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ABSTRACT

The objective of the research is the development and implementation of methodological, methodical and technological aspects of creating an information system by farms of the Republic of Uzbekistan. The subject of the research is the process of introducing modern information and communication technologies into agriculture. To achieve this goal, the work pursues the solution of the following tasks: study and scientific substantiation of theoretical and methodological approaches to improving the farm management system; study, analysis and systematization of the accumulated experience and publications on the creation of information systems in the farm management system; creation, pilot testing and implementation of a farm management information system: development of scientific and practical recommendations for the creation and implementation of a farm management information system based on scientific findings, innovative ideas, analysis of experimental results; development of universal databases and programs for automated calculation of farm tax reports; development of model solutions for farm management, sample business plans for the use of free funds in the accounts and sample forms of aggregated statistical data on farms in the region.

Keywords: Information technologies, information system, automated control system, database, knowledge base.

1. INTRODUCTION

After the Republic of Uzbekistan gained independence, the adoption of a number of laws and national programs in our society became an independent basis for building a democratic society and moving towards a great future. In our country, as in all other areas, much attention is paid to the effective use of information technology in the agricultural sector. The creation and implementation of an information system (IS) for farm management is one of the main tasks of today. It is difficult to imagine an organization that does not have an automated management system at the moment when Uzbekistan is moving to e-government.

As stated in [1], the IS farm management system has the following features:

- Each farm will have a separate personal account with an automated control system;

- Through a personal account, each farmer can manage their own funds, view business plans based on the amount of free funds, view the latest alerts (taxes, social spending, etc.) and receive rough money management plans;

- Systematized databases for farm members, agricultural specialists (science-based suggestions for growing melons, vegetables and crops - this process takes into account crop conditions, soil moisture, energy, costs, expert opinions on what can be planted in cultivated land, scientific publications, books, business plans) will help to obtain the necessary information;

- Provided wide access to information services;

- Installed farm management software;

- Technological instructions for the provision of information services to farms have been developed and implemented.

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2. MATERIALS AND METHODS

Research methods: analytical reviews, comparative analysis, experimental testing.

Level of implementation of research results:

On the topic of the research, the accumulated experience and publications in the field of information management in the farm management system both in our country and abroad were studied and analyzed.

The first electronic information system "Farms of the Republic of Uzbekistan" was created.

The developed information system is being implemented in a number of farms in the Tashkent region, in the near future it is planned to introduce it in all other regions of the Republic of Uzbekistan.

Scope of scientific research: farms and dekhkan farms, district khokimiyats, agricultural specialists.

3. RESULTS

The work [1] provides a detailed description of the automated farm management system of the Republic of Uzbekistan, which is the core of the information system "Farms of the Republic of Uzbekistan". This IS also includes databases (DB): “Types of agricultural products grown in Uzbekistan”, “Location of farms”, “Types of products grown by a separate farm”, “Farm collective”, as well as other databases. The definition of IS concepts, "automated control system" (ACS) in the tasks of automating research in agriculture is given in [2], according to which information system is information technology and competent data processing personnel who know methods and technical means. Processing data of a specific subject area with the issuance of a result is the purpose of any information system. The result of data processing is sent to the control object. Since a computer makes it possible to automate data processing, speaking of IS we will always mean an automated IS (AIS).

Information system - a set of information available in databases and technical means, information technologies that ensure its processing. You can also give the following definition: IS is a complex of computing and communication equipment, software, linguistic tools and information resources, system personnel that supports a dynamic information model (IM) of a certain part of the surrounding world to satisfy the informational interest of users.

IM is a model of an object in the form of information. As a rule, a full-fledged IM is a complex development that can have many structures. These structures can be divided into three main types:

- Descriptive. These include models created in natural languages, having an arbitrary structure and satisfying the person who makes them.

- Formal. These include models created in formal languages (professional, scientific or specialized). For example, all kinds of formulas, tables, maps, graphs, diagrams and other similar structural formations.

- Chromatic. These include models created using the natural language of the semantics of color concepts and their ontological predicates, which are understood as the possibility of recognizing the meanings of color meanings and canons. As an example of chromatic models, one can cite those that were built using the appropriate methodology and theoretical framework.

An information model can be represented as a diagram that describes the essence of a certain object and all the procedures necessary for its study.

The developed information system is aimed at managing a farm or dekhkan farm by analyzing the input data that characterize all the "life" processes that occur during the operation of the farm. Thus, the information system must collect information, catalog it, have an intuitive interface so that the user can build a model of the farm activity [3-6]. Such a model should be "flexible" and respond to the slightest changes in external or internal factors that affect the processes of the economy. Based on the foregoing, the system being designed will be a tool that models the behavior of a farm based on the resources that it has and what tasks the farm faces. It should be noted that all behavior models will be tied to time frames both in terms of execution time and calendar date.

