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**FOOD SECURITY PECULARITIES: FACTORS AFFECTING EXPORT CAPACITIES  
OF ONE OF THE MAJOR WHEAT GRAIN PRODUCER**

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**Abstract.** Food security of the world is in a big extent dependent on performance of the major grain producers, one of which is Kazakhstan. Grain production in Kazakhstan allows not only to meet domestic grain needs, but also to ensure a steady export. The country is a major global grain exporter and is one of the top ten countries in the world for wheat exports in recent years. It has been leading the export of flour in terms of high quality indicators. Creating an effective transport and logistics infrastructure in key export destinations, developing measures for transit countries, and increasing the level of state support for exports are among the tasks, implementation of which appears to be a precondition of sustainable food security.

**Keywords:** food security; international trade; flour; cereals; enterprises; production; output; processing; capacity; mechanism; grain industry

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**Jel Codes:** Q2, Q3, Q4

## 1. Introduction

Sustainable development path embraces solving issues of energy security (El Iysaouy et al., 2019; Tvaronavičienė, & Ślusarczyk, 2019; Tyo et al., 2019; Razminienė & Tvaronavičienė, 2018; Dudin et al., 2019; Rezk et al., 2019; Tishkov et al., 2020; Strielkowski et al., 2020), water security (Monni et al., 2018; Moumen et al., 2019) and food security (Faridi, & Sulphay, 2019; Bareja-Wawryszuk, 2020).

The paper is devoted to peculiarities of performance of the one of the top world grain producers, Kazakhstan. The interest is triggered by the concern in food security facets by all stakeholders, to be it countries, companies or people.

Currently, Kazakhstan's economic policy is focused on a gradual departure from the "raw material" model of development in the direction of creating conditions for industrial diversification and increasing the competitiveness of domestic production. The implementation of the strategic goals can be achieved through intensive use of natural resources, which will create conditions for increasing the added value of industries that are characterized by the presence of significant potential for future growth.

The flour and grain industry is one of these industries. The sphere of this production is characterized by the rational use of the rich natural potential of the country, which allows ensuring the stability of economic growth of economic entities. The flour and grain industry, due to its technological involvement in other links in the value-added chain, naturally generates an impulse to the development of technologically related industries.

tries, which leads to improving the structure of the industry, expanding export opportunities and, as a result, strengthening the competitiveness of the national economy.

The importance of the industry is also dictated by its contribution to the formation of food security in this country (including by continuously increasing the volume of production of competitive domestic products) (Altukhov & Nechaev, 2015; Altukhov, 2014).

## **2. Methods of research**

A feature of the development of the flour and grain industry at the initial stages of market transformations was the presence of a significant number of emerging enterprises that formed the future competitive environment.

Kazakhstan is among the top ten countries in the world by 9 indicators: territory, area of agricultural land, grain crops, etc. Given the development of the latest technologies, the country's land and water resources can significantly increase the production of agricultural raw materials, especially grain, and consequently increase its supply to the world market (Ushachev et al., 2017; Ushachev et al., 2019).

The economic significance of the flour and grain industry is determined primarily by its ability to fully meet the needs of the baking, macaroni and confectionery, alcohol industries, as well as partially combined feed, since by-products can be both pure and combined feed for livestock industries.

Italy and Turkey are in the first and second positions in the top 5 main buyers of Kazakh wheat-durum with a purchase share of 63.4% (223.3 thousand tons) and 20% (69.2 thousand tons), respectively. Kazakhstan's grain exports in the 2019/2020 marketing year are projected to be at least 10 million tons. The decrease in imports of Kazakh products is due to protective measures introduced by Central Asian countries to reduce dependence on domestic flour exports (Karenov et al., 2019; Mizanbekova & Nurmanbekova, 2019; Sabirova & Kurmasheva, 2018; Mizanbekova et al., 2019).

In recent years, these countries have preferred to buy wheat to develop their own mills. Central Asian countries and Afghanistan will remain among the main export destinations. Two areas should be considered as promising and growing: China and the countries of South-East Asia; Iran and the countries of the Persian Gulf that transit through its territory (Charykova & Latynin, 2015; Tileuov et al., 2019).

## **3. The discussion of the results**

Over the past 10-12 years (almost 5.3 times), the number of grain processing enterprises has increased. At the same time, existing enterprises can annually produce more than 5 million tons of flour with a domestic demand of 1.8 million tons, i.e. the country's export potential for flour exceeds more than 3 million tons annually.

Cereal products are produced by 165 enterprises, including 67 for rice with a total capacity of 504 thousand tons per year. In the structure of produced cereals, 19.7% is buckwheat, 18% is wheat and 11.6% is millet. The share of production of pearl, barley and semolina is 5.4%, 6.5% and 9.4%, respectively, of the total production of cereals. At the same time, corn, oat and barley cereals are produced in a small volume (from 1.7 to 0.2 %).

