Concept of network management of commercial activities in agricultural organizations

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Abstract — The article provides information on concept of creating a model of commercial activities network management for agricultural organizations. In the modern information world, important factors in the development of commercial activities of organizations of the agro-industrial complex are the construction of productive long-term relationships with contractors and the place of the organization in the network structure. This becomes possible only under the condition of successful implementation and development of network relations, implementation of “smart agriculture” technologies, adequacy of the network’s potential and information resources of the organization, which ultimately stimulates organizations to create high-quality network management systems and network transactions in the agro-industrial complex.

Keywords — network, transaction, commercial activity, agriculture, innovations

I. INTRODUCTION

The twenty first century is the dominance of network organization in all spheres of human life and activity, the creation and use of networks at all levels of economic management: micro, meso, macro networks, the global Internet, which is typical of the global economy and it works in real time [1].

Network theory is based on the fundamental research of many scientists from various fields of science who have made a significant contribution to the development of this theory: an integrated global network information model (D. Beaumont), a corporate network model (X. D. Ven), a computer model of a corporate network (B J. Clark), a community network model (K. Klok, J. Goldsmith), a small business network model (L. Bidgigerio), a computer model of an intercorporate network (D. Märkloy, E. Terban), a high-tech management model (M. Jelena), computer accounting systems governmental networks (A. Sakharov, K. Sando), enterprise resource planning (A. Sakharov, K. Sando), the model of virtual enterprise (A. Kolobov, I. Omelchenko, and others.) and so on.

The network is characterized as a structure with numerous connections, consisting of a set of cells of different sizes, interconnected by arrows and connected according to a given condition in oriented graphs, which may contain cycles [2p.353] in the field of commercial activity of agro-industrial enterprises, which is characterized by adjacency graphs, algorithms and models of information processing from the received innovative sources, which enables much faster exchange of information.

Modern networks are an adequate way of flexible integration of economic entities, corresponding to the dynamic shifts occurring in the technological mode of production during transition to a post-industrial economy, by combining the advantages of hierarchical and market structures and reducing transaction costs that mediate interaction of economic entities [3].

Transition to new network technologies has influenced organization of commercial activities of enterprises engaged in the field of agriculture. This transition may be characterized by the following changes:

- growing importance of networks in the commercial activities of enterprises and organizations engaged in the field of agriculture;
- emergence of the Internet and separation of information flows from physical flows, their subsequent digitalization for grouping, processing, storing and subsequent use of information for building networks;
- fragmentation of the economy and value chains into a large number of individual levels of control, some of which represent “convenient cities” of much greater value than others;
- emphasizing the economy of "increased revenues" and "a winner who takes the most part"; [4, p.310]
- systematization of various informational characteristics of networks in the field of commercial activity, economics, accounting and analysis;
- formation of a network of virtual space systems for creating a “smart information space” of organizations of the agro-industrial complex and the subsequent emergence of “smart agriculture”.

II. THE PURPOSE AND METHODOLOGY OF THE RESEARCH

The research aim was a comprehensive study of network management of commercial activities in organizations of the agro-industrial complex and the formation of the model “Network management of commercial activities in organizations of the agro-industrial complex”.

The method of forming the model takes into account the following series of iterations:

- the main problems of network organization of modern society (commercial characteristics of networks; network culture; network institutes; network...
organization of commercial activities; information technologies; network organization of labor; culture of real and virtual reality; the expansion of interactive networks; the emergence of virtual enterprises; domination of information resources over material resources, fast world coverage with new technologies);

- full integration of features and capabilities of telecommunication and computer technologies with the information space, the emergence of new technologies under the influence of global network instrumentalism;

- development of effective networks taking into account different positions (information and knowledge industry; self-reproduction of networks; joint measurement of costs and economic benefits; creation of agrarian business networks and their effectiveness; network resilience to external influences; integration of networks into the commercial activity of the agro-industrial complex; organization of situational (event-based) commercial activities; transaction networks, etc.);

- construction of networks and their systematization taking into account the peculiarities of the agro-industrial complex (corporate; centralized; decentralized; zonal; communication; network business segments; public; international and global ones).