As mentioned above, the main task of the designed IS is to enable the operator to model the activities of the economy, that is, to make certain decisions regarding one or another step in the work of the organization.

The selection of an activity decision is a complex technological process that can be defined as the choice of a set of actions or inaction to meet the information needs of management. Conceptually, classical, behavioral and fuzzy decision-making models are used to describe this process. Under each of these models, the operator, or farm manager, does not directly compare farm behavior alternatives: he selects them using factors such as the end effect or desired level of development. The outcome corresponding to each alternative is the result of a complex interweaving of all the variables that describe the external conditions with all the variables that characterize the desired outcome.

For the designed information management system, we accept a mathematical system, for which the following interrelated elements are characteristic, namely, a data structure model, a functional element model, and a model for delimiting access rights for system users. Let us describe the main features of each of them in more detail.

The data structure model provides access to all information characterizing the areas of activity of the farm, reflects the relationship of information objects to each other, as well as interfaces for displaying and providing information, methods for processing them for analysis.

The model of a functional element is the main tool that forms, based on the entire structure of the input data, behavior models or system states and ways to transition between them with reference to time indicators.

The model of restricting user access rights ensures the security of the information system, and also provides access control to information objects, based on the elements of the first two models.

The data processed in the IS belongs to critical information, and also contains a share of information related to personal data. Accordingly, one of the most important functions of information system is to ensure the security of processed information. An analysis of the structure of information protection systems from unauthorized access showed that the access control system is fundamental for the implementation of information protection, since the protection mechanisms of this particular group are designed to counteract the resources of the information and analytical system.

As a system of access control in IS, it is proposed to use a functional-role model based on the following concepts: user, role, view, section. This model is designed specifically for access control in systems with a complex organizational structure, a large number of users and the presence of a large number of heterogeneous access objects. The concept of "representation" used in the functional role model is similar to the representation in the data model. The fact is that for the operation of the entire system as a whole, it is necessary to coordinate constantly changing data, however, the collection of information about the operation of the farm in all its departments is carried out directly by the heads of these departments, thus, it is necessary to ensure constant monitoring of the integrity of the input data and ensure the safe functionality of the system in general.

Next, we present a block diagram on which we display the entire functionality of the information system with an illustration and description of all elements (figure 1).

4. DISCUSSION

The proposed IS has been implemented in more than 200 farms in Uzbekistan. To analyze the data obtained as a result of collecting information about farms, the methods for reducing the dimension of the original feature space [7-14], as well as the methods for converting feature types proposed in [15], were used.

