

# Priority Directions for Regional Grain Market Development



**Konstantin Eduardovich Tyupakov, Sergey Mikhailovich Reznichenko, Rustem Adamovich Shichiyakh, Pavel Valeryevich Mikhailushkin, Liubov Aleksandrovna Belova**

**Abstract: Research Objectives.** The article analyses the regional grain market, which makes it possible to substantiate the priority areas of its development, including the expansion of its export opportunities through modernising, updating and creating the port export infrastructure of the region. **Methods.** The article uses the methods of systemic, structural and logical research, the analytical method, comparison, generalisation, economic statistical method. Each of the methods was used based on its functionality. **Results Achieved.** The article provides a detailed analysis of the largest regional grain market in the Russian Federation; highlights internal and external factors favouring the development of export production and logistics systems of the Russian and regional grain industries; identifies restrictions for the development of export opportunities for the grain market of Krasnodar Territory. It proposes measures for developing the export potential of the grain market of Krasnodar Territory, to overcome the existing weaknesses in the grain market development in the region. **Practical Relevance, Applications.** The investment project proposed by the authors for the construction of a new grain terminal in Novorossiysk will allow to comprehensively solve the urgent problem of low efficiency of the port facilities, which limits the development of the export potential of the regional grain market.

**Keywords:** agri-food complex, export potential, grain market, government policy, grain and leguminous crops, assessment.

## I. INTRODUCTION

Grain market occupies a special place in the structure of commodity markets, since grain is not only the nutrition basis for the population of almost all countries of the world, but also a strategically important raw material for other sectors of national economy. Cereal production occupies a leading place in agriculture of a country and the level of its development accounts for the functioning of all sectors of the

agricultural sector, the living standards of the population and the country's economic potential [1]. Stable and steady demand for grain and leguminous crops and their processed products in the world allows agricultural producers in a region to increase productivity, optimise the structure of production and stimulate efficient land use, which leads to the appearance of surpluses that can be realised abroad [2-3].

A special role in the development of grain market belongs to the transport and logistics system, including sea ports, road and railways, which allow timely supply of products not only across the country, but also abroad. A stable growth in the production of grain and leguminous crops requires the development of export transport and logistics infrastructure - the enhancement of the port sector, the modernisation of grain storage and transportation systems, and the tanker fleet updating. In the course of the study, the goal was set to perform an analysis of the regional grain market, identify problems prevailing at the regional level, and substantiate the directions for expanding grain export by regional producers.

## II. PROPOSED METHODOLOGY

### A. General description

The problems of the the agro-industrial complex development in the Russian Federation and regions, including the grain-product subcomplex, have been most fully, objectively and systematically studied by domestic scientists who made a significant contribution to the development of this area of agricultural economics. Well-known Russian economists devoted their works to the issues of the world food and grain markets [4-7].

According to V.I. Nechaev, intensified global economic competition leads to geopolitical rivalry, which requires increasing food production on a new qualitative basis, toughening environmental requirements and at the same time creating new opportunities for national food producers to form an innovative Food Net market [8]. It should be noted that many important theoretical, methodological, and practical scientific aspects of the functioning and development of the grain product subcomplex have not been fully studied and remain the subject of discussion both in Russia and in the world community. The relevance of these problems has determined the choice of topic and setting goals and objectives of the study.

The article uses methods of systemic, structural and logical research, analytical method, comparison, generalisation, economic statistical method. Each of the methods was used based on its functionality.

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## Priority Directions for Regional Grain Market Development

It should be noted that among all segments of the agri-food market, a special place is occupied by the market of grain and leguminous crops, it is the largest segment with up to 50% of the total agricultural production engaged in it. The grain market has a special influence on the nature of reproduction processes in both global and national economies [9-15].

In Russia, crops are cultivated in almost all regions and occupy about 60% of the total cultivated area of the country, and the average yield reaches 30 c/ha. Gross harvest of grain and leguminous crops in Russia increased almost 2 times by 2017 and amounted to 113.3 million tons. Among the regions of the Russian Federation, the main share in the production of grain and leguminous crops is occupied by Krasnodar Territory. It is 12.4%, followed by Rostov Region with an indicator of 11.7%, Stavropol Territory closes in the top three leaders with a share of 8.8%. Grain crops in Krasnodar Territory occupy more than half of the arable land. The level of engineering and technology in the region allows to get the highest productivity in the country - over 55 c/ha. Grain production annually is about 12 million tons, including 60% of wheat, with 80% of high quality - classes 3 and 4 [16].

