Improvement of business processes of subjects of the agro-industrial complex through a digital platform

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Abstract. This article presents the results of a research. It is aimed to investigate the business processes of the key participants of the projected digital platform of the agroindustrial complex. Moreover, the authors assess the potential for their optimization during the transition to the application of a digital communication platform. The techniques of analysis and synthesis, system and process approaches, and the IDEF3 method are used. The authors have previously formed ontological and cognitive models of the agro-industrial complex. This paper verifies the research hypothesis concerning the possibility of improving individual business processes of management entities while applying the tools of a digital communication platform. In order to do this, business processes are displayed on the example of a manufacturer of agricultural products in animal husbandry. We have identified a number of business processes in the category of providing, which can be improved with the use of a digital industry platform of the agro-industrial complex.

1. Introduction

The article focuses on the development of a digital communication industry platform for the management of the agro-industrial complex of the region.

At the first stage of the study, the subject area of digital agriculture management tools was investigated. We conducted a critical review of Russian information systems used at various levels of management of agricultural economic processes [1]; the existing approaches for development evaluation of the region’s information infrastructure as well as industry [2,3] were investigated; a model was developed to predict the competitiveness of the region depending on the development level of the information infrastructure [4].

The second study stage is aimed at the formation of management models of the region's agro-industrial complex. An ontological and cognitive model have been formed. It is essential to create business processes of the objects and subjects of industry management. This should be done to evaluate the possible impact of the digital communication platform on the business processes of the participants. This paper will be limited to the study of business processes of management objects. Therefore, a research hypothesis has been generated: the digital communication platform of the agro-industrial complex is effective in improving the business processes of controlled elements.
2. Materials and methods

The data for the study was collected under the review of modern academic publications of Russian and foreign researchers in the field of management of the agro-industrial complex [5, 6] as well as the possibilities and mechanisms of application of Industry 4.0 tools [7-13]. Moreover, it was obtained within the authors' work on the development of strategies for the socio-economic development of five municipal districts of the Republic of Bashkortostan in the period from 2018 to 2019 [14, 15]

Research methods:
− analysis and synthesis. It was based on the analysis of the activities of the subjects of the industry. The main challenges were identified; the decomposition of problems provided an opportunity to identify business processes and their owners; the synthesis method admitted to combine non-industry relevant digital solutions and direct them to solve the challenges of the agroindustrial complex;
− the process approach and IDEF3 method were applied to represent the activities of industrial business entities in the agro-industrial complex as a set of business processes aimed at obtaining agricultural products or services for the industry's subject [16, 17];
− systematic approach. It was applied to describe the business processes of the digital platform participants and the follow-up evaluation of the business process redesign for individual subjects of the industry using digital tools on the key industrial indicators as a whole [18];
− statistical methods of data processing. We applied the grouping method in the analysis of the industry structure).

3. Results and discussion

The hypothesis is relying on the principles which are the basis of the digital platform of the agro-industrial complex of the region.

The principles are the following:
− the principle of developing a unified digital industrial infrastructure;
− the principle of transparency for all interested participants;
− the principle of maximum coverage of the economic entities of the region's agro-industrial complex and potentially interested individuals;
− the legitimacy principle of transactions;
− the principle of combining self-regulation and centralized management of the industry;
− the principle of a sloppy management of the industry;
− the suboptimization principle;
− the efficiency principle for all the platform participants.

