Formation of electronic information management environment as a factor in the development of animal husbandry in the Volgograd region

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Abstract. The article substantiates the need for targeted state support of digitalization of agricultural enterprises of the Volgograd region for the development of digital infrastructure. A model of electronic information management environment of an agricultural enterprise of dairy cattle breeding as a set of applied software systems and complexes designed to process legal, regulatory and reference, commercial, accounting and analytical, planning information in accordance with the principles of forming a single interactive database of managerial decision-making in terms of information security was developed. A link between the applied software systems, smart livestock complexes and the process of managerial decision-making in the electronic information environment of agricultural enterprise management is the information of management accounting and analysis. Special importance in the electronic information environment of agricultural enterprise management is given to corporate communications, providing discussion of proposed solutions, communication control of decision implementation, organization of communication with counterparties (customers, suppliers), potential partners, creditors, investors and government agencies.

1. Introduction

Digital transformation today affects all sectors of the economy. In this context, digitalization is seen as a tool for socio-economic development of the economy, allowing to achieve an increase in the efficiency and competitiveness of the economy, a consistent improvement in the quality of reproduction of economic goods.

Studies of the problems of digitalization of the agricultural sector are mainly devoted to the digital transformation of state information resources and services for interaction between state authorities and agricultural enterprises on the implementation of state support measures, as well as the digitalization of the main technological processes of agricultural enterprises: precision farming, smart agriculture, robotization of production [1-7]. However, the studies do not provide enough specific recommendations for modeling the electronic information environment of agricultural enterprise management as an object of comprehensive digitalization. We hereby believe that a necessary condition for reducing the gap between scientific knowledge and the practical implementation of digital technology should be a

methodological basis of applied software solutions and services, which is industry-specific and takes into account the specifics of technological progress and innovation [3].

2. Materials and methods

The information base of the research is the data of Rosstat [8], Committee of agriculture of Volgograd region [9], an independent source of information about Russian organizations List-Org [10].

The results of the study are based on the methods of scientific research (observation, comparison, description, analysis, abstraction, generalization, systematization, modeling), statistical research (statistical observation, summary and grouping of statistical observation materials, absolute and relative statistical values, graphic method).

To assess the dynamics of revenues from the sale of dairy cattle products in the Volgograd Oblast a statistical sample of agricultural enterprises of the Volgograd Oblast with the main activity: dairy cattle breeding, raw milk production was carried out.

3. Results

In the structure of agriculture of Volgograd region, as well as in the entire Southern Federal District of the Russian Federation, the livestock industry takes slightly more than 30% (figure 1). In this regard, the development of livestock in the Volgograd region is a priority of the policy of socio-economic development of the region.

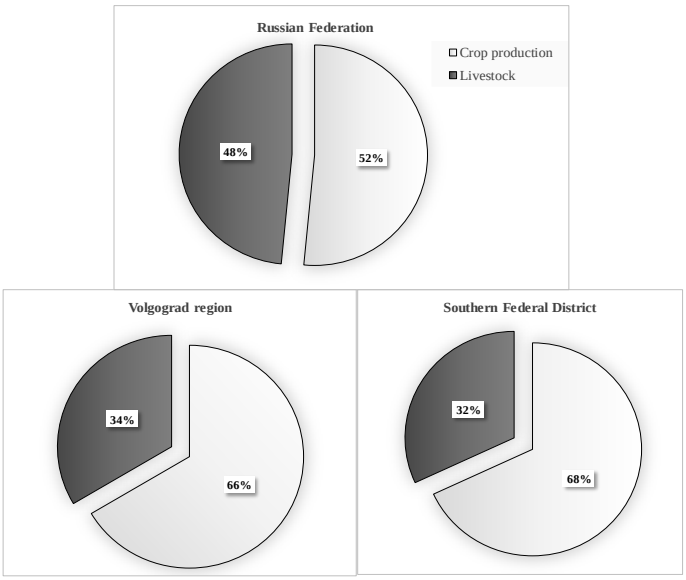

Figure 1. The structure of the agricultural industry. Source: Authoring O A Kovalenko based of the [8].

State support of agriculture of Volgograd region positively influences all branches of cattle breeding. Dairy cattle breeding in Volgograd region produces 1.8% of dairy products of all dairy production of the Russian Federation and 14.7% of the Southern Federal District (figure 2). The industry of dairy cattle breeding in the Volgograd region in the conditions of pandemic, the influence of unfavorable natural and climatic factors on agricultural production, shows sustainable development. Milk production in the Volgograd Oblast in 2020 for the first time in 20 years exceeded the value of 2000.

