objects into a single network, data exchange and management based on the Internet of Things, increased computer efficiency, the development of software and cloud platforms, it became possible to automate the maximum number of agricultural processes and plan emergency measures to prevent emergencies by creating a virtual (digital) model of the entire production cycle and interconnected links of the value chain. calculate the recorded threat, calculate the possible yield, production costs and profit.

The world population is growing (see Figure 1). In 30 years, humanity will need 1.7 times more food than it currently produces. To achieve this, agriculture will need to be seriously modernized; • According to UN forecasts, the world population will reach 9.8 billion by 2050; to feed it, food production will need to increase by 70%;

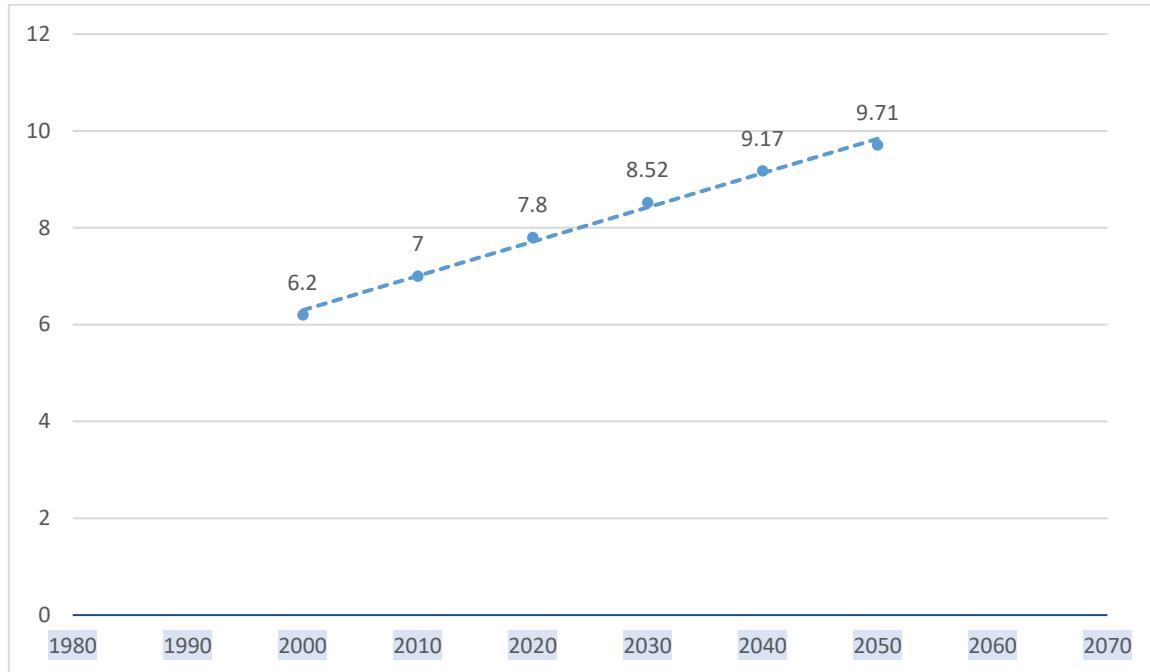


Figure 1. Dynamics of growth of the Earth's population (billion people)

The world's population is rapidly shrinking the amount of land available for agriculture. The Food and Agriculture Organization of the United Nations (FAO) estimates that by 2050, farmers will need to produce one and a half times more food to feed the world's population.

IoT technologies can help in this important task, which will change and optimize agriculture in many ways. The agricultural market is traditionally exposed to external risks, which are very difficult to influence and almost impossible to predict: there may be drought in the summer or, conversely, excessive moisture, frost can destroy most of the crop; if cattle do not have sufficient quality nutrition, the negative impact will be noticeable in the cheese and milk segment.

Daily challenges make farmers restless and unable to effectively plan for yields and future sales. How IoT can help:

- Collecting big data using smart sensors. They collect information about weather conditions, soil quality, crop growth, and livestock health. This data helps monitor production processes and the overall health of the business. It also allows you to assess the effectiveness of specific aspects: how well employees are working, whether equipment is malfunctioning, etc.
- Analysis and forecast of the harvested or manufactured product, which allows to calculate the volume of the product in advance and plan its optimal distribution.
- Monitoring deviations in the health of

livestock at any stage of plant growth or livestock allows farmers to reduce financial risks arising from the loss of the crop or finished product. In addition, controlling the reduction of waste and poor-quality goods should lead to a reduction in financial costs.

• Automation of processes in the production cycle: irrigation, fertilization, growth assessment, maturity, compliance with standards. All this serves to support high standards of quality and crop growth.

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