Chapter 14
Videocapsule Management of Agro-Technological Processes

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ABSTRACT

The chapter reveals new opportunities for the use of digital video surveillance in the agro-industrial sector. It presents a methodological approach and practical guidelines for modeling and managing changes in agrotechnology, in the conditions of digital transformation of large amounts of data. The proposed technical solutions are aimed at creating better products and gaining competitive advantages, thanks to the improved relationship of specialists and the transition to predictive data analysis. Video surveillance as the most accessible way to obtain information involves the creation of large amounts of data, their long-term storage, fast retrieval, and diverse analysis. The possibilities of video surveillance systems widely used to ensure the safety of industrial buildings and the protection of areas equipped with automatic video analytics modules and integrated computer programs are considered. The organization of managing geographically-distributed agricultural production using mobile and remote video surveillance systems is shown. By using the proposed project of integrating digital video surveillance into a big data system, the organization can be transformed to improve strategy, make system decisions, improve marketing and sales results, improve efficiency and productivity of business processes, improve the performance of production personnel, minimize unprofitable risks, and maximize management efficiency, which will lead to the emergence of new opportunities.

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INTRODUCTION

Digital economy, as the basis of a new stage of technical and technological development of modern civilization, has a significant impact on all areas of human activity, including agricultural production. To successfully and effectively solve the problems of "digitalization", it is not enough to introduce any one information and control technology(Robert D. Fiete, 2012). In agricultural production, such tasks include the creation and implementation of accurate agricultural production technologies. Modern ideas concerning the implementation of agricultural technologies consider production systems a synthesis of natural and man-made systems –agrocenoses(Krausp,1980 & Kudrin, 2006). They include technical devices for providing and supporting agrotechnological processes (technocenoses) and natural structures (biocenoses), including living biological structures capable of self-development and self-regulation (plants, animals). The functioning of agrocenoses unites a large number of technological and biophysiological processes, distributed in time and space. Only an integrated system-oriented approach with a consistent and simultaneous use of several key information and communication technologies gives the expected effect (Norman S. Kopeika, 1998). This approach consistently and adaptively, in a cost-effective way, links the reality of agriculture (land, infrastructure, settlements and agricultural production) with their objectively measured digital representation. One of the most important components of digital control systems in agricultural production are vision systems and video surveillance for agrotechnological processes.

The purpose of the chapter is the development of a system-structured approach and the definition of practical guidelines for the design of modern information and control video surveillance systems in agricultural production, agrotechnical and agricultural enterprises based on video-digital integration, and transformation of large amounts of video data.

TECHNICAL AND TECHNOLOGICAL FEATURES OF DEVELOPMENT

Closed Circuit Video Surveillance in Agricultural Production

The approach developed in the article is aimed at creating better products and gaining competitive advantages by improving the relationship of agricultural production specialists and switching to operational analysis of video data that accurately and informatively reflects changes in agrotechnological processes.

In an effort to provide the most comfortable work for their users, manufacturers of various "smart" devices and developers of "digital" programs ensure their work in conjunction with each other. It can be traced even in everyday life: for example, through the Internet a modern mobile phone easily communicates with users on social networks and creates contacts and photos in an e-book. When building an agribusiness management system, combining different video surveillance tools into a single environment will help to multiply the efficiency and usability.

Technological processes in agriculture have significant differences from industry, they are associated with biological objects. These objects have the ability to self-organization and self-development. The most difficult problem is getting information about the behavior of biological objects and interpreting it through technical information and analytical tools for human understanding and decision making. The use of video surveillance, technical, machine and computer vision in the management of agrotechnological processes can be an effective way to improve agricultural production.