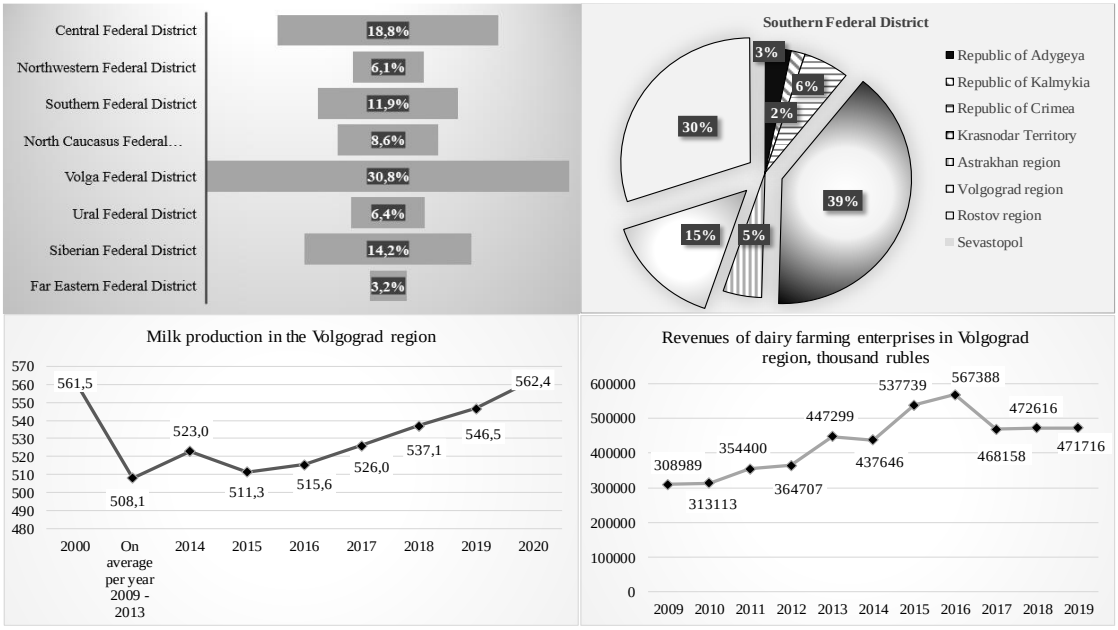

Figure 2. Milk production in the Volgograd region. Source: Authoring O A Kovalenko based of the [8-10].

Despite the sustainable development of the livestock industry in the Volgograd region, the modern market requires the transformation of the production and economic system in the digital format. Digital transformation will contribute to the efficiency and sustainable development of agricultural production, the application of advanced technologies of digital infrastructure by agricultural enterprises [11-15].

Within the limits of the state support of branch of animal industries in Volgograd region such strategic reference points, as creation of the balanced forage base due to development of melioration, development of breeding cattle breeding, artificial insemination and embryotransfer to increase animal productivity, creation of objects of cattle slaughter, increase in livestock in the cattle breeding enterprises and creation of platforms on cattle fattening, introduction of highly productive tribal livestock in commodity farms of region are allocated [9]. The state support of agricultural enterprises in the Volgograd Oblast is provided for the development of the material and technical base of agricultural production, reimbursement of agricultural production costs, reimbursement of borrowed funding sources [16]. The digitalization of farms in the Volgograd Oblast as a separate direction is not highlighted among the priority directions of development of the industry and is not the subject of state support. The Ministry of Agriculture of the Russian Federation is just beginning to implement certain measures of state support with regard to digitalization. In 2021, agricultural enterprises will be able to receive preferential short-term loans, which can be used, including for the implementation of digital technologies and automation of agricultural enterprises [17]. In general, the departmental project "Digital Agriculture" of the Ministry of Agriculture of the Russian Federation envisages among its priorities the increase of the effectiveness of state support measures in terms of stimulating the digitalization of the economy of the agricultural sector, as well as the identification of the main and most promising digital technologies from the perspective of agricultural producers [18].

In the structure of costs for information and communication technologies of agricultural enterprises of Volgograd region prevail the costs of payment for telecommunication services, the purchase of machines and equipment related to digital technology, as well as their maintenance, modernization, maintenance and overhaul, performed by their own forces, the purchase of software, adaptation and improvement of software performed by own forces, development, rental, adaptation, improvement, technical support and software updates (figure 3).