These iterations enable us to develop and adapt the model “Network management of commercial activities in organizations of the agro-industrial complex”, which systematizes commercial activities and network connections of agro-industrial enterprises into four groups (Fig.1):

1) Micro-networks - institutional units: business entities, enterprises, corporations, holding companies engaged in the agro-industrial business, etc.;

2) Mezo-networks - institutional units: associations, professional, industry and other associations of the agro-industrial business;

3) Macro-networks - state agro-industrial, interstate, etc.;

4) Global networks - Internet, information, settlement, marketing in the field of agriculture and so on.

As a result of networks development of the agro-industrial complex, a paradigm of multi-connectedness has arisen (each associated with each), on the basis of which a single communication space is created within the framework of the so-called virtual private networks that become multi-service. With the arrival of network technologies to the agro-industrial complex, the possibility of global informatization of the people agro-industrial activities has appeared. The flow of information generated by the company has become a commodity whose value exceeds the cost of the other manufactured products [5].

In this regard, the network must be identified by three parameters:

- business characteristics of networks (comprehensive customer satisfaction; universal measure of resources; system constraints associated with payments; presence of a synergistic component; priority of opportunities over efficiency; transactional attribute of a network; network modeling using network logic; an ideal growth mechanism (no limit at the input and exit);

- rapid introduction of innovative technologies in the agro-industrial sector through network resources (changing the paradigm of business thinking - efficiency - explainability - economics - knowledge - wisdom - reintegration - intelligent technologies - decentralization; rapid adaptation through the algorithmic network of all processes using network information products to increase business value and in the subsequent turn of the agro-industrial complex);

- fundamental networking opportunities (business management based on disaggregated information in four dimensions: time, valuation, time horizons, segments of the agro-industrial complex; change and risk management in agriculture based on fractal business engineering tools grouped by type of activity, industrial sales chain, enterprise functions, multilevel information architecture, business processes, transactions, structured information system, contact role and analysis of commercial activities of agro-industrial enterprises, an ideal mechanism for assessing and managing risks and changes, the accumulation of knowledge, changing the methodology of doing business, increasing the value of the network business, etc.).

III. THE RESEARCH RESULTS

Modern trends in the development of society and the creation of new technologies, such as the IoT platform for various sensors and readers, the use of satellite navigation, GPS and GLONASS, unmanned aerial vehicles and airplanes, allowing to automate the process of obtaining agricultural products - leads society to "reasonable agriculture". The introduction of "smart" technologies in agriculture allows us to simplify and automate the production process. The process of economic globalization is growing, which causes the emergence of new network forms of commercial organization. The activity of the commercial organization of the agro-industrial complex is effective if it is capable of integration, information interaction, the production of new knowledge and the introduction of innovations.Commercial organizations of the agro-industrial complex in the course of their activities interact with various network structures and become their part. In modern conditions, the spread of networks as an organizational form of commercial activity of enterprises of the agro-industrial complex was influenced by the development of industry markets, increased competition, complications of production and economic activity of enterprises, the uncertainty of their external environment, the growing importance of information, time, quantity of products and services offered and the growth of innovation [6].

The distribution of network types of organization of commercial activity not only by indicators of the commercial activities of organizations of the agro-industrial complex, but also by its other areas is determined by comparing transaction costs [2].
### TABLE 1. MODEL OF NETWORK MANAGEMENT OF COMMERCIAL ACTIVITIES IN AGRIBUSINESS ORGANIZATIONS

<table>
<thead>
<tr>
<th>Networks</th>
<th>Fundamentals</th>
<th>Networks</th>
<th>Business</th>
<th>Network Technologies in Agriculture and Related Interests in Agribusiness Enterprises</th>
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<td>I. Micro-networks</td>
<td>- links, economic</td>
<td>II. Macrom-networks</td>
<td>- associations of the agro-industrial and agro-commercial associations of professional and institutional units, etc.</td>
<td>Business paradigm</td>
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<td>III. Macrom-networks</td>
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<td>III. Macro-networks</td>
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<td>Business engineering instruments: zero and fractal reports</td>
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The person is a main object of management interests. A comprehensive consumers satisfaction is being done.

3-level model of network services: a task model and processes; processes processor; network directory

More than 3000 standards have been developed and are in use

Restrictions related to services payment

$2 + 2 = 5, 6, 7, 8$ etc.

