



DIGITAL ECONOMY OF PERMSKII KRAI'S AGRO-INDUSTRY IN SOFTWARE SIMULATION ENVIRONMENT OF THE INTERACTION BETWEEN GOVERNMENT BODIES, PROFESSIONAL AND SCIENTIFIC COMMUNITIES

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ABSTRACT

The paper is concerned with an integrated approach to the Agro-industry informatization of the region. Implementation of design solution is based on the modernization of Agro-Industry traditional productive sectors through the digitization of management, economic, financial and logistical operations as well as applying the new approaches to analytics and forecasting for providing management decision making. Project-based approach and digital economy of Agro-Industry of Perm Krai guarantee the development of data bank of science-intensive projects in Agro-Industry that is based on the interaction between government institutions, professional and scientific communities. Much attention is given to the implementation of access mechanism to the data stores, integrated and adapted software applications of Agro-Industry, information consulting, information and communication environment provided for the participants of social and economic areas in Agro-Industry of the region.

Introduction

Digital economy programme implementation requires a systematic approach in the development of industry solutions, especially in such sectors as agriculture. Introduction of topical information solutions, use of scientific advances in the agricultural production will allow the use of an analytical approach to management and organization formation of high-tech jobs in agriculture. The proposed approach allows forming approaches the realization of industry's digitalization taking into account institutional, infrastructural, regulatory characteristics, on the basis of the developed technological and methodological approaches.

The aim of the regional Digital economy of Perm Krai's agro-industry programme is to develop a complex informatization system for asset management of agro-industry, management tasks, accounting, forecasting at the enterprises integrated into a set of specialized agro-industry management information systems, harmonization of systems, human resources training.

End-to-end information technology penetration in all economic sectors, including industry, agriculture and the agro-industrial complex as digital (intangible) assets in the form of new business models is a basis for the formation of large amounts of economically relevant sectoral and intersectoral data.

Thus, digitalization offers opportunities for new decision-making models that change the business model and the model of economic activity of the population. Potential of digitalization provides data to

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make informed calculated decisions, creates preconditions for the emergence of competitive advantages of enterprises, as well as agribusiness, both at the regional and national levels.

Primary and basic task of digitizing the economy is the formation of the necessary infrastructure for digitization, namely: providing settlements of Perm Krai with access to high-performance broadband Internet networks.

In accordance with Annex 8 to the State programme of the Russian Federation "Information society (2011-2020)" from March 31, 2017 # 380 in "Information on indicators of the State program on subjects of the Russian Federation», share of citizens using a mechanism for receiving state and municipal services in electronic form values are planned at the following level:

- Privolzhsky Federal District: 2015 year – 40% plan, 42.6% fact, 2017 – 60%, 2018-70%;
- Perm Krai: 2015 year – 40% plan, 34% fact, 2017 – 60%, 2018 – 70%.

Common access to the Internet will enable developing systems management benefits in agribusiness, using mobile and portable devices, appliances, industrial sensors, security cameras, transport and regulation mechanisms, other technologies.

Regional digital economy programme of Perm Krai's agro-industry encompasses three main areas:

Research direction is provided by Perm State Agricultural Academy, Faculty of Informatics and Economics of PSHTTU, GIS Centre of PSSRU.

Industrial direction is provided by the basic enterprise for the development of an integrated informatization system –"Agricultural enterprise Pravda" LLC; Project office "Digital integration systems; Faculty of Applied Informatics of the Perm State Agricultural Academy; "Center for space technology and services" LLC.

Educational direction is provided by the Faculty of Informatics and Economics of the Perm SHTTU; Faculty of Applied Informatics of the Perm State Agricultural Academy; Department of Cartography and Geoinformatics of PSSRU; "Perm Institute of Municipal Management and Innovation".

Each direction has its own tasks.

Tasks of the research direction:

1. Development of the information infrastructure of rural areas and the agricultural sector.
2. Research on the development model of information flows to ensure managerial decisions of agrarian enterprises, municipal areas of the region.
3. Building the model of information communications parties solutions in agro-industry.
4. DB implementation of knowledge-based projects and best practices in the field of agribusiness through the portal of hi-tech projects of agro-industry of Perm Krai.
5. Development of measurement system of informatization in the field of agro-industry:
 - norm of automatized work places in material production;
 - changing nature of work, the employment structure;
 - labour saving in agriculture.
6. Research survey of land, land quality assessment, precision agriculture for agricultural enterprises of Perm Krai.

Tasks of the production direction:

7. Regional digital space for agricultural enterprises, municipal departments of agriculture and the Government of the Perm region.
8. Research and development of unique, introduction and adaptation of model solutions for informatisation of agro-industry. Formation of prospective subjects of research of the applied nature in agro-industry.
9. Harmonization and implementation of an integrated approach to the use of information systems and services to processes advancing IT projects in the agro-industrial sector.
10. Development of integrated information solutions for agricultural enterprises, unions of agro-industry in the region, departments of agriculture municipal districts, in collaboration with other industries, trade, services, logistics in the context of regional development digital space.