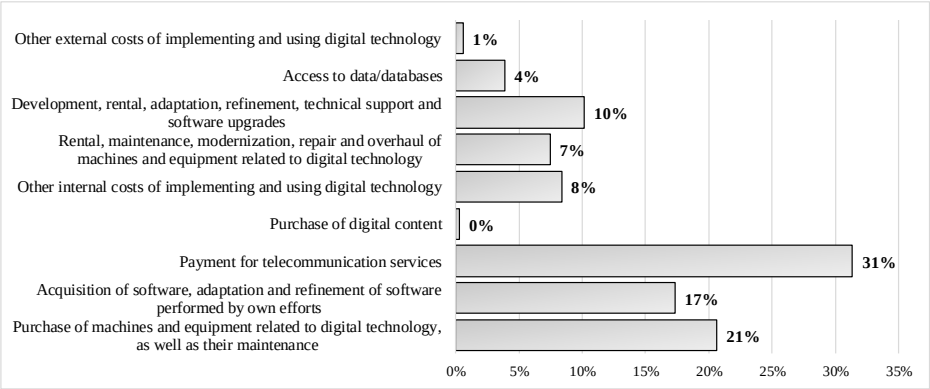

Figure 3. Structure of costs for information and communication technologies of agricultural enterprises in Volgograd region in 2019. Source: Authoring Kovalenko O A, based on the [19].

In connection with the above, within the framework of the digital transformation of the economy, we propose to introduce in the key areas of state support for agriculture of the Volgograd region state support for the reimbursement of costs for the purchase of machines and equipment related to digital technology, as well as for their maintenance, modernization, running and overhaul, performed by own efforts, software purchase, software adaptation and refinement, performed by own efforts, development, and

With the high cost of digitalization, the model of electronic information environment will be in demand for agricultural enterprises, providing operational information to all areas of production and not having a high cost. Let's consider the model of electronic information environment for the management of agricultural enterprise of dairy cattle breeding (figure 4).

The electronic information environment of agricultural enterprise management is one of the most important parts of its infrastructure, includes a set of non-digital (tools for forming information on various principles and activities) and digital information processing technologies (software tools, technologies and Internet resources) and requires certain resources for its formation and maintenance [20]. The main element of the information environment is information, and the main goal is to provide employees with the necessary information in a timely manner [21]. The functioning of the electronic information environment of agricultural enterprise management allows it to obtain legal, regulatory and reference, commercial, accounting and analytical, planning information, providing the decision-making process, including operational information about state support measures, risks of natural and climatic nature, about the productivity and condition of animals, about advanced digital technologies of smart livestock [6-7].

A prerequisite for the successful management of agricultural enterprises are effectively organized corporate communications [22, 23]. Corporate communications provide support for the management decision-making process: discussion of the proposed solutions, communication control of decision implementation, organization of communication with counterparties (customers, suppliers), potential partners, creditors, investors and government agencies [24]. Corporate communications in the electronic information environment include a whole software complex of corporate interaction are applications: messaging and organization of video conferencing; setting professional tasks and control of their implementation; monitoring of working time [25]. The result of the functioning of corporate communications is the incoming information flows, transformed, among other things, into the data of primary accounting.

