

SCTCMG 2019

International Scientific Conference «Social and Cultural Transformations in the Context of Modern Globalism»

INNOVATIVE DEVELOPMENT OF THE AGRICULTURAL INDUSTRY AND NATIONAL FOOD SECURITY

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Abstract

Innovation processes in the agricultural industry of Russia were analyzed; the relationship between the level of food supply and the innovation component in the agricultural sector was identified. The agricultural industry is characterized by low rates of equipment renewal, imperfect state regulation and support of the innovation environment. In order to intensify innovative activities in the agricultural sector, it is necessary to apply the experience of other countries and develop national technologies, taking into account peculiarities of the national food market. Internal threats to national food security due to weak development of innovative technologies in the agricultural sector were systematized. These threats are as follows: low quality reproduction which does not allow for satisfaction of changing needs for food products; high dependence on imported seeds, animal breeds, machinery and technologies; high physical and moral depreciation of fixed assets; high unit costs of food production and agricultural raw materials; undeveloped production and social infrastructure of rural areas. In order to fill the niches of the national market with domestic products, raw materials and food, it is necessary to create breeding and genetic centers, modern innovation infrastructure and renew fixed assets. The state food sovereignty can be achieved through innovative development of the national agricultural industry which determines efficiency and competitiveness of agricultural raw materials and food products.

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Keywords: Innovation, food sovereignty, biotechnology, efficiency, competitiveness.



1. Introduction

One of the key world problems is global and national food security (Diouf, 2008; Buks, Obiedzińska, & Prandecki, 2016). In the conditions of growing international political tension, military conflicts, to ensure food sovereignty, urgent solutions are required.

The agricultural industry of Russia has undergone structural transformations due to technological modernization and development of the institutional environment (Altukhov, Drokin, & Zhuravlev, 2016). However, the current rates of development of innovative production technologies and management do not meet modern challenges which prevents import-substituting and export-oriented industries from development. In this regard, the study of trends in the innovative development of the domestic agricultural industry (AI) as a factor strengthening the national food security system is relevant.

2. Problem Statement

For the development of civilization, food resources should be available. Food determines the health state of the nation. Reproduction of the population depends on the efficiency of the agricultural industry and its innovative development.

Active development of innovative technologies by domestic producers will increase the volume of production of agricultural raw materials and food and solve the problem of import substitution.

Globalization trends and require intensification of innovative processes in the agricultural sector by creating certain conditions: improvement of the system of state regulation of the innovation sphere, creation of the innovative infrastructure, optimization of the legislation taking into account transformational changes in the market.

The Doctrine of Food Security of Russia is aimed at increasing living standards through development of the national agri-food market, reduction of the dependence on imported raw materials and food, enhancement of the efficiency and competitiveness of domestic agricultural products (Artemova, Skomoroschenko, & Melnikov, 2011; Ushachev, 2017). This requires intensification of the innovation component of reproduction processes in the agricultural industry by modernizing the agrarian sector as a key element of the organizational and economic mechanism for ensuring food security of Russia.

3. Research Questions

The system of economic relations which determines the development of innovative processes in the agricultural industry is connected with the need to achieve a level of production that would ensure high-quality economic growth of the agrarian sector and food security. However, the problem is complex. Changing conditions of world and national agri-food markets require justification of priorities of innovative development of the domestic agricultural sector.

To ensure food sovereignty taking into account foreign economic priorities for the development of innovative activities in the agrarian sector, it is necessary to develop a systematic approach to “growth points” of the agrarian economy (Rosin, Stock, & Campbell, 2012; Doroshenko, Troshin, & Sandu, 2016). It is important to take into account the specifics of the domestic agri-food market, select and assess strategic priorities of the innovative development of the agricultural industry.

4. Purpose of the Study

The purpose of the study is to substantiate priority areas of innovative development of the national agricultural industry ensuring Russia's food security in the context of economic transformations.

For this purpose, it is necessary to solve the following tasks:

- to systematize and specify internal threats to national food security due to low rates of development of innovative technologies in the agricultural sector and determine factors strengthening the system;
- to analyze the problems of innovative development of the domestic agricultural industry;
- to justify priority directions of intensification of innovative processes in the agrarian sector taking into account their impact on national food security.

5. Research Methods

The following methods of system analysis were used: logical, monographic, economic statistical, design-calculation, etc.

6. Findings

Efficiency of the national food security system is determined by its stability, that is, its ability to withstand a complex of internal and external threats and quickly return to its original state after the crisis cycles of economic development (Altieri, Nicholls, Henaio, & Lana, 2015; Kadlečíková & Kapsdorferová, 2012).

Threats to food security have various sources (external, internal, ecological, climatic, etc.).

The internal threats are as follows: technological backwardness of agricultural production, a low share of the innovation component in the development of the agricultural sector, inefficient implementation of innovative technologies.

The sanctions impose restrictions or a total ban on importation certain products and technologies from the USA and Europe. The agricultural sector is sensitive to the supply of imported seeds, equipment, innovative technologies for reproducing farm animals (Artemova & Kremyanskaya, 2016).