The distribution of grain industry enterprises by region is not uniform. The volume of cereals production is significant in Pavlodar (28.1 %) and East Kazakhstan regions (20.2 %). In South Kazakhstan region, production capacity is concentrated -14.5 %; in West Kazakhstan region - 8.1 %; in Almaty – 7.7 % and in Almaty and Kostanay regions - 4.8 % and 3.1 %, respectively.

However, the production of cereals in Kazakhstan does not meet the minimum standards of cereal consumption per capita and the actual domestic demand of the country. Unsecured consumption of cereals is associated with incomplete loading of enterprises of the country's cereal industry, whose production capacity is more than 800

tons per day. It should also be taken into account that over the past three years, more than 25% of grain has been processed.

To fully meet the demand for cereals, the country has a sufficient raw material base: all types of cereals are grown, although the share of cereals used for the production of cereals is 0.03 – 19.7% depending on the types of cereals.

In the flour milling industry, the growth of production capacity was mainly due to small, modular mills that do not require large investments. The number of large mills in South Kazakhstan, North Kazakhstan and Karaganda regions has decreased. There is an increase in processing industries in the grain-growing regions of the Republic, for example, in the Akmola region, the growth rate was 225%, in Kostanay 131.9%, in Aktobe 150%. It should be noted that more than half of the total number of mills accounts for small up to 10 people, 1/3 are small mills with up to 50 people working on them, a smaller share is occupied by medium-sized (9%) and the remaining part is accounted for by large mills. The emergence of new entities for grain processing contributes to the formation of a competitive environment in the market, but at the same time, this trend in the development of the flour industry does not contribute to the development and strengthening of its competitive potential, the production of grain processing products according to international standards.

The different degree of concentration and placement of flour and cereals enterprises determines the ranking of the regions of the Republic by the level of self-sufficiency. In order to get a more objective picture, we used the average annual data of the last three years (table 1).

**Table 1.** Grouping of regions of the Republic of Kazakhstan by the degree of provision with bread products (in terms of flour)

Area groups			
1	2	3	4
High level of provision	Middle level of provision	Below average of provision	Low average of provision
150% or more	100-149%	50-99%	0-49%
1. Akmola Region 2. East Kazakhstan Region 3. Kostanay Region 4. North Kazakhstan Region 5. Nur-Sultan city	1. Aktobe Region 2. Karaganda Region	1. Almaty Region 2. Almaty city 3. Pavlodar Region 4. South Kazakhstan	1. Atyrau Region 2. Mangystau Region 3. West Kazakhstan Region 4. Kyzylorda Region 5. Zhambyl Region

Due to the lack of funds for the purchase of grain for pre-payment, grain processing enterprises began to widely practice accepting grain from commodity producers and processing it on tolling terms. It is carried out mainly in two directions:

- exchange operations in which commodity producers hand over grain in exchange for finished products (flour, cereals, feed, seeds);
- operations for the provision of services by grain processing enterprises, in which commodity producers hand over grain for processing into flour or mixed feed.

The conducted research shows that the conditions for accepting raw materials for processing, terms of order fulfillment, prices for services and the procedure for issuing finished products are usually set taking into account the priority of their own interests. A flour milling company only charges at least 40-45% of the produced flour for processing tolled grain, does not return liquid bran, the yield of which is 20-22% per unit of raw material, which is equivalent to the cost of 4-5% of flour, in addition, there is a hidden form of levy (from 5 to 10%), which is formed by artificially understating the quality, class of grain and flour yield, as well as overstating the selling cost of sacks, etc.

Thus, at least 50-60% of the finished product is left by the agricultural producer at the flour milling enterprises when processing grain on tolling terms. If you take into account the cost of delivering grain to the flour mill and exporting finished products to the farm, the effect of processing grain and selling it as finished products

is zero. It is preferable for a commodity producer to sell grain to intermediaries, although half of real income is lost.

Currently, there are 120 mill enterprises in the Northern regions of the Republic, of which 3 are large (with more than 250 employees), 7 are medium - sized (from 50 to 250 employees), 54 are small (from 10 to 50 employees) and 56 are mini - mills (up to 10 employees). Large and medium-sized enterprises, which make up about 9% of their total number, produce 68 % of the total volume of flour produced in the region. The different degree of concentration and location of flour-and-grain enterprises determines the ranking of the regions of the Republic by the level of self-sufficiency.

Kazakhstan exports 7 million tons of grain and flour in the 2019 / 2020 marketing year. The national company “Kazakhstan TemirZholy” will provide grain of the new crop with grain wagons. The total grain storage capacity in the Republic is 27 million tons, including 12.4 million tons at grain - receiving enterprises and 14.6 million tons for rural producers.

