

Digital platforms as a factor in strengthening national food security

*Dmitry A. Loginov**

Vyatka State University, Department of Finance and Economic Security, Kirov, Russia

Abstract. Ensuring food security is one of the key areas in the management of economic security. Today, Russia's food security is sufficiently strengthened. However, a reasonable question arises about the promising directions of its development. The article explores the possibility of using digital platforms to improve the efficiency of national food security management. It is established that currently many countries of the world are betting on increasing the level of self-sufficiency in food as a fundamental condition for ensuring national food security. At the same time, the importance of criteria such as food quality and compliance of the domestic food market with the requirements of healthy nutrition is rapidly increasing. Using the example of the dairy market, it is shown that the Russian food market is quite stable and is characterized by the predominance of domestic production over imports in resources. There is an increase in exports. At the same time, there are no signs of active import substitution, the growth of domestic consumption lags behind the growth of production. To solve the current problems of food security, it is proposed to implement digital platforms in the agro-industrial complex at the stages of production of agricultural raw materials, its processing, consumption control and implementation of social policy to support the nutrition of socially vulnerable segments of the population. The use of digital platforms is aimed at improving the efficiency of national food security management.

1 Introduction

The transition to digitalization provides great and new opportunities both for agriculture in particular and for the agro-industrial complex in general. One of the practical tools of digitalization in the agro-industrial complex is the creation and use of digital platforms in a variety of basic and related processes, in planning, production, sales, financial management, personnel, technological improvement of production and much more. Among the digital platforms that can be used in the agro-industrial complex, it is worth mentioning instrumental digital platforms, represented mainly by software complexes (for example, Bitrix), infrastructural digital platforms, among which the central place is given to digital ecosystems (for example, GLONASS), and applied digital platforms, the content component of which is mainly focused on business models (for example, Avito). Modern digitalization processes

* Corresponding author: doctorloginov@mail.ru

have provided such a multiplicity of trends that it has become appropriate to single out industry-specific digital platforms reflecting a set of instrumental, infrastructural and applied digital platforms adapted for operation in a particular branch of the economy, and often specially created for this industry. The agro-industrial complex, taking into account the deep level of its specifics and the variety of operational needs, can be a typical example of owning such an industry digital platform. Today, precision farming systems, "smart" crop care, the use of artificial intelligence in the preparation of feed rations in animal husbandry and breeding management, and many other areas of digitalization in the agro-industrial complex are widely used.

Food security has become an urgent issue for our country since the transition to market relations. In previous periods, considerable efforts were also made to actually ensure food security, but, as a rule, they were not officially designated as actions to manage food security. Along with the official recognition of the fact of the need to maintain food security in Russia, there came an awareness of the existence of quite serious, systemic problems in the field of national food security, many of which were aggravated in the current period of time. In this regard, the State has taken a number of measures aimed at institutionalizing the process of managing national food security, which, in particular, consisted in approving the goals and priorities of food security, its criteria and quantitative targets. Over time, as a result of systematic long-term work, certain goals of ensuring Russia's food security have been achieved. Currently, the state continues to develop the institute of food security, supplementing it with new priorities and criteria, new requirements arise for recognizing the fact of achieving food security goals. At the same time, there is an incomplete confidence that all the goals and priorities of food security will be achieved, that there will be enough resources for these purposes. In addition, there is a reasonable scientific and practical interest in the extent to which the processes of digitalization of the agro-industrial complex, including the introduction of digital platforms into agro-industrial production, can be considered as a resource for further strengthening the national food security of Russia. In this regard, the topic of this study seems to be very relevant in scientific and applied terms.

The purpose of this study is to consider the prospects for the development of national food security from the standpoint of using digital platforms as a resource for further strengthening and improving the level of food security at the national level.

Objectives of the study:

- to assess the problems of ensuring food security in the modern segment of the development of the agro-industrial complex and the food market, taking into account the latest global, economic and technological challenges;

- identify the possibilities of using digital platforms to strengthen national food security;

- to predict the prospects of digitalization of the agro-industrial complex of Russia in the framework of actions to strengthen and increase national food security.