### B. Algorithm

In the process of the research, we identified a number of internal and external factors conducive to increasing the export potential of the Russian grain industry:

- in recent years, there has been an increase in investments in grain production, both of foreign and domestic vertically integrated holdings, processing enterprises, which leads to the enlargement of market participants, a reduction in the chain of intermediaries and minimisation of agricultural production risks [17];

- the creation of large hierarchical structures, both in the

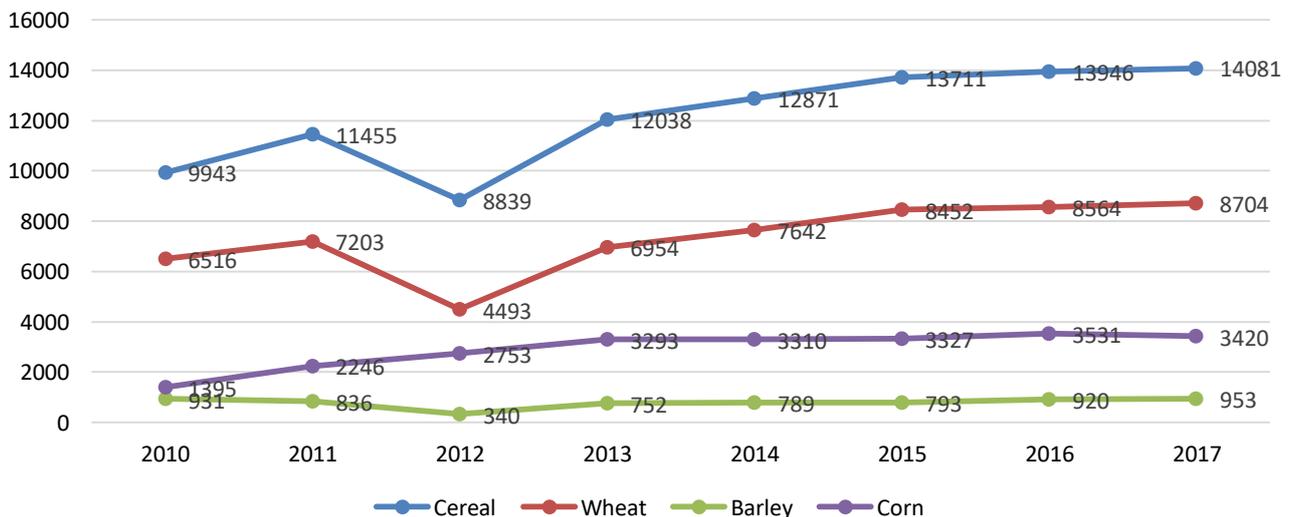


Fig.1. Dynamics of gross grain production in Krasnodar Territory, thousand tons

Winter wheat, winter barley, corn and rice are the main export crops cultivated in Krasnodar Territory. The data on their production in the region are presented in Table 1. The analysis of table 1 shows that over the period under study, the parameters of grain production in Krasnodar Territory are stably high. The sown area is over 3.6 million ha, which, with an average yield of 56-57 c/ha, results in the harvest of more

production and marketing of grain, allows access to capital markets, improve management, minimise costs and ensure economies of scale, reduce the share of non-cash settlements, increase transparency and efficiency of production and marketing activities;

- expansion of forms of state support for grain production from budgets of all levels;
- a developed network of grain storage facilities and elevators located inside the country;
- the availability of labour in the countryside and the relative cheapness of agricultural machinery creates favorable conditions for the expansion of grain production;
- geographic proximity to potential markets in comparison with leading grain exporters, which reduces the cost and duration of transportation;
- the creation of integration associations with former foreign trade partners of the Soviet Union (countries of the Near and Far East, Africa), which are large importers of grain.