Money circulation normalization at micro and macrolevels

At network organization, the center of architecture is transaction, and not its content

Performance, economy due to liberty of action, knowledge, reintegration and decentralization

Network models built on the basis of network logics

Network aggregation – a perfect structure for growth and learning

Risk-related situations management

Development of mechanisms ensuring property rights protection

Information processing as per 5 million analytical positions

Knowledge accumulation enables to make decisions on the basis of recursive programs using semantic methods

Disaggregated information in 4 dimensions: time, assessment, horizon periods, agribusiness segments

Calculation of risk-related situations in agro-industry following the data in managerial and strategic flows in fractal aspects

Algorithms development on the bases of transactions oriented towards enterprises property

Network computer programs enabling to obtain multifactor information oriented towards cost

Value increase of the agriculture enterprise, its payment capacity and financial condition

Information cost is not to exceed the costs related to obtaining it, that is why any loss of information brings more loss than data loss

Certain economic processes basin on which ones the results are assessed

Value chain parts starting from resources influx to products and services realization

Added value creation stages of the enterprise

Fractal format of information flows

Orientation towards to users and processes forming transactions

Information system center is transaction itself, but not its real content

Information positions complex ensuring functioning of multilevel analyticity

Information organization as per activities types

Information organization as per internal activities segments

Information organization as per external segments, strategic activities directions

Management of economic situations, events, risks, resources, results

Management of resources potential, risks, enterprise backup system
The concept of transaction costs was first introduced into scientific circulation in the 1930s by R. Coase in the article “The Nature of the Firm” to explain the existence of structures opposite to the market — firms. Transaction costs are key in the decision-making process to establish a company. R. Coase proved that in every transaction it is necessary to have information, negotiate, control, establish relations and resolve differences. The cost of this entire transaction is worth [7].

From the point of view of O. Williamson, the choice between different organizational forms — hierarchy, market, and network — occurs as a result of comparing the effectiveness of the transactions performed by these structures. Thus, in accordance with the theory of transaction costs, many organizational forms arise, primarily to minimize these costs [8].

The transaction management system proposed in the model includes: property theory (formed by the concept of transaction costs); the essence of transactions (consists in the integrated management of a wide range of economic processes on the basis of a single expanded aggregated information); transaction identification (identifiable and unidentifiable transactional components); transaction evaluation (formed from the transaction value, transaction income and transaction result); transaction management (consists in the integrated management of a wide range of economic processes on the basis of a single aggregated information); transactional control technology (formed by an engineering control system with separation of the control result into a security zone and a security boundary); transactional analysis (using the method of chain substitutions, which is the basis of the system of tools of analytical engineering).

Organizations of the agro-industrial complex, which actively use networks and information technologies, have greater potential and mobility than traditional enterprises with a hierarchical structure, with specific goals and a characteristic horizontal single-level structure of management and operation.

The main advantage of the enterprises included in the network is reduced to the formation of competitive advantage in comparison with isolated firms.

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The work of enterprises of the agro-industrial complex with various networks indisputably has several advantages, namely: reduction of transaction costs, relationships based on mutual trust, a substantial choice of strategies and production, which makes up the space and time of the fractal Network as a community using the effect of scale. As a result, all this determines the network potential of the organization of the agro-industrial complex and contributes to the effective implementation of the strategy of the agricultural organization and the implementation of the 80/20 principle (Pareto efficiency criterion) [9].

The combination of various means and capabilities of a commercial organization leads to increased productivity by increasing the market share, increasing profit margins, reducing costs, including transactional and opportunity costs, and allows the company to fully realize the opportunities of the Company through network transactions and intangible assets, which are the “toolkit of the network potential of the organization’s commercial activities” and create conditions for adaptation to the external environment. The network potential of the organization’s commercial activities and indicators of the effectiveness of such integration are influenced by political, economic, environmental, social, technological and other factors affecting all resources [10].

IV. CONCLUSIONS

In the modern information world, important factors in the development of commercial activities of organizations of the agro-industrial complex are the construction of productive long-term relationships with contractors and the place of the organization in the network structure. This becomes possible only under the condition of successful implementation and development of network relations, implementation of “smart agriculture” technologies, adequacy of the network’s potential and information resources of the organization, which ultimately stimulates organizations to create high-quality network management systems and network transactions in the agro-industrial complex.

As a result, the model “Network management of commercial activities in organizations of the agro-industrial complex” enables to identify network and business communication systems (at the micro, meso, macro, global level ones), business characteristics of networks, their fundamental capabilities taking into account transactional operations, with the goal of rapid implementation innovation, creating new networking opportunities in the agribusiness sector.

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