The ontological model defines producers and processors of agricultural raw materials, sellers and buyers of agricultural products, as well as suppliers of resources as objects of agribusiness management. The ontological model designates them as subclasses. As appears from the management objects designation, the basis was the following: the roles of the participants in the industry markets of resources and finished products, as well as the main business processes of the participants. Meanwhile, it should be understood that the economic entities themselves (in the ontological model they are designated as instances) can combine several roles. In this regard it would be wrong to describe the business processes of subclasses. The digital platform participants are specific economic entities. Thus, in order to describe business processes, according to the authors, it is essential to adopt ontological cases performing the same type of activity, having the same form of ownership, working in the same sub-sector of agriculture or branch of the economy. Such economic entities are agricultural organizations, owner-operated (farming) enterprises, individual entrepreneurs, and personal subsidiary plots of the population. Despite the fact that the latter do not perform entrepreneurial activities, they should not be neglected from two positions. First of all, the stability and efficiency of their operation must be ensured from the development point of view of agricultural areas. Secondly, if the conditions are favorable, they can be a start for the development of entrepreneurial activities. Moreover, in the structure of economic entities of the Republic of Bashkortostan, the personal subsidiary plots account for the maximum share in terms
of quantity – 99%.

There are four types of business processes in the activity of an agricultural enterprise: core, auxiliary, supporting and business processes of development [19-21].

The main (production) processes in animal husbandry are considered:
− in cattle breeding: fattening, milking, ensuring reproduction of livestock, slaughter and dehiding;
− in sheep breeding: fattening, shearing of wool, ensuring reproduction of livestock, slaughter, and dehiding;
− in goat breeding: fattening, milking; ensuring reproduction of livestock, and slaughter;
− in pig breeding: fattening, ensuring reproduction of livestock and slaughter;
− in rabbit breeding: fattening, plucking, ensuring reproduction of livestock, slaughter, and dehiding;
− in poultry breeding: fattening, plucking feathers, producing and collecting eggs; ensuring the reproduction of livestock, and slaughter.

There are main business processes in other types of animal husbandry, such as horse breeding, fish farming, beekeeping and others.

Auxiliary (servicing) business processes in animal husbandry:
− zootechnical and veterinary services;
− cost and maintenance of technological equipment and premises;
− cost and maintenance of transport:
− storage of raw materials, fodder, and finished products.

Business process providers:
− purchases: purchase of fodder, purchase / rental of transport, purchase / rental of technological equipment, purchase / rental of premises, purchase of breeders, land tenancy of allotments and pastures, other purchases;
− recruitment;
− financial support: credits, subsidies, equipment leasing;
− sale of finished products, raw materials, property;
− waste disposal;
− quality management.

Business development processes (business projects):
− upgrading of technological lines, equipment, buildings, premises, storage facilities;
− introduction of highly productive breeds;
− introduction of resource-conserving, knowledge intensive technologies;
− introduction of innovative management communication technologies, IoT.

The construction of the listed business processes in the IDEF3 notes provided an opportunity to identify a number of features inherent in the supporting business processes. They ask for interaction with entities external to the organization and contain operations with the search and processing of information. The latter can easily be implemented in a highly specialized information system. This system will be able to connect potential counterparties to the transaction. For example, search for a specialist, an employee, special equipment, a buyer (products, raw materials, waste, property), a lender, a consultant, etc.

Additionally, the listed supporting business processes are inherent to agricultural producers and processors of agricultural raw materials of all forms of ownership and activities. There are only differences in the scale of activity. More than 625900 units are registered in the agro-industrial complex of the Republic of Bashkortostan.

The application of a digital communication platform as a digital tool in supporting business processes will contribute to reducing the cycles of the listed business processes and saving on the costs of organizing procedures. It follows from this that there will be a relative reduction in the cost of products due to the decrease in supplementary costs.

Both direct and indirect effects of working on the digital platform on the business processes of the participants are expected to be observed. The indirect one will be based on the elements of external
benchmarking applied by individual interested users of the system (comparison of their own business processes with similar business processes of other participants and the introduction of best practices). This will be promoted by the "Forum" tab. Incidentally, not only business processes will be subject to benchmarking, but also costs, services, products, and customers.

4. Conclusions
The study of the business processes of agricultural producers showed a number of similar supporting business processes. They may be redesigned through the use of a digital tool – a digital industry communication platform. By this, indirect costs in agricultural production as well as agricultural production costs will be reduced and the profitability of production will increase. The made research hypothesis has been confirmed.

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