### III. RESULT ANALYSIS

Krasnodar Territory is one of the main regions of the country for the production of grain and leguminous crops. The volume of production of grain and leguminous crops in 2017 amounted to over 14 million tons, including wheat - about 9.0 million tons, with a yield of 63.5 c / ha (Figure 1). Despite the stability of the sown area and a fairly high productivity, the gross harvest in 2018 amounted to 12.7 million tons of grain.

than 14 million tons of grain.

It should be noted that in Krasnodar Territory, with a stable area, productivity increases, which leads to an increase in gross yield.

Thus, the region under study has resources for the production of grain and leguminous crops.

**Table 1. Parameters of production of grain and leguminous crops in Krasnodar Territory**

| Indicators                         | 2015  | 2016  | 2017  | 2017 in % to 2015 |
|------------------------------------|-------|-------|-------|-------------------|
| Total cultivated area, thousand ha | 3636  | 3649  | 3658  | 100.6             |
| Cereals and leguminous crops       | 2444  | 2470  | 2456  | 100.5             |
| among them: winter cereals         | 1609  | 1602  | 1544  | 96.0              |
| among them: - wheat                | 1472  | 1454  | 1403  | 95.3              |
| - barley                           | 133   | 145   | 140   | 105.3             |
| Corn for grain                     | 613   | 641   | 678   | 110.6             |
| Rice                               | 134   | 136   | 122   | 91.0              |
| Yield, c/ha                        | 56.0  | 56.5  | 57.3  | 102.3             |
| - wheat                            | 57.5  | 58.4  | 62.0  | 107.8             |
| - barley                           | 59.5  | 53.7  | 57.6  | 96.8              |
| Corn for grain                     | 53.7  | 55.1  | 50.5  | 94.0              |
| Rice                               | 63.0  | 59.9  | 59.9  | 95.1              |
| Gross harvest, thousand tons       | 13682 | 13946 | 14081 | 102.9             |
| - wheat                            | 8460  | 8495  | 8693  | 102.8             |
| - barley                           | 793   | 777   | 805   | 101.5             |
| Corn for grain                     | 3291  | 3531  | 3420  | 103.9             |
| Rice                               | 845   | 815   | 731   | 86.5              |

An important indicator of the grain market analysis is the analysis of the economic efficiency of grain and leguminous crops production in Krasnodar Territory (Table 2) [18].

**Table 2. Parameters of economic efficiency of grain and leguminous crops production in Krasnodar Territory**

| Indicators                                | 2015    | 2016    | 2017    | 2017 in % to 2015 |
|---|---------|---------|---------|-------------------|
| The cost of gross output, million rubles: |         |         |         |                   |
| - wheat                                   | 78229.6 | 81339.6 | 75846.4 | 97.0              |
| - barley                                  | 6612.0  | 6463.8  | 5904.6  | 89.3              |
| Corn for grain                            | 26196.3 | 31468.2 | 25314.8 | 96.6              |
| Rice                                      | 14956.5 | 12225.0 | 11350.9 | 75.9              |
| Profit, million rubles                    |         |         |         |                   |
| - wheat                                   | 32173.3 | 32782.2 | 23671.0 | 73.6              |
| - barley                                  | 2548.7  | 2202.0  | 1269.4  | 49.8              |
| Corn for grain                            | 12206.3 | 15744.7 | 9432.3  | 77.3              |
| Rice                                      | 5566.8  | 2715.5  | 2395.4  | 43.0              |
| Profitability of production, %:           |         |         |         |                   |
| - wheat                                   | 69.9    | 67.5    | 45.4    | -                 |
| - barley                                  | 62.7    | 51.7    | 27.4    | -                 |
| Corn for grain                            | 87.3    | 100.1   | 59.4    | -                 |
| Rice                                      | 59.3    | 28.6    | 26.7    | -                 |

Analysis of the data in Table 2 shows that the cost of gross production of wheat, barley and corn during the period under study has decreased slightly, and the cost of rice produced – by 25%. The dependence of prices on gross harvest led to a decrease in them over the years, as a result of which in 2017 they decreased by: - wheat by 5.6%, barley - 12.0%, corn - 7.0% and rice by 12.3%. However, the cost of grain production due to inflation had increased, which led to an increase in production costs as follows: for wheat by 13.3%, for barley - 14.4%, for corn - 13.5%. The cost of rice production decreased by 4.5% due to a 10% decrease in sown areas.