Tasks of the education direction:

11. Integrated training program development and modification of educational programmes in the light of the development of the digital economy in agriculture, and in other spheres of public life.
12. Development and implementation of training and retraining of public and civil servants, heads of enterprises for the current and future projects.

13. Development and practical use of perspective directions of development of the digitalization of the economy when implementing education programmes and career guidance activities.

14. The formation of proposals for modifications in educational and professional standards for the jobs of agriculture taking into account the implementation of the Digital Agriculture Programme.

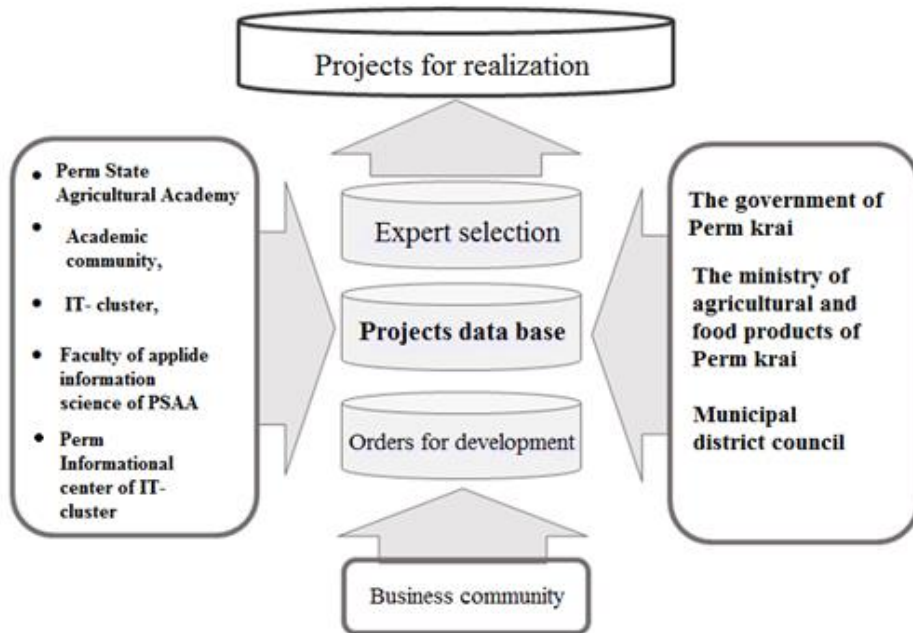
For the implementation of the programme, the interaction model of government power, entrepreneurs and the academic community is used that assumes the interaction and active cooperation of the following structures (Fig.1):

Authorities of Perm Krai: Legislative Assembly, ministries and departments (Ministry of Agriculture and Food of the Perm Krai, the Ministry of Information Technologies and Communication of the Perm Krai), municipalities.

Scientific community, IT community: Perm State Agricultural Academy, higher education institutions of Perm Krai, vocational institutions, IT-cluster, IT-companies, Project Office.

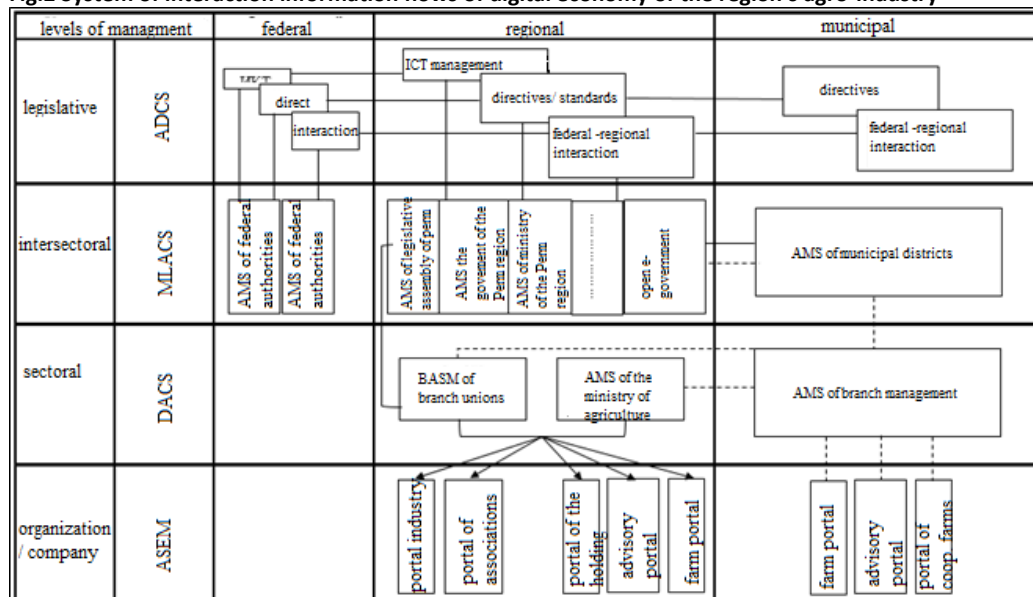
Agro-industry enterprises: livestock enterprises, crop production enterprises, agricultural production processing enterprises, feed production enterprises, farms.

