Preamble

The concept of the digital economy was formed in the last decade of the last century. For the first time, the fundamental principles of the digital economy were formulated by Nicholas Negroponte, a computer scientist, founder of the media laboratory (MediaLabs) at the Massachusetts Institute of Technology (MIT) [1]. Back in 1995, he spoke about the disadvantages of classic goods (weight, raw materials, and transport) and the advantages of the new economy (no weight of goods, virtuality, almost unnecessary raw materials, and instant global movement). The document [2] defines the digital economy as an activity in which the key factors of production are data presented in digital form, their processing and use in large volumes, including their formation. This allows, in comparison with traditional forms of management, to significantly increase the efficiency, quality and productivity in various types of production during storage, sale, delivery and consumption of goods and services.

Agriculture is on the verge of a Second Green Revolution. Experts believe that thanks to IoT-based precision farming technologies, there could be a surge in yields on a scale that humanity has not seen even in the days of the advent of tractors, the invention of herbicides and genetically modified seeds. Technologies have evolved, become cheaper and advanced to such a level that, for the first time in the history of the industry, it has become possible to obtain data on every agricultural facility and its surroundings, to calculate mathematically accurately the algorithm of actions and predict the result. Digitalization and automation of the maximum number of agricultural processes is included as a recognized need in the development strategy of the largest agro-industrial companies in the world. The task of Informatization and digitalization of agriculture is the maximum automation of all stages of the production cycle to reduce losses, increase land productivity, and optimize resource management. But even in this case, the result applies only to plants ready for harvest or animals, but does not guarantee profit, since the crop still needs to be harvested, stored, primary pro-

cessed and transported to the consumer. Further automation represents a higher level of digital integration, which affects the most complex organizational changes in business, but their implementation can dramatically affect the profit and competitiveness of products and the company as a whole. The integration of the resulting data with a variety of intelligent IT applications processing it in real time is revolutionizing decision-making for the farmer by providing multi-factor analysis and rationale for his subsequent actions. At the same time, the more sensors, sensors and field controllers are connected to a single network and exchange data, the more intelligent the information system becomes and the more useful information it can provide to the user.

On the basis of scientific calculations, an intelligent information system is able to create recommendations for the processing and care of plants or instructions for automatic execution by robotic equipment. For the first time in the history of agriculture, a farmer has the opportunity to control natural factors, design accurate business processes, and, in addition, predict the result with mathematical precision. The relevance of digitalization and intellectualization of the economy and agriculture does not raise any doubts, which is accompanied by a noticeable increase in investments in this problem, including state ones. This poses serious challenges for agrarian science, which is simply obliged to indicate the right directions for these investments in specific programs and projects. These areas should provide a breakthrough in the field of Informatization, automation and actualization of the agricultural sector, providing a multiple increase in its efficiency and global competitiveness.

Intellectualization is transforming agriculture into a very data-intensive sector. Information comes from various devices located in the field, on the farm, from sensors, agricultural machinery, weather stations, drones, satellites, external systems, partner platforms, suppliers. General data from various participants in the production chain, collected in one place, allows you to receive information of a new quality, find patterns, create added value for all participants involved, apply modern scientific processing methods (data science) and, on their basis, make the right decisions that minimize risks, improving manufacturers business

and customer experience. The intensive introduction of digitalization and the Internet of Things in agriculture promises to turn it into a modern high-tech business. The Internet of Things in Agriculture (IoTAg) market is one of the vertical segments of (Industrial Internet of Things). As the market develops, more and more devices, mechanisms, technology and information systems will be «connected» and have all the attributes of the Internet of Things. Therefore, when assessing the market, one should consider equipment, solutions, applications connected into a single network along the entire value chain, including the end user.

Currently, experts have come to the usual conclusion in the field of digitalization that the introduction of technologies is only a tool, and the key development factor is good management and human resources. In this sense, an important area of work is the software of agronomists and the search for specialists capable of applying IT technologies in agriculture. This is the most difficult task in solving the problem of agricultural technology management. At the same time, modern cloud technologies can reduce the costs of a commodity manufacturer for the purchase of powerful computer equipment by almost ten times. In addition to storing data, this way you can use the software, renting it for several hours, instead of spending a lot of money on purchasing and constant updating.

The purpose of this book is to present new results in the development of the theory of agricultural technology management and the scientific and methodological basis for its implementation in precision farming systems. At the same time, such a basis is the intellectualization of management functions through the transition to expert control systems operating in modern cloud information systems.

References

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