Note that Krasnodar Territory is one of the main regions of Russia for the production of export-oriented agricultural products. Grain export through the seaports of Krasnodar Territory is growing annually. Grain transshipment capacities are growing in the ports of Yeysk, Port Kavkaz, Temryuk, Novorossiysk. More than 1400 ships annually go through the

seaports of Krasnodar Territory - Yeysk, Port Kavkaz, Novorossiysk, Taman, Temryuk and Tuapse with grain and products of its deep processing.

Total grain exports of Krasnodar Territory in 2018 amounted to about \$ 2.0 billion, which makes about 4.0% of total Russian exports. Grain and products of its deep processing are shipped to 135 countries of the world, including Turkey, Egypt, Bangladesh, Vietnam, Yemen, Israel, Indonesia, Cameroon, South Korea and others. Grain export of Krasnodar Territory is presented in Table 3.

**Table 3. Grain export of Krasnodar Territory, thousand tons**

| Indicators                               | 2015   | 2016   | 2017   | 2017 in % to 2015 |
|--|--------|--------|--------|-------------------|
| Gross harvest, thousand tons             | 13682  | 13946  | 14081  | 102.9             |
| among them wheat                         | 8460   | 8495   | 8693   | 102.8             |
| Внутреннее потребление                   | 4860.2 | 4956.2 | 5012.3 | 103.1             |
| Export - total                           | 5174   | 5253   | 5256   | 101.6             |
| among it wheat                           | 3869.6 | 3956.2 | 3998.3 | 103.3             |
| Export share in gross grain harvest, %   | 37.8   | 37.7   | 37.3   | -                 |
| Export share in gross wheat harvest, %   | 45.7   | 46.6   | 46.0   | -                 |
| Wheat share in the total grain export, % | 74.8   | 75.3   | 76.1   | -                 |

Analysis of grain exports in Krasnodar Territory has shown that export volumes are growing at a slow pace. So in 2015, 5174 thousand tons of grain were exported, including 74.8% of wheat of classes 3 and 4, and in 2017, 1.6% more was exported, which amounted to 5256 thousand tons and 76.1% of wheat. The share of exports of Krasnodar Territory in the gross harvest of grain crops amounted to 37.3%. The share of exports in the gross harvest of wheat increased by 0.3 percentage points, and amounted to 46.0%. An important export indicator is the share of wheat in total exports, which amounted to 76.1% in 2017.

Analysing the grain market of Krasnodar Territory, we can say that it has a special competitive advantage, which is manifested in the presence of sea access to the world market, through which a large share of Russian grain export is effected. Shipment of grain through 8 seaports (Novorossiysk, Tuapse, Anapa, Gelendzhik, Yeysk, Temryuk, Port Kavkaz, Taman, as well as the river port of Krasnodar), open for international communication and export of products, shows an outstripping average Russian dynamics.

An important component of the development of grain exports is the comprehensive rate for transshipment of grain in deep-sea ports, which currently reaches \$ 23-25 per ton, which is significantly higher than that of competitors from Ukraine, Romania and leading exporting countries. In the United States and Europe, the rate for transshipment of grain is about 6-10 dollars per ton. The main factor affecting the development of the export potential of the grain industry of both the Russian Federation and its regions, in our opinion, is overcoming the technical and technological lag behind developed countries. Therefore, in recent years, there has been an increase in the investment activity of grain exporters in terms of acquiring grain storage and transshipment capacities [19-22].

Krasnodar Territory has the richest natural and labour resources for the production of grain and leguminous crops, a favorable geographical position for accessing world markets, a developed transport and storage infrastructure in comparison with other regions of the Russian Federation, however, the region has a low level of realization of the export potential of the grain market.

Despite the advantages presented above, in the course of the study it was possible to identify a number of obstacles that serve as significant restrictions for the development of the export potential of the grain market of Krasnodar Territory:

- unstable production of sufficiently large volumes of grain, without which it is impossible to ensure regular grain supplies to the world grain market;
- high production risks and instability of grain harvest make it difficult to create reserves necessary for export;
- not always the optimal structure of grain consumption due to large losses when using;
- non-compliance with agricultural production technology does not significantly increase the yield of grain crops, although the conditions for the production of grain crops in Krasnodar Territory allow the use of both extensive and intensive methods to increase productivity;
- insufficient capacity of export port terminals does not allow to sell available products on the world market through ports on the Black Sea (Novorossiysk), the Sea of Azov (Yeysk), etc.;
- unstable and unproductive work of railway transport;
- grain quality control system that does not meet international standards: in the Russian Federation, grain quality is assessed by gluten, while abroad it is by protein content;
- the imperfection of the existing regulatory framework limits the ability of Russian exporters, including in terms of strategic and investment planning;
- fuzzy implementation of tax and customs procedures.