Fig.1 Model of interaction of the State authorities, entrepreneurs and the academic community



Source: (Kazarinova, 2016)

Fig.2 System of interaction information flows of digital economy of the region’s agro-industry



Source: (Kazarinova, 2016)

Each structure has following tasks:

Orders for development: bodies of legislative and executive power of the State; agro-industry’s enterprises.

Storing database projects: ready-to-use solutions and research – scientific community, IT community.

Implementation of Peer selection: bodies of legislative and executive power of the State; agro-industry’s enterprises; scientific community, IT community.

Implementation of projects: scientific community IT community with the participation of the basic enterprises of agro-industry, educational playground for the digital economy.

System of interaction information flows of the Programme is built on three paths of interaction of the agro-industry’s digital economy (Fig. 2):

A system of model areas of digitalization of Perm Krai’s agro-industry was developed for each path.

First path: central regional path *центральный региональный контур* (Table 1).

Table 1 – First path of interaction

Typical topical directions of automation	Special directions
<ul style="list-style-type: none"> Planning and reporting on directions 	<ul style="list-style-type: none"> Interaction module; Portal of knowledge-intensive projects

Second path: municipal centers path solutions, information and communication technologies industry unions, municipalities, consumer cooperatives, holdings (Table 2).

Table 2 – Second path of interaction

Typical topical directions of automation	Special directions

<p>ERP-system «1C: Management of agricultural enterprise» (plant production, animal breeding); «1C: Livestock breeding»</p>	<p>Unified portals offices agricultural municipalities in the region; Precise farming (joint with Perm SSRU, Department of Cartography and Geoinformatics)</p>
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Third path: outline of agrarian enterprises, farms (Table 3).

Table 3 – Third path of interaction

<p>Typical topical directions of automation</p>	<p>Special directions</p>
<ul style="list-style-type: none"> • «1C: ERP Production management», «1C:ERP Agro-industry»; • Processing «1C: Milk plant. Module for 1C: ERP and 1C: KA»; «1C: Bakery and confectionery. 1C: ERP»; • Automation of accounting of peasant (individual) farms; • Veterinary documents. 	<p>Basic Enterprise on the introduction of integrated management solutions for agro-industry «Agricultural enterprise «Pravda»» LLC.</p> <ul style="list-style-type: none"> • Honing technology, training of experts of Perm Krai on the example of the pilot project. <p>Digital Engineering Center:</p> <ul style="list-style-type: none"> • Laboratory of agro-industry control systems. Laboratory for development of information-analytical, information and communication systems. Laboratory of agro-industry monitoring systems development. <p>Educational Cluster HE/VE: multifunctional Center (practical training /re-training of the specialists on the basis of cluster areas in conditions of high-tech and manufacturing information management in agribusiness)</p> <ul style="list-style-type: none"> • Educational programs for work training / further education in digital economy of the region in terms of development of rural territories: "Network farming".

To monitor and assess the role of the programme for the development of the digital economy in enhancing the competitiveness of the Russian economy as a whole in the global markets and the growth of agro-industry of the Perm Krai, creating conditions for a phased transition to the level of innovation economy, knowledge economy, improve the quality and standard of living of the population the following targets are defined:

- Data on loading the production capacities of agrarian enterprises, farms;
- Current balances and prices of spare parts, raw materials and equipment for all warehouses of agro-industry's enterprises;
- Current output of marketable products of industry's enterprises;
- Digital social and competence analysis in the field of agro-industry;
- Optimization of purchase, production processes, logistics chains and financial calculations of the main commodity transactions of industry's enterprises;
- Evaluation of the use of digital technologies in the organization of business processes and in cooperation with partners;
- Assessment of the impact of technology on the enterprise's staff;

- Assessment "The scale of the digital economy", the digital form of labour activity;
- Development of metrics for new, emerging activities based on the introduction and use of digital technologies, to withdraw from this metric indicators.

Achievement of planned digital economy characteristics of the agro-industry of the Perm Krai is ensured through the following targets:

- the share of households that have broadband Internet access (100 Mb/s): by 2020 – 60%, by 2025 – 90%;
- the share of agro-businesses using the integrated control systems with satellite monitoring systems: by 2020 – 30 %, by 2025 – 60%;
- the number of employees of agricultural enterprises, farmers, workers in the offices that possess skills in the IT sector for the agro-industrial sector, by 2020 – 1.5 thou. people, by 2025 – 5 thou. people;
- the number of graduates of higher education, specialists in agribusiness with in-depth knowledge in the IT field, by 2020 – 4 thou. people, by 2025 – 9 thou. people;
- the population of the rural site, involved in the implementation of the concept of "Five smart enterprises", "Ten smart rural territories», by 2020 – 7 thou. people, by 2025 – 20 thou. people.

A necessary condition for realization of tasks for the development of the digital economy of Perm Krai' agro-industry is the active participation of the Ministry of informational development and communication of the Perm Krai, the Ministry of agriculture and food of Perm Krai, and interaction of representatives of all stakeholders in the development of the digital economy of the agro-industry (enterprises, entrepreneurs, IT and scientific community) to solve and coordinate digitalization and coordination of the programme.

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