Management in the agro-industrial sector: methods for assessing effectiveness of the network associations

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Abstract. Reducing the level of import substitution is one of the important issues of the Russian agro-industrial complex development. In this regard, there is a need to find new management methods for regional agro-industrial systems with an emphasis on their interaction with retail chains and industrial enterprises. Creating comfortable conditions for the integration of economic entities in the regions is one of the aspects of management. These conditions include the retail networks development, the availability of legal mechanisms for organizing network systems and the development of the business investment environment. The article is devoted to the issues of enterprises network interaction in the agro-industrial complex, as one of the promising areas of development in a crisis economy, namely, assessing the effectiveness of associations.

1. Introduction
Fast non-invasive methods of detection and identification of diseases and other stressful conditions of According to the results of 2018-2019, the share of the agro-industrial sector in Russia in the structure of the gross domestic product of Russia is at least 5.8%. There is an annual growth in exports of the Russian agro-industrial complex in the range of 18-20%. Meanwhile, imports also occupy a fairly large share of the Russian market. The largest importers of agricultural products on the Russian market today are the companies from such countries as China, Turkey and South Korea. However, the conditions for the development of the global economy, downtime of agricultural production and political events in recent years, make thinking about the need to improve the management of enterprises in the agro-industrial complex, where network companies play a special role.

In historical retrospect, the policy of import substitution in the agricultural market was implemented during the crisis periods, which contributed to the country’s economic growth. Thus, in 1998, the volume of imported goods in general for all sectors decreased by 20%, and in 1999 by 28%, while the overall GDP growth for 1998-1999 was 25%.

Another example is the period of the global crisis of 2008-2009, which also contributed to the growth of the Russian domestic market, caused by the depreciation of the ruble and the necessary development of the food industry and machine-building complex. It was during the period of economic crises that governmental programs support for the agro-industrial complex were actively developed. In the period 2008-2012, the governmental program was aimed at reducing the share of imports and developing their own production of agricultural enterprises.

It should be noted that the negative result of the implementation of these programs is a low profitability of production, which is associated with the high cost of agricultural raw materials, fuel and
agricultural machinery. Based on the management experience of previous periods and negative forecasts of the Russian economy development in the future of two or three years, it should be concluded that it is necessary to introduce new management methods for enterprises of the agro-industrial complex, aimed at reducing the cost of production.

2. Methods of study
An annual study of the companies in the Russian agro-industrial sector, presented by the national analytical center “Expert” [1] allows to conclude that there are several trends in their development related to political and economic events:

- the Russian agro-industrial market is consolidating, with more than 60 percent of the industry's revenue owned by 20 large firms;
- there is an increase in the revenue of large agricultural companies, which in 2019 and 2018 is less significant than in the previous period, which proves stabilization of the market and allows making a forecast of its further consolidation;
- there is a redistribution of markets for export production in the areas of supply and a transition from the markets of Western Europe to the market of China, the Arab Emirates and neighboring countries, which requires organizations in the agro-industrial sector to focus on logistics processes;
- a comparative analysis of the dynamics of income and profit indicators of organizations, conducted using the basic method (in relation to 2014), allows to judge the increase in the level of income of agricultural companies by almost 2 times, along with maintaining profits at the same level. The increase in revenue is due to the processes of absorption of companies in the agro-industrial complex, the integration of infrastructure that allows optimizing production processes.

In general, we should conclude that companies’ profitability may grow due to future acquisitions and further market consolidation. Already today, experts identify the most actively growing 15 companies from the top 50, which allows to predict the oligopolization of the agricultural market in the future [1].

An analysis of the performance of 15 leading companies in Russia shows the presence of specialization, the allocation of major areas of activity in the agro-industrial sector, and therefore the possibility of creating oligopoly associations. Figure 1 shows the differentiation of economic sectors and the positioning of leading companies in the market segments of agricultural products.

![Figure 1. Differentiation of Russian agro-industrial sector companies by the types of production activity in 2019 [1].](image)

Figure 1 demonstrates that the most attractive segments for companies are crop and livestock production (20 and 25% of companies), the second position is occupied by food production segments, including meat (14% of companies), and the third position is processing, poultry (including poultry meat processing), feed and oil production (from 4 to 7% of companies). Thus, it becomes obvious that the
market is divided into enlarged segments. It makes possible judging the capitalization coefficient and the need of finding new forms of managing associations.

Given that pricing in the oligopoly market is determined by the level of average costs of large corporations, the methods of cost reduction, digitalization of production and logistics processes should be considered as a promising area for improving the efficiency of companies.

The experience of developing inter-organizational (inter-firm) integration of agro-industrial enterprises, namely the model of network integration of companies, is considered as one of the promising management models [2].

3. Models and forms of network management

The interest in network structure management methods is explained by existing market changes not only in the agro-industrial sector, but also in general in industries related to the supply of products to the final consumer [2-4]. Network structures in the light and food industry and the complexes providing them are directly related to the living conditions of the population. This is why such industries are characterized by the development of network structures that allow implementing a strategy of inter-organizational integration, which leads to cost reduction.

The scientific interest in network structures is caused by the need to develop network forms of interaction between organizations of the agro-industrial complex and the food industry. Industrial (functional) and territorial integration are usually considered as forms of network integration. If functional integration is based on the principles of combining production processes within a single territory, then territorial integration involves combining structures within different cities, regions, and countries. Territorial integration allows developing network interaction at the intersectoral level, thereby developing a single base for innovation within a single territory.

An important area of analysis when integrating companies and creating network structures is the choice of organizational form, which depends on the goals of the activity.