Thus, the problem of developing grain export potential of Krasnodar Territory is complex. Its solution requires the development of coordinated actions by the state and grain market participants [23].

The existing problems in the development of the grain potential in Krasnodar Territory can only be overcome by the joint efforts of the state and interested market participants, for which the following is necessary:

- renewing the state target program for the development of the export potential of the grain market of Krasnodar Territory and creating a coordinating body for the implementation of this program;
- expanding the capacity of port grain terminals to increase grain exports;
- transferring the national grain quality control system to the existing one according to international standards;
- creating information and consulting services to provide system support for the activities of Russian companies;
- improving the regulatory framework of the grain business.

Consequently, the development of the export potential of the grain market of Krasnodar Territory should become an important direction of state policy in the agricultural sector of the region along with the development of exchange trading,

interventions in the grain market and state programs to support agricultural producers [24-25].

One of the advantages of the export potential of Krasnodar Territory is the presence of port facilities in the territory capable of taking part in the shipment of grain abroad. However, the projected growth in the production of grain and leguminous crops, with relatively stable domestic consumption, sets before the export infrastructure of Krasnodar Territory the task of modernising and updating existing equipment and building new outlets for world markets. The region has a low efficiency of port facilities, a high percentage of depreciation and insufficient access to rail and road routes, which limits the development of the export potential of the region.

There is a need for large port complexes, which include large granaries (more than 100 thousand tons), a wagon unloading station, a cleaning tower and a deep-water berth for receiving vessels, and the versatility is an important condition for the development of port infrastructure, i.e. cargo reception, both from vehicles and from the railway, as well as from barges and river-sea vessels. Grain transshipment should be provided according to the so-called direct option, i.e. from the wagon to the ship immediately, the presence of several types of elevators for different types of grain. The largest in Russia and Krasnodar Territory seaport of Novorossiysk has three grain terminals for supplying grain to the world market.

We propose the construction of a new grain terminal to provide for the installation of 9 new silos with a total volume of 110 thousand tons, the construction and commissioning of a complex for receiving 7.5 million tons of grain per year by rail, which is to achieve a design capacity of 12.5 million tons of grain per year.

The main competitive advantages of such a grain terminal are: 1) the ability to deliver grain by road, which will be less expensive than by railway if delivered within less than 500 km; 2) savings on the services of elevators; 3) the presence of direct access roads from the federal highway M-4 "Don"; 4) the ability to service two tankers of the Handymax class or one Panamax; 5) reduction of transshipment time; 6) the presence of a certified laboratory for determining the grain quality.

Construction of a new grain terminal with a capacity of 12.5 million tons, worth 8 billion rubles in the port of Novorossiysk is proposed to implement at the expense of the largest Russian exporters (Table 4). At a transshipment rate including port charges, freight forwarding, fumigation, paperwork for export and surveying at a rate of \$ 15 per ton, the projected annual net profit of the company is to make about 3 billion rubles.

**Table 4. Result from investment, operational and financial activities during the implementation of the grain terminal construction project**

| Indicators                  | 2019 | 2020  | 2021  | 2022  | 2023  | 2024  |
|-----------------------------|------|-------|-------|-------|-------|-------|
| Investment activities       |      |       |       |       |       |       |
| Investments, million rubles | 8300 | -     | -     | -     | -     | -     |
| Operating activities        |      |       |       |       |       |       |
| Revenue, mln. Rub.          | -    | 12375 | 13200 | 14025 | 14850 | 15300 |