In the marketing season of 2019-20, it plans to export half a million tons of grain to China.

Deliveries of Kazakh grain and flour to China only increased: in 2016, the volume of about 300 thousand tons was delivered to the Chinese market, in 2018, deliveries increased to 600 thousand tons.

One of the main activities of “Aruana-2010” LLP is the production of flour. The mill complex is equipped with the latest equipment “Gencdegirmen” (Turkey). “Gencdegirmen” (Turkey) offers modern integrated technological solutions for flour mills: grain cleaning and milling systems, automation systems, automatic knocking out, aerosol transport of finished products, as well as waste processing systems.

By producing high-performance quality equipment for the grain processing industry and putting customer satisfaction at the forefront, to contribute to the development of the flour milling industry. Keeping the maximum quality of products and maintenance under control, work on the consolidation and recognition of the brand “Gencdegirmen” (Turkey) in all corners of the world.

Currently, the company produces wheat flour for baking and consistently provides flour for trade and baking industry enterprises. “PATSHA” brand flour is produced from high-quality grain with a high protein content, which grows in ecologically clean fields of Kazakhstan. Our own Elevator allows us to create an optimally balanced grain supply. Thanks to this, it is possible to achieve high quality of the final product by forming grinding batches. The flour obtained from this grain has an increased gluten content, which is significantly higher than the norm. The high quality of the product is determined by the hydrothermal preparation of the grain for grinding. Hydrothermal grain processing is performed in three stages, which allows you to effectively loosen the endosperm and achieve the necessary technological humidity.

Flexible technology ensures the output of products of adjustable grade and destination, depending on the needs of customers. The mill complex is fully automated, all production processes are controlled by an electronic control system. It is possible to ensure efficient operation of the enterprise only by rational use of raw materials and reducing costs by improving the technology of grain preparation and milling, installing modern equipment at all stages of the technological process, organizing its highly efficient operation, rational use of labor and energy resources.

The largest Kostanay mill complex “Best-Kostanay” LLP, where the entire production cycle, from the receipt of grain to the Elevator to the packaging of finished products, is under a single computer accounting, the Production capacity of the enterprise per year is 155 thousand tons of flour. Despite the fact that the mill is quite new and launched its work this summer, today it has already established exports to a number of CIS countries - Uzbekistan, Tajikistan, Kyrgyzstan, Afghanistan and Russia. We plan to enter the Chinese market.

This is the first single processing line in Asia (including Turkey) with a capacity of 700 tons per day for grain, before it, the most productive lines did not exceed 500 tons per day. At the same time, all technological processes are computerized. Multi-systems of control and control allow you to transfer the flour production completely into automatic mode, without human intervention.

If conventional milling enterprises produce one-, two- or three-grade milling, the use of the latest technologies allows the “Best-Kostanay” flour complex to produce 5 grades of flour at a time, from premium-class ultra-fine flour to coarse flour, which preserves the maximum amount of vitamins contained in the grain-A, thiamine, Riboflavin, nicotinic acid, etc. In addition, the production line includes pipette tips, which allow you to fortify the bread with vitamin complexes. The entire production cycle, from the arrival of grain to the Elevator to the packaging of finished products, is under a single computer accounting, which allows you to control the efficiency of production processes at any time. To prevent manufacturing defects and eliminate the human factor in determining the quality of products, the “InNRsCAn” system was first applied, which allows you to manage the consumer properties of flour, under individual orders of buyers from different countries, bringing the product to a premium level.

A feature of the mill complex to reduce the harmful effects on the environment, technological line of the complex is equipped with devices for dust collection and dust control, so that the emissions do not exceed the maximum permissible norms and not pollute the environment.

The company will ensure the growth of flour production in the region by 16%, increasing the export potential by 20%. Thanks to digital technologies, you can manage this complex remotely from anywhere in the world. The company was supported under the state program “Business Road Map-2020” - a loan in the amount of 1845 million tenge was approved for subsidizing, and subsidies were paid -156.9 million tenge. In addition, the guarantee of the “Damu” entrepreneurship development Fund in the amount of 170 million tenge was approved. This project was implemented with the participation of Turkish investments.

When reaching the design capacity, the mill complex will produce 155 thousand tons of flour of the highest, first and second grades, which will increase the volume of exports of the region’s manufacturing products and provide the market with goods that meet modern standards and quality.

Kazakhstan’s grain is an important source of foreign exchange funds needed for domestic investment of the economy and development of the country. Since the beginning of the year, Kazakhstan has increased grain exports by 1.6 times and the volume of flour shipments has also increased. Only Kostanay region has increased grain exports by 2 times, flour-by 22%. In General, for 6 months of 2018, 1.1 million tons of grain were exported, which is 2 times more than last year, and flour – 435.2 thousand tons, or 22% more than last year. 332.8 thousand tons of grain and flour were shipped to other regions of the Republic (3% more than last year). At the same time, many distant countries, such as Italy, buy small but stable batches of wheat in Kazakhstan. Depending on the state of the grain balance and the volume of crops, the Republic of Kazakhstan can export from one third to half of the current crop.