The agricultural industry has to increase the volumes of agricultural and food production, competitiveness in the domestic and foreign markets. To solve this problem, it is necessary to intensify innovation processes.

Internal threats to national food security due to low rates of innovative development are presented in Figure 1.

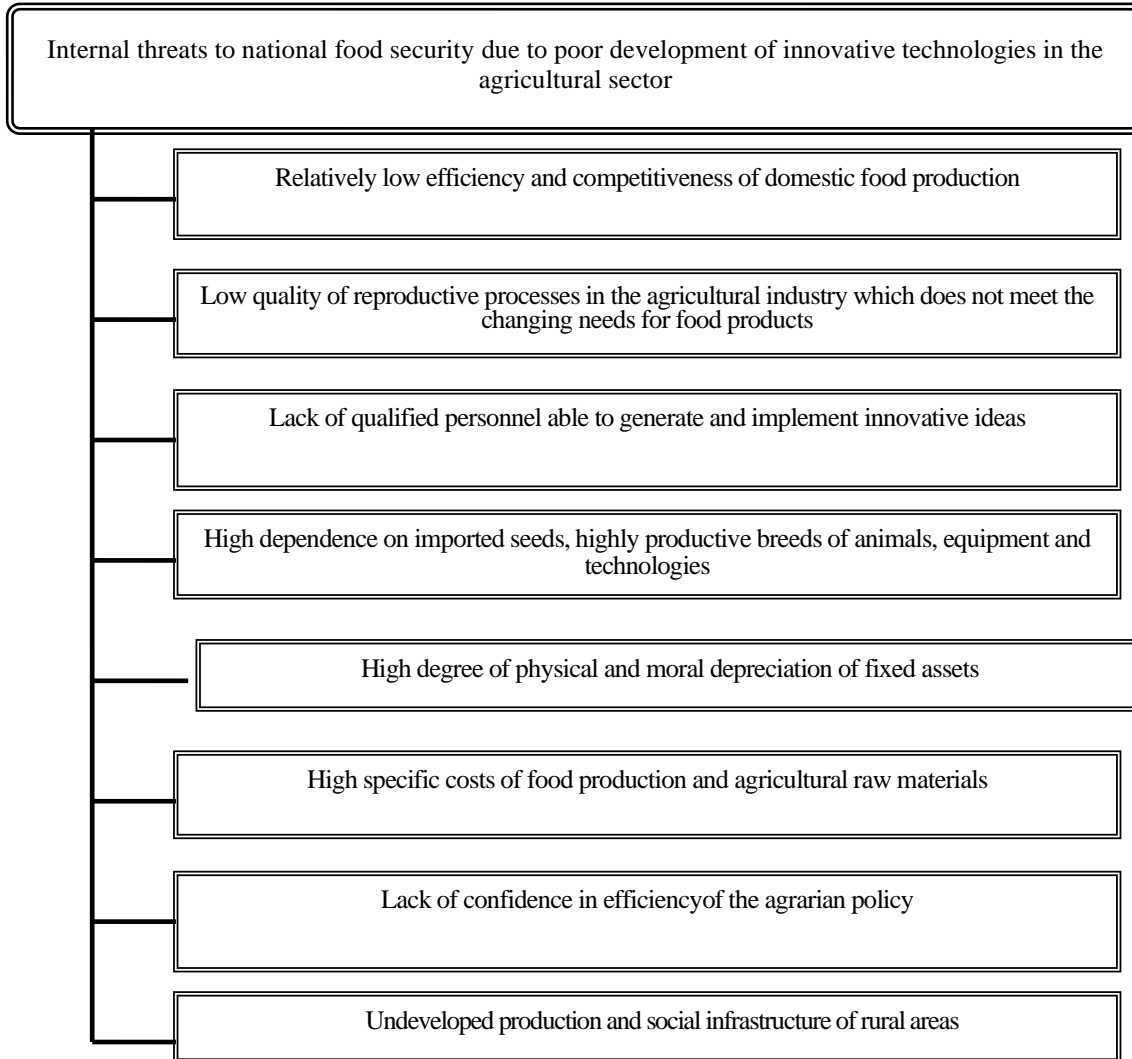


Figure 01. Internal threats to national food security

It becomes obvious that without improving the organizational and economic mechanism of accelerated development of the innovation environment in the domestic agricultural industry, neither national food security nor food sovereignty can be ensured.

The organizational and economic mechanism of innovation development includes: government regulation and market support for domestic innovations, creation of conditions for effective work of innovators, intensification of the protectionist policy in relation to producers who implement innovations, elimination of legal, informational, infrastructural restrictions.

The low efficiency and competitiveness of production of domestic food and agricultural raw materials is largely due to the low quality of reproduction processes in the agricultural industry which do not allow for increasing the resource base of domestic food products.

Table 1 shows self-sufficiency indicators for meat and meat products, milk and dairy products.