2 Materials and Methods

The topic of food security is on the agenda of many countries of the world, including many Eurasian countries. National Governments identify various problems in food security, including food shortages, insufficient nutrition of certain segments of the population, nutritional deficiencies in the diet, insufficient level of food quality, lack of food sovereignty, excess nutrition of certain segments of the population. At the same time, some countries rely on gaining food independence and self-sufficiency of the national food market, while other countries prefer to develop foreign trade in food and do not pay attention to the lack of self-sufficiency for certain types of food. Moreover, in retrospect, there is a change of emphasis in the national food security agenda. Thus, at the earlier stages of the formation of national food security, problems such as low per capita food consumption prevailed, which was

closely related to social problems at this stage, at the same time, such problems gradually passed, replaced by others, for example, insufficient food quality, and at later stages of formation national food security – the emergence of the problem of overweight in part of the population [1]. In the practice of developing countries, the problem of shortage of food produced from the country for the needs of the population prevails. The solution to such a problem, even for a developing country, may not be to expand food supplies by import, but by increasing domestic production of basic types of food. Such experience gained in modern times shows how ensuring food security in terms of increasing national food depends on investments and scientific and technical cooperation with countries leading in the field of agro-industrial complex and food technologies. [2]. In modern conditions, national food security should be considered as a combination of several levels, the lowest of which should be considered food independence as a condition involving the provision of at least 80 percent of the demand on the national market for a particular type of food by domestic production. The fulfillment of this condition provides an opportunity to move to a higher level of food security, which consists in the possibility of providing the national food market with goods of such a quality level that is recognized as acceptable and satisfactory from the point of view of the needs of the majority of the population and with the support of appropriate instruments of state agrarian policy and consumer protection policy [3].

Import substitution is a separate aspect of ensuring modern national food security. Indeed, without taking decisive measures to support import substitution, it is impossible to imagine any significant shifts of emphasis in the structure of the national food market from the standpoint of the proportion of domestic production and imports. In this matter, both the level and quality of state support for agricultural producers and the state of the actual competitiveness of domestic agriculture are important. Only when a certain level of competitiveness is reached, the possibility of sustainable and significant import substitution in the national food market can be considered. [4]. Considering the issue of ensuring the competitiveness of the agro-industrial complex in order to ensure the conditions for achieving the criteria of food security, it is necessary to pay attention to the fact that the subjects of national agricultural production should be characterized by secured economic security at the level of an economic entity, for which in turn it is necessary to create appropriate macroeconomic and sectoral conditions, develop an investment and resource environment that helps to gain economic stability and the possibility of extended reproduction. [5]. Striving for the goals and priorities of national food security, the state should use an integrated approach, providing conditions for the development of not only agriculture, but also related industries, such as the food industry and food trade. Modern state management of the agro-industrial level should be an integrated process that does not focus only on the problems of agriculture, but finds comprehensive mutually acceptable solutions for the system of key links in the value-added chain in the food market. This practice is a process of organizing an integrated, integrated management of the agro-industrial complex at the state level and involves the active use of a cluster approach to organize an effective spatial architecture of the agro-industrial complex in all its links. [6]. At the same time, at the national level, the degree of food security depends to a very large extent on the amount of financial resources invested in agriculture [7], when the state needs to decide whether it will direct additional state budget funds to stimulate domestic food production or organize the attraction of private investments of national or foreign origin.

Efforts to ensure national food security may require special measures related to countering international sanctions in cases where they are imposed on a country and directly or indirectly affect a particular sector of the agro-industrial complex. A country's accession to certain international trade agreements can also become a stressful factor if one of the consequences of joining such an agreement is the deterioration of economic conditions for one of the elements of the national agro-food complex. [8].

Systematic measures to strengthen food security are able to bring the agro-industrial complex of the country to a new level, which may even lead to a change in the role of this state in the world food market and in the world economy [9], therefore, activities to ensure national food security can reach the level of strategic management of the development of the national economy. Climate change can provoke the emergence of new challenges for the national agro-industrial complex and change priorities in the system of food security goals of the country. In this regard, it is important to make regular forecasts of climate change in the country and on the planet as a whole in order to correlate new opportunities and new threats with the system of national food security goals [10].