|                                  |   |      |      |      |       |       |  |      |      |      |      |      |      |
|----------------------------------|---|------|------|------|-------|-------|--|------|------|------|------|------|------|
| Total costs, million rubles      | - | 8723 | 9284 | 9884 | 10598 | 10995 | Equity, million rubles                   | 8300 | -    | -    | -    | -    | -    |
| Tax base, million rubles         | - | 3652 | 3916 | 4141 | 4252  | 4305  | The inflow of real money, million rubles | -    | 2921 | 3132 | 3313 | 3402 | 3444 |
| Profit tax (20%), million rubles | - | 730  | 783  | 828  | 850   | 861   |  |      |      |      |      |      |      |
| Projected net profit, mln. rub.  | - | 2921 | 3132 | 3313 | 3402  | 3444  |  |      |      |      |      |      |      |
| Financial activities             |   |      |      |      |       |       |  |      |      |      |      |      |      |

Given the increase in the transshipment rate and the cost of providing services in the amount of inflation, we can calculate the effectiveness of the investment project for net profit at a discount rate of 20% in Table 5.

**Table 5. Calculation of the effectiveness of the investment project for the construction of the grain terminal**

| Indicators                                 | Years       |             |             |             |             |             |
|--|-------------|-------------|-------------|-------------|-------------|-------------|
|  | 2019 (0-th) | 2020 (1-st) | 2021 (2-nd) | 2022 (3-rd) | 2023 (4-th) | 2024 (5-th) |
| Investment costs, million rubles           | -8300       | -           | -           | -           | -           | -           |
| Total costs, million rubles                | -           | 12375       | 13200       | 14025       | 14850       | 15300       |
| Tax base, million rubles                   | -           | 8723        | 9284        | 9884        | 10598       | 10995       |
| Profit tax (20%), million rubles           | -           | 730         | 783         | 828         | 850         | 861         |
| Cash inflow, million rubles                | -           | 12375       | 13200       | 14025       | 14850       | 15300       |
| Cash outflow, million rubles               | -           | 9453        | 10067       | 10712       | 11448       | 11856       |
| Net cash flow, million rubles              | -8300       | 2921        | 3132        | 3313        | 3402        | 3444        |
| The same cumulative total, million rubles. | -8300       | -5379       | -2247       | 1066        | 4468        | 7912        |
| Discount coefficient (r = 20%)             | 1           | 0.8333      | 0.6944      | 0.5787      | 0.4823      | 0.4019      |
| Net discounted flow, million rubles        | -8300       | 2434        | 2174        | 1917        | 1640        | 1384        |
| The same cumulative total, million rubles. | -8300       | -5866       | -3692       | -1775       | -135        | 1249        |

**Table 6. Integrated indicators of economic efficiency of the investment project**

| Indicators                      | Parameter values |
|---------------------------------|------------------|
| NPV for 5 years, million rubles | 1249             |
| Internal rate of return, %      | 38.5             |
| Discount payback period, years  | 4.1              |
| Profitability index             | 0.15             |

The analysis of the calculations presented in Table 6 shows that the construction of a grain terminal is not only cost-effective and appropriate for the investor, but will also strengthen the material and technical base of the export potential of Krasnodar Territory.

#### IV. CONCLUSION

As a result of the study, the following data are obtained and conclusions drawn:

1) Despite the fact that the Krasnodar Territory has the richest natural-climatic and labour resources for the production of grain and leguminous crops, a favorable geographical position for accessing foreign markets, a developed transport and warehouse infrastructure, compared with other regions of the Russian Federation, there is a low level of export sales grain market potential realisation.

2) We have proposed the following measures for the development of the grain potential of Krasnodar Territory, which can only be overcome by the joint efforts of the state and interested market participants:

- expanding the capacity of port grain terminals;
- transferring the national grain quality control system to the existing one according to international standards;
- creating information and consulting services providing system support (marketing, financing and insurance) for the activities of Russian export companies;
- improving the regulatory framework of the grain business.

3) it is determined that the main problem of developing the export potential of Krasnodar Territory is the low port throughput. We propose the construction of a new grain terminal with a capacity of 12.5 million tons, worth 8 billion

rubles in the port of Novorossiysk at the expense of the largest Russian exporters. The calculation of the economic efficiency of the proposed project for the construction of a grain terminal in the port of Novorossiysk is not only cost-effective and appropriate for the investor, but will also strengthen the material and technical base of the export potential of the grain market of Krasnodar Territory.

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