Table 01. The self-sufficiency level for meat and dairy products (FAO, 2019)

Indicator	Year				2017 (+, -)	
	1990	2000	2010	2017	1990	2010
Meat and meat products, million tons						
Production	10.1	4	7.2	10.3	-0.2	3.1
Imports	1.5	2.1	2.8	1.1	-0.4	-1.7
Exports	0.06	0.03	0.1	0.3	0.24	0.2
Production consumption	0.1	0.1	0.04	0.03	-0.07	-0.01
Personal consumption	11.4	6.6	9.9	11	-0.4	1.1
Losses	0.1	0.01	0.02	0.02	-0.08	0
Self-sufficiency ratio,%	87.1	59.6	72.3	93.3	6.2	21
Milk and dairy products, million tons						
Production	59.4	32.3	31.8	30.2	-29.2	-1.6
Imports	8	4.7	8.2	7.1	-0.9	-1.1
Exports	0.2	0.5	0.5	0.6	0.4	0.1
Production consumption	7.8	5.2	4.3	2.9	-4.9	-1.4
Personal consumption	41.8	31.3	35.2	33.9	-7.9	-1.3
Losses	0.04	0.03	0.03	0.03	-0.01	0
Self-sufficiency ratio,%	120	88.4	80.4	82	-37.7	1.6

The self-sufficiency coefficient was calculated as a ratio of the volume of production to its internal consumption, including production and personal consumption, as well as product losses.

The calculation showed that in 2017, the self-sufficiency level for grain was 99.3%, vegetables and melon crops - 85.9%, and fruit and berry - 32.7%. The low value of the self-sufficiency coefficient for fruit and berry is due to the climatic conditions. It is necessary to increase the volume of production of milk and vegetables through intensification of innovative activities aimed at re-equipment and expansion of production.

However, modern domestic technologies are not used in the Russian agribusiness (Nicholls, Altieri, & Vazquez, 2016) due to the imperfect system of state regulation and support of the scientific and technical sphere. The current level of financing of the federal scientific and technical programs aimed at the development of agriculture until 2025, imperfect tools for supporting domestic agrarians and innovators do not allow for implementation of technological solutions, import substitution plans and and creation of export-oriented industries. The depth of the existing problems is evident from the following figures: Russia imports about 80% of seed potatoes, 98.0% of foreign breeding hybrids, and almost 100% of breeding genetic material in broiler poultry farming (Hockmann, Levkovych, & Grau, 2018). In order to fill the niches of the national market with domestic products, raw materials and foodstuffs, it is necessary to create breeding and genetic centers, a modern innovation infrastructure, and focus on accelerated renewal of fixed assets. If we do not implement competitive agricultural production technologies, the agricultural sector will remain dependent on foreign technologies and political policies of Western countries.

The consumption of basic food products per capita shows significant deviations from the norm for individual products. In 2017, the following products were found to be deficient: milk and dairy products (-94 kg), vegetables (-33 kg), fruit and berries (-41 kg). In 2017, the volume of consumed products per capita is as follows: meat and meat products - 75 kg, milk and dairy products - 231 kg, eggs - 279 pcs., potato - 96 kg, vegetables - 107 kg, and fruit and berries - 59 kg. In 2017, the consumption rates for eggs (+19 pcs),

sugar and confectionery (+ 15 kg), as well as bread products (+21 kg) were exceeded (Hockmann et al., 2018).

In the structure of human nutrition, milk and dairy product play an important role. They provide the population with animal protein, calcium, iron, zinc, selenium, vitamins and other nutrients. Currently, the number of cattle, including cows, is declining, and an increase in animal productivity cannot compensate for losses in the production of raw milk. This is due to unsatisfactory conditions for feeding, maintenance and breeding of animals. Further development of dairy cattle breeding is possible through biologization of production, implementation of biotechnologies, including bio-transplantation technologies.

Embryo-transplantation technologies can accelerate the process of selection (Madison & Madison, 2014). According to experts, embryo-transplantation makes it possible to accelerate livestock productivity and replace the leukemic livestock of cows (Nikitkina, Pestunovich, & Yegiazaryan, 2011).

This technology is widespread in many countries around the world. For example, in the USA and Canada, about 350 thousand embryos are produced each year, in Brazil, this number is 280 thousand. The EU countries produce about 128 thousand embryos each year.

A literature review showed that in many regions of the country, there is no state support of biotechnologies. In Samara, Voronezh and Tambov regions, implementation of this technology is subsidized. However, in order to implement innovative technologies, it is necessary to invest in modern equipment and staff training.

Thus, in order to increase production of agricultural raw materials and high-quality food products, it is necessary to intensify innovation and investment activities of agricultural producers. To ensure national food sovereignty, it is necessary to implement innovative production technologies, create an effective insurance system, public-private partnership, improve methods for allocating subsidies, taking into account priority needs of the country and its regions.

7. Conclusion

There is a close relationship between the level of innovative development of the national agricultural sector and state food sovereignty. By increasing the innovation component in the agrarian sector, one can accelerate the pace of modernization of the technological base of the agricultural industry and ensure import substitution in the national agri-food market.

The development of the agrarian innovation environment is possible through protection of national innovators who generate innovative ideas and develop and implement innovative technologies. This will enhance competitiveness of domestic agricultural raw materials and food products, contribute to economic growth in the agri-food sector and solve the national food problem.

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