The creation of digital platforms and their active use in various sectors of the modern economy is a serious and profound technological breakthrough that promises significant positive changes in the work on improving the efficiency of many industries, including those in the agro-industrial complex. However, the latest research in macroeconomics also points to certain socio-economic risks, for example, such as a decrease in the need for labor and, accordingly, an increase in unemployment [11]. However, we consider such risks to be excessive, since at present the Russian economy is more labor-deficient than labor-surplus, and it is the digitalization of the agro-industrial complex that can solve the problem of shortage of personnel. There is a well-known problem of shortage of workers in animal husbandry, which is solved by robotization of the main operational processes in this industry through, for example, the introduction of robot milkers. It should be emphasized that some studies have revealed a significant positive role of digitalization in general and the creation of digital platforms in particular in improving the efficiency of the economy due to such positive changes as increased capital mobility and synchronization of business processes. [12]. Indeed, digital platforms make it possible to make management decisions, including business decisions, in conditions of greater awareness and, moreover, more quickly, which makes the movement of capital between investment objects more mobile. Agricultural producers, in the context of applying traditional approaches to lending, spend significant time resources and incur large administrative costs to attract borrowed financial resources. Similarly, the control of operational processes in traditional, non-digital conditions in agriculture is significantly difficult and associated with costs caused by the sprawl of agricultural production facilities over significant areas. Both the issue of attracting borrowed capital and the issue of controlling operational processes can be solved in the agro-industrial complex much more quickly in terms of using digital platforms. Nevertheless, it should be borne in mind that the transition to the mass use of digital platforms in the agro-industrial complex, as well as in other sectors of the national economy, is organically hindered by factors of insufficient readiness of society for digital changes. "Digital immaturity" can affect both management and contractors and employees of industry enterprises, which will delay the process of digitalization and requires the implementation of approaches to digitalization of the whole society with the active participation of the state [13].

The research uses such methods as monographic – to assess the current state of science and practice in the field of using digitalization tools to strengthen national food security, balance – to assess the current state of national food security and identify its "weaknesses", threats, the method of predictive assessments – to form ideas about the possibilities of digitalization in management activities national food security, management design – to set priorities for the further development of national food security based on the introduction of digital platforms.

3 Results and Discussion

National food security is assessed in a variety of ways. One of the key areas for the Russian agro-industrial complex is animal husbandry. Dairy farming plays an important role in the

system of Russian animal husbandry. Considering the system of national food security comprehensively, it is impossible to be limited only to the agricultural sector, therefore, food security in the field of milk and dairy products must be analyzed as a complex of conditions and processes occurring both in agriculture and in the dairy industry, and in the consumer market of dairy products.

At the heart of any food element of national food security is production. The production of milk and dairy products in the Russian Federation at the present stage is characterized by stability and a tendency to a gradual increase (Table 1).

Table 1. Resources of milk and dairy products in the Russian Federation, thousand tons.

| | 2019 | 2020 | 2021 | 2021 in % to 2019 |
|-------------------------------------|---------|---------|---------|-------------------|
| Stocks at the beginning of the year | 1680.1 | 1798.9 | 2012.7 | 119.8 |
| Production | 31360.4 | 32225.1 | 32339.6 | 103.1 |
| Import | 6727.8 | 7044.4 | 6889.5 | 102.4 |
| Total resources | 39768.3 | 41068.4 | 41241.8 | 103.7 |

At the same time, during the analyzed period 2019-2021, not only the production, but also the import of dairy products to the Russian market increased, which indicates that it is impossible to recognize the fact of import substitution in the Russian market of milk and dairy products. Probably, there are not enough resources for active import substitution in this market. In parallel with the increase in the production and import of milk and dairy products, the stocks of milk and dairy products are growing (and at a faster pace). During the study period, the stocks of milk and dairy products increased by 19.8%. At the same time, it should be borne in mind that the stock index does not apply much to milk due to the fact that it is a perishable product. Consequently, the stock index in this market segment is formed mainly due to those dairy products that have longer shelf lives – primarily butter and milk powder. Thus, an increase in stocks may indicate that the volume of supplies of dairy products to the consumer market rests on the ceiling of demand. The slowdown in demand growth provokes overstocking of production with those goods that, due to the possibility of postponing their sale, are postponed to stocks.

Analysis of the structure of milk and dairy products resources in the Russian Federation (Table.2) confirms the conclusion made above that import substitution processes in the dairy market are not being forced. This is evidenced by the fact that the share of domestic production in the structure of milk and dairy products resources in Russia remained virtually unchanged during the analyzed period.

Table 2. Structure of milk and dairy products resources in the Russian Federation, %

| | 2019 | 2020 | 2021 |
|-------------------------------------|------|------|------|
| Stocks at the beginning of the year | 4.2 | 4.3 | 4.9 |
| Production | 78.9 | 78.5 | 78.4 |
| Import | 16.9 | 17.2 | 16.7 |
| Total resources | 100 | 100 | 100 |

Accordingly, the share of imports in the national resources of milk and dairy products has not decreased in 2019-2021.