The most common goals of companies’ integration in the agro-industrial complex are considered the next:

- development of innovative activities and experimental research;
- formation of a single fund to finance various activities of several companies participating in the integration process;
- diversification of the agro-industrial companies’ activities;
- creation of a unified infrastructure base for the most effective use of fixed assets of partner organizations, etc.

Setting and achieving these goals involves choosing the form of integration of companies in the agro-industrial sector. There are usually so called “soft” and “hard” models of integration. “Soft” forms of network include an economic association. It is a model for combining organizations in the same production chain that perform different functions in order to resolve non-commercial (including legal) issues. Another “soft” form of integration is strategic alliances based on an agreement to cooperate with several independent firms to achieve commercial goals. From the point of view of developing strategic alliances in the agro-industrial sector, the most promising is the formation of alliances for organizing joint production, developing new markets for agricultural products, and alliances for investing in new projects [3]. A consortium is considered as a form of strategic alliance in the agro-industrial sector. The consortium is also a temporary association whose purpose is to invest in joint projects. Combining agricultural enterprises with the banking sector would increase the efficiency of investment in the agro-industrial complex.

“Hard” models of integration include corporate and close associations: pools, concerns, holdings, cartels, etc. Pools are associations of investors in which there are strict rules for distributing the partners’ profits. In the agro-industrial complex, the greatest effect can be obtained by organizing a patent pool.
(in the case of innovation) or a trade pool (in the case of targeted pressure on the market, the formation of uniform prices and the need to control sales of agricultural products).

The formation of holdings in the agro-industrial sector allows organizations to jointly implement a single target strategy, protect against possible threats from the competitive market and develop network forms of business, organizing a single production and logistics chain. The latter significantly affects the cost level of the holding and increases the indicator of production efficiency. The most promising form of holding should be considered a mixed holding, which allows companies to conduct their own business activities.

Foreign experience shows that the advantages of managing network integration in the market of agro-industrial companies are a reduction in the amount of investment used for their development, focus on specialization and competitive advantages, focus on the professional qualities of employees, development of information and human resource integration [5]. All these advantages lead to the main goal, which is saving management costs. This allows to increase the efficiency of network structure management with a stable economic result.

Since the effectiveness of the management system is the rate to which the goal is achieved at the necessary cost, each network structure must determine the approach to its assessment and the choice of evaluation criteria. The issues of evaluating the effectiveness of network management systems were considered earlier in the works of modern scientists and practitioners, both at the level of functional interaction [6] and at the level of territorial integration [7, 8].

The analysis of scientific works of Russian and foreign scientists allowed to identify several approaches for assessing the effectiveness of agro-industrial associations management, taking into account the specifics of production [5].

Table 1 shows typical approaches for assessing the effectiveness of agro-industrial associations, divided into enlarged groups.

**Table 1. Approaches for assessing the effectiveness of agro-industrial integration.**

| Scientific approach | Content | Assessment |
|---------------------|---------|------------|
| Assessing an object effectiveness | Assessing the managed object activity | Production process (production volume), management process (delivery performance indicator), level of resource use (costs and profit) |
| Assessing a comprehensive performance indicator | Comparative assessing the profit indicator and the complex cost indicator | Profit per unit of costs, indicator dynamics |
| | Ranking a set of individual (selected) indicators | Index and matrix methods for assessing individual (selected) indicators |
| | Management by objectives and assessing rate of their achievement | Assessing the target (strategic) and cost (tactical) effectiveness |
| Ecological effectiveness | A complex indicator related to the production specifics. A system of indicators is formed to compare profits and costs | Profit and energy costs for agricultural production, profitability from recycling, pollution degree and cleaning costs, etc. [9] |
| Management effectiveness | Benchmarking of the management system | Final results of activity, the rate of result achievement |
| | Regulatory assessing the management system | Indicators of performance, cost-effectiveness, adaptability, flexibility, efficiency, reliability |
| | Expert assessing the management system quality | Management system compliance with the organizational structure and management object |
| | | Rationality of the organizational structure and its technical and organizational level |

As follows from the table, a feature of assessing the effectiveness of network integration associations in the agro-industrial complex is the introduction of an environmental efficiency group and a management efficiency group into the system of performance indicators [9].
Of course, such an extensive set of indicators, parameters and assessment criteria requires careful selection and alignment with the strategy of corporate associations. In associations with flexible relationships, the set of jointly selected management performance indicators will be significantly smaller, since the integration of companies is based on a short- or medium-term management perspective (investment efficiency, joint implementation of new technologies).

The variety of performance assessment methods requires the development and implementation of digital management methods, especially in the production accounting sector. The most popular methods of monitoring production processes in the agro-industrial sector that are subject to digitalization are chipping animals, measuring feed costs, and scanning information about objects.

However, at the level of network associations and corporate structures, the most popular is the monitoring of management systems, created on the basis of the formation of comprehensive performance indicators.

4. Conclusion
Analysis of the current conditions for the development of the Russian economy, as well as the resulting indicators of production of national economy sectors, allows to conclude that there are crisis phenomena and a decline in the production of public products as a whole.

One of the management methods in the crisis period is the organization of network and corporate associations based on the organizational and functional integration of companies. Integration of companies in the agro-industrial sector allows saving cost in the production process, as well as reducing cost of purchasing and supplying resources in the production chain.

One of the management methods is to form a system of indicators and assess the effectiveness of the associations’ management. The choice of approaches for assessing effectiveness depends on the form and nature of the association, as well as the purpose of its activities. The current development of network associations in the agro-industrial sector of the economy requires the choice of a system of indicators for a comprehensive assessment of management effectiveness, as well as the development and implementation of digital systems for monitoring them. The next step in the development of digital systems for monitoring management effectiveness should be the development of a method for selecting performance indicators according to the models of corporate and non-corporate associations of companies, taking into account the specifics of agricultural production.

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