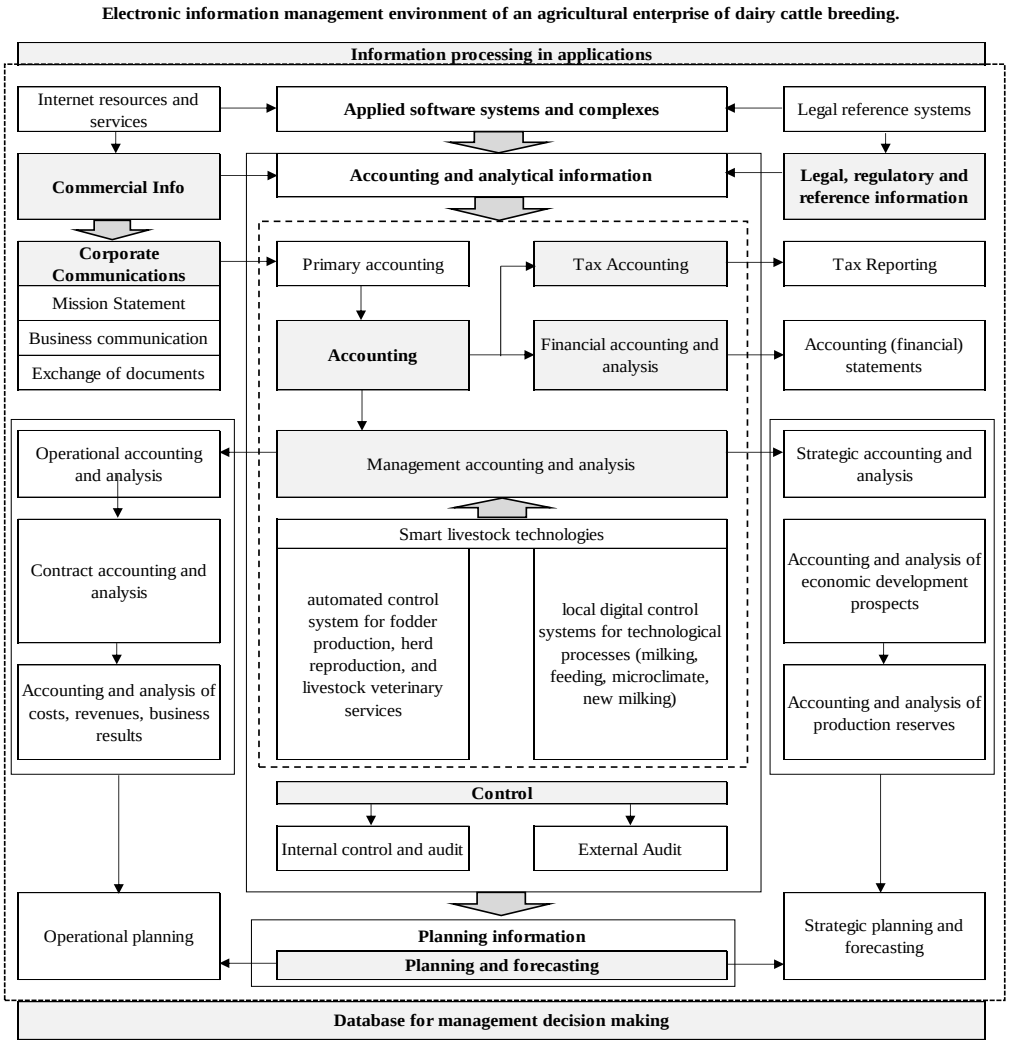

Figure 4. Model of electronic information management environment of an agricultural enterprise of dairy cattle breeding. Source: Authoring Kovalenko O A.

Legal and normative-reference information provides, on the one hand, legal protection, on the other hand - regulation of business processes of the agricultural enterprise. In addition, normative-reference information allows the agricultural enterprise to receive up-to-date information about measures of state support. Commercial information includes information about: market requirements, market conditions, competitive environment, potential capabilities of an agricultural enterprise and its competitiveness. To solve the problem of processing a large volume of economic information the system of accounting and analytical support is designed, the result of the functioning of which is a database of economic data, as well as external and internal reporting. The elements of the system of accounting and analytical support include: primary accounting, accounting and analysis, control [26, 27]. Planned information in these conditions serves as a tool for finding reserves to improve the economic sustainability and competitiveness of an agricultural enterprise [28, 29].

The block of accounting and analytical information includes information of management accounting and analysis, which is formed on the basis of smart livestock breeding technology that ensures the identification and monitoring of animals using information technology [30]. Smart livestock breeding is an automated control system for feed production, herd reproduction, animal and veterinary services,

as well as local digital control systems of technological processes (milking, feeding, microclimate, manure removal) [5, 6; 31].

The entire set of management tools designed to form various kinds of information for the purpose of making management decisions, under the conditions of digitalization, acquire new forms, means and methods of processing. Despite the variety of management tools, as a result of their functioning a single interactive database for making management decisions is formed. Due to the current situation, all management tools are inherent in a single database processing methods, the use of which allows users to get the most useful information in different variants and scenarios of decision-making paths. The advantages of a unified method of processing databases in the conditions of digitalization are: processing the entire array of information at once; the use of the original information, the search for relationships throughout the information flow to achieve the results, instant analytical processing of information flows with a graphical representation of the results. When forming a database of electronic information environment of agricultural enterprise management, a number of requirements must be taken into account: convenience and ease of use; completeness and accessibility of information stored in the database; availability of systematization and classification of database information in different user requests and, in general, for making management decisions; compliance of database content with strategic objectives of the enterprise; constant updating and updating of the database [32].

The functioning of the electronic information management environment of an agricultural enterprise should be based on continuous monitoring of potential threats to information security and the establishment of their possible sources [33]. The database formed in the electronic information environment of economic security of the enterprise contains confidential economic information that requires constant protection from disclosure, leakage and unauthorized access [32; 34].

4. Conclusion

Summing up the study, we note that the digitalization of the agricultural sector is gaining quite a high rate of development, which requires, first, targeted assistance from the state, and second, the preparedness of the digital infrastructure of agricultural enterprises. The most important for the agricultural enterprise is the preparatory work for the implementation of digital technologies in all areas of its economic life through the formation of an electronic information management environment, including a system of information flows that ensure the adoption of effective management decisions.

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