The trend of a certain increase in personal consumption of milk and dairy products in our country during the study period should be recognized as positive (Table 3). This indicates the stability of the consumer dairy market and hopes for its gradual growth from year to year. However, if we compare the increase in personal consumption with the increase in production over the same period, we can see that production has grown more than personal consumption. This is a dangerous trend, which means a signal to manufacturers to limit the increase in production. The consumer market is not able to consume the entire increase in milk and dairy products produced. In this case, food security is problematic not so much from the standpoint of the ability to produce milk, but from the standpoint of effective demand in the market. This indicates the preferred direction of further work to strengthen food security – solving social problems and stimulating the consumption of dairy products among socially vulnerable segments of the population.

Table 3. The use of milk and dairy products in the Russian Federation, thousand tons.

| | 2019 | 2020 | 2021 | 2021 in % to 2019 |
|--|---------|---------|---------|-------------------|
| Production consumption | 2992.3 | 3107.6 | 3133.3 | 104.7 |
| Losses | 38 | 57.8 | 42.3 | 111.3 |
| Export | 611 | 707.2 | 806.2 | 131.9 |
| Personal consumption | 34328.1 | 35183.1 | 35176.3 | 102.5 |
| Inventories at the end of the reporting period | 1798.9 | 2012.7 | 2083.7 | 115.8 |

A new and promising trend should be recognized that the export of milk and dairy products increased by 31.9% during the study period. The export potential of the domestic dairy industry is growing. Obviously, the competitiveness of dairy production is also increasing. At the same time, we see an increase in milk production consumption by 4.7%. This indicator is formed mainly due to the consumption of milk on dairy farms for feeding calves. This indicator could decrease if feeding technologies are improved, among which some modern technologies assume a smaller share of the use of milk for fattening calves. But the absence of a decrease in production consumption indicates the stability of technology and, in fact, the lack of progress in this area. Probably, progressive technologies in dairy farming are not being introduced as quickly as the conditions for increasing the competitiveness of national dairy farming require. It is also alarming that in the analyzed period, the loss of milk and dairy products increased by 11.3%, which cannot allow us to characterize positively the state of technologies in milk production and in its industrial processing.

In the structure of the use of milk and dairy products in Russia, there is a fairly stable picture, in which an increase in the share of exported milk can be noted as a positive trend (Table 4).

Table 4. The structure of the use of milk and dairy products in the Russian Federation, in % of resources

| | 2019 | 2020 | 2021 |
|------------------------|------|------|------|
| Production consumption | 7.5 | 7.6 | 7.6 |

| | | | |
|--|------|------|------|
| Losses | 0.1 | 0.1 | 0.1 |
| Export | 1.5 | 1.7 | 2.0 |
| Personal consumption | 86.4 | 85.7 | 85.3 |
| Inventories at the end of the reporting period | 4.5 | 4.9 | 5.0 |

Nevertheless, as a negative factor, it should be noted that the share of stocks at the end of the reporting period increased by 0.5 percentage points, which may negatively characterize the state of the consumer dairy market, which, due to the stagnation of effective demand, is unable to accept new volumes of dairy products.

The analysis showed that food security on the example of the market of milk and dairy products in Russia is ensured, there is a positive trend of increasing exports of dairy products, but there is no further progress in terms of consumption of dairy products in the domestic market. Obviously, further progress in food security in the field of milk and dairy products needs to be developed in the following directions:

1) implementation of social programs aimed at stimulating the consumption of dairy products in socially vulnerable segments of the population;

2) increasing the competitiveness of milk and dairy products production at the stages of milk production (in dairy farming) and dairy products production (in the dairy industry), which would ensure further export growth and supply of cheaper and better products to the domestic consumer market.

From our point of view, both directions of food security development can be supported by the digitalization of the industry and the introduction of digital platforms. The participation of the introduction of digital platforms in strengthening food security is seen as follows:

1) digital monitoring of food consumption by the population, identification of low, below-standard levels of food consumption, implementation of targeted (named) programs to stimulate food consumption by providing opportunities for socially vulnerable families to receive food for free without the possibility of monetization of this privilege for the purpose of targeted use of such support. For such digital monitoring of food consumption by households, a digital ruble system may be suitable, allowing you to observe the movement of money from their owner to the seller;

2) the introduction of digital technologies in breeding, breeding, agricultural production technologies in order to increase yields and productivity in agriculture, and, accordingly, reduce the cost of producing a unit of production;

3) creation of digital platforms in the field of industrial processing of agricultural products in order to manage the flow of raw materials and the selection of optimal processing directions. This will avoid overstocking of production and accumulation of unrealized balances. When food industry enterprises, with the help of high-precision digital control of the choice of processing directions and the amount of raw materials consumed, will be able to rid themselves of overproduction, the risk of a sharp decline in purchase prices in the agricultural raw materials market will decrease, which will increase the stability of the agricultural production economy.