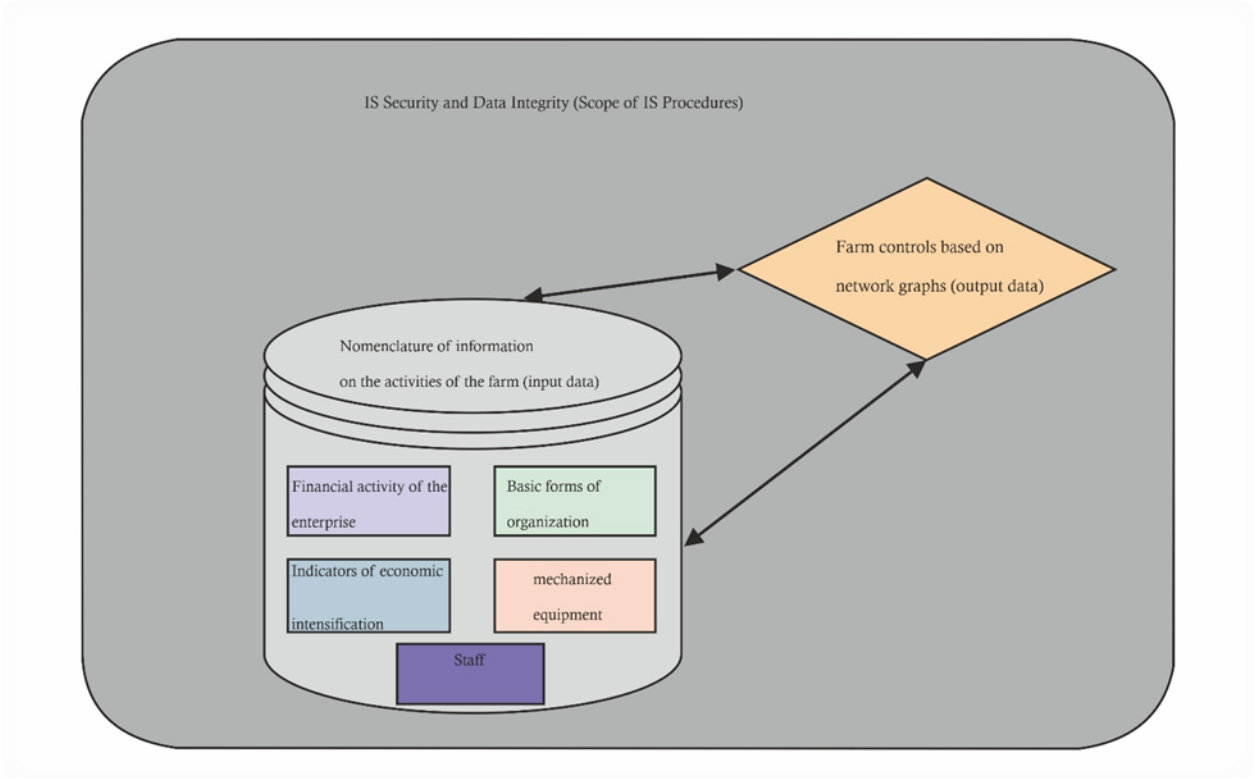

Figure 1. Functional diagram of the farm management information system.

5. CONCLUSION

The role and tasks of information systems at agricultural enterprises, as well as the prospects for the use of information technologies in rural areas, are determined. The IS "Farms of the Republic of Uzbekistan" was created. The developed IS has been implemented in a number of farms of the Republic of Uzbekistan.

REFERENCES

[1] Narzullaev, D.Z., Shadmanov, K.K., Baidullaev, A.S., Rajabov, E.E. and Tursunov, A.T., Automated farm management system in Uzbekistan, IOP Conf. Series: Earth and Environmental Science, 723, 032036 (2021).
[2] Narzullaev, D.Z., Sultonmurodov, D., Usmonov, A. and Ahraykulov, A., Definition of the terms “information system”, “information model”, “automated management system” in the tasks of automation of farming of Uzbekistan, Advanced innovative developments. Prospects and experience of use, problems of implementation in production. Papers, 10(52), 155-160 (2019).
[3] Celicourt Paul, Jose Gumiere Silvio, Lafond Jonathan A., Gumiere Thiago, Gallichand Jacques L. and Rousseau Alain N., Automated Mapping of Water Table for Cranberry Subirrigation Management: Comparison of Three Spatial Interpolation Methods, Water, 12, 3322 (2020).
[4] Alameer Ali, Kyriazakis Ilias and Bacardi Jaume, Automated recognition of postures and drinking behavior for the detection of compromised health in pigs, Scientific Reports, 10, 13655 (2020).
[5] Simanca H., Paez J.A., Mendez J.C., Díaz E.C., Palacio J.V., Design of a crop irrigation system controlled by the IoT application, Journal of Engineering and Applied Sciences, 15(19), 2161-2167 (2020).
[6] Masía F.M., Lyons N.A., Piccardi M., Balzarini M., Hovey R C and Garcia S.C., Modeling variability of the lactation curves of cows in automated milking systems, Journal of Dairy Science Papers, 103(9), 8189-8196.

[7] Fazilov, S., Mamatov, N., Samijonov, A., Abdullaev, S., Reducing the dimensionality of feature space in pattern recognition tasks, Journal of Physics: Conference Series, 1441(1), 012139 (2020).
[8] Fazilov, S.K., Mirzaev, N.M., Radjabov, S.S., Mirzaeva, G.R., Determination of representative features when building an extreme recognition algorithm, Journal of Physics: Conference Series, 1260(10), 102003 (2019).
[9] Shavkat, F., Narzillo, M., Nilufar, N., Developing methods and algorithms for forming of informative features' space on the base K-types uniform criteria, International Journal of Recent Technology and Engineering, 8(2), 11, 3784–3786 (2019).
[10] Shavkat, F., Narzillo, M., Abdurashid, S., Selection of significant features of objects in the classification data processing, International Journal of Recent Technology and Engineering, 8(2), 11, 3790–3794 (2019).
[11] Nishanov, A.H., Akbaraliev, B.B., Tajibaev, S.K., About One Feature Selection Algorithm in Pattern Recognition, Advances in Intelligent Systems and Computing, 1323, 103–112 (2021).
[12] Atoev, S., Nishanov, A., Abdirazakov, F., Object Tracking Method Based on Kalman Filter and Camshift Algorithm for UAV Applications, International Conference on Information Science and Communications Technologies: Applications, Trends and Opportunities (2021).
[13] Nishanov, A.K., Akbaraliev, B.B., Samandarov, B.S, Akhmedov, O.K, Tajibaev, S.K., An algorithm for classification, localization and selection of informative features in the space of politypic data, Webology, 17(1), 341–364 (2020).
[14] Nishanov, A.K., Akbaraliev, B.B., Djurayev, G.P., A symptom selection Algorithm based on classification errors, International Conference on Information Science and Communications Technologies, 9351481 (2020).
[15] Narzullaev D.Z., Abdurakhmanov B.A., Baydullaev A.S., Ilyasov S.T., Shadmanov K.K., Transformation of types of signs for a task of the regression analysis, IOP Conference Series: Materials Science and Engineering, 862(5), 052065 (2020).