The implementation of these directions for the introduction of digital platforms will ensure further growth of Russia's food security, and in particular:

it will help to increase the production of competitive agricultural raw materials, which, due to a lower price level, will be able to take a higher share in the national food market and expand its presence in the world market;

it will increase the level of targeting in the implementation of nutrition support programs for socially vulnerable segments of the population, which will ultimately lead to an increase in per capita food consumption in Russia;

it will strengthen the quality control of the food produced and avoid the use of undesirable ingredients in the manufactured food products that reduce their nutritional value, such as, for example, palm oil.

4 Conclusion

Russia's food security has now reached a high level compared to the problematic state of the 1990s - early 2000s. Today, with the achieved level of national food security, some unresolved problems remain, such as the insufficient rate of import substitution in the domestic food market, the low growth rate of food consumption in the domestic market, the lack of acceptable growth rates of per capita food consumption. The solution of these problems can be facilitated by the introduction of digital platforms in the agro-industrial complex in such areas as: management of operational processes in agricultural production; regulation of the volume of purchases of agricultural raw materials by enterprises of harvesting and processing agricultural products and the exact choice of processing directions depending on the market conditions of a particular food product; inventory management of finished food products; fuller implementation of the principle of targeting in the implementation of nutrition support programs by representatives of socially vulnerable segments of the population. The causal relationship between the introduction of digital platforms and the level of national food security is that the implementation of digital platforms increases the quality of management, expands the scope of awareness of decision makers, contributes to improving the quality of products, reducing production costs, makes it possible to make high-precision decisions on the choice of directions of industrial processing of agricultural raw materials, which in turn, it helps to reduce the risks of overstocking and the inability to sell finished products, and increases the awareness of society and the state about food consumption. Ultimately, at least two key goals are achieved: improving the efficiency and competitiveness of food production, which increases the nation's food supply and increases the export potential of the domestic agro-industrial complex, and ensuring a greater balance of final food consumption, which is manifested in increasing the targeting of food use, reducing risks to socially vulnerable segments of the population, protecting consumer interests in terms of quality food, strengthening the balance of supply and demand in the consumer market.

Acknowledgements

The article was prepared with the support of the grant of the President of the Russian Federation NSH-5187.2022.2 for state support of the leading scientific schools of the Russian Federation within the framework of the research topic "Development and substantiation of the concept, integrated model of resilience diagnostics of risks and threats to the security of regional ecosystems and technology of its application based on the digital twin.

References

1. S. Burkitbayeva, J. Swinnen, N. Warrinnier, Russian Journal of Economics, **6**, 1, 6-25 (2020)
2. I.U. Lucky, MGIMO Review of International Relations, **13**, 3, 138-150 (2020)

3. D.A. Loginov, E.V. Karanina, A.A. Bakhtimov, O.A. Ryazanova, Contributions to Economics, 9783319606958, 69-76 (2017)
4. A.I. Altukhov, V.V. Drokin, A.S. Zhuravlyov, R-Economy, **1**, 3, 487-494 (2015)
5. E.S. Sapozhnikova, L.P. Domracheva, A.N. Timin, S.V. Grin, D.A. Loginov, Contributions to Economics, 9783319606958, 21-30 (2017)
6. D.A. Karkh, V.M. Gayanova, F. Aimel, R-Economy, **1**, 2, 315-324 (2015)
7. N.H. Abd Rahman, M.Z. Md Zabri, M.M. Ali, Agricultural Finance Review (2021)
8. N.A. Mikhaylova, T.V. Babich, O.S. Smirnova, Contributions to Economics, 9783319606958, 151-157 (2017)
9. S.K. Wegren, F. Nilssen, Post-Communist Economies, 45-60 (2021)
10. M. Navratilova, M. Beranova, L. Severova, Terra Economicus, **19**, 4, 127-140 (2021)
11. A.A. Khachatryan, Studies on Russian Economic Development, **32**, 3, 297-304 (2021)
12. S. Abendin, D. Pingfang, Journal of International Trade and Economic Development (2022)
13. D.A. Lipinsky, A.A. Musatkina, R.A. Romashov, S.G. Golenok, K.N. Evdokimov, Contributions to Economics, 329-337 (2020)