The main market for Kazakh grain, primarily wheat and barley, is the countries of Central Asia-Uzbekistan, Tajikistan, Kyrgyzstan, and Afghanistan. This is the closest market and the most convenient for grain deliveries from the point of view of Kazakhstan’s land logistics with transportation mainly by rail. Therefore, Kazakhstan’s grain is competitive, and it is difficult for suppliers from other countries to compete with our product here.

These countries are the main consumers of processed grain in the form of flour. But in recent years, the flour market is narrowing – its production technologies are not so complex, and the above countries are actively developing their flour industry and produce flour not only based on Kazakh grain, but also from local wheat, mixing it, if necessary, in the necessary proportion (Baum et al. 2016; Bojncic & Fertő, 2015).

This market was, is now and will remain the most stable and most capacious in terms of consumption of Kazakh-

stan's food wheat for flour production. Uzbekistan is the largest importer of Kazakh grain and flour. In the structure of Kazakhstan's grain and flour exports, it has held a leading position for many years. At the same time, the implementation of another promising direction of grain export through the Caspian sea to Iran and Azerbaijan became possible thanks to the reconstruction of the port of Aktau, and then the construction of the international railway line Kazakhstan–Turkmenistan–Iran (Krivko et al., 2019). Now Iran is an important importer of Kazakh barley, and Kazakhstan feels strong competition with Russian grain. There is a trend in increasing grain imports due to the insufficient amount of arable land in China, water resources and labor, with growing demand for grain. Kazakhstan is persistently pushing for new routes for grain exports (Mizanbekova et al., 2020).

The construction of the Druzhba-Alashankou border railway crossing between Kazakhstan and China and the opening of the Serakhs – Mashhad railway crossing between Turkmenistan and Iran created new transit corridors along the route of the great silk road: from the Pacific ports of China, Lianyungang, Qindao, Tianjin to Kazakhstan, Kyrgyzstan, Uzbekistan, Turkmenistan, Iran, Turkey, to the ports of the Mediterranean and the Persian Gulf. The existing road network provides access to Russia and the former Soviet republics, as well as to China, Turkey and Iran, which provides access to the ports of the Black and Mediterranean seas and the Indian ocean. Sea navigation is carried out on the Caspian sea (Aktau port) with access to the Black and Baltic seas via the Russian river routes. (Mazloev & Khairullina, 2019). In addition, Kazakh grain is supplied to many EU countries, but in relatively small volumes. Some wheat, especially with a high proportion of protein and gluten, is exported to Russia, despite the abundance of its own grain in the country. Kazakh grain occupies its market share in Egypt, Algeria, Turkey, South Africa, Bangladesh, the Philippines and other countries.

Class 3 wheat is a food grain that is most widely used for processing into flour, deep-processing products such as dry wheat gluten, etc.

One of the main quality indicators that determine the technological properties and class of wheat grain is the quantity and quality of gluten (Sidorenko, 2015). According to ST RK 1046-2008, wheat grain with a gluten content in the range of 23-25% and a gluten quality of 20-100 units of IDC belongs to class 3. However, the rating class of wheat to determine such parameters as the grain, falling number, protein mass fraction, weed and grain dimasi and if one of the indicators of quality does not meet the standard requirements for classes, it is transferred to the lower class.

One of the main indicators of flour milling advantages of wheat grain – its performance is nature. Scientific research and experience in the work of flour mills confirmed that the higher the nature, the more complete the grain (with other similar quality indicators), i.e. it contains more endosperm and fewer shells, which ultimately determines the production of more flour and less bran.

In the Akmola region, 319 enterprises are engaged in processing agricultural products, including 55 flour-milling enterprises with a production capacity of 954.0 thousand tons per year. With the actual consumption of one person of 120 kg of bread products (in terms of flour) per year, the daily demand of Nur-Sultan and Akmola region in this type of product is 528 tons, per month – 15840 tons and per year 192720 tons. In 2019, 434,233 tons of fine flour were produced, or an increase of 23% by 2018. The workload of flour production enterprises was 43.0% (in 2018 – 3.27%). Depreciation of technological equipment of enterprises (according to the submitted questionnaires) is on average 23.4%.

## Conclusions

Security in the products of grain processing is one of the most important tasks of state structural policy and is reflected in regulatory legislation and targeted integrated programs. The solution of these tasks is aimed at ensuring the physical and economic availability of these food products in the necessary quantity and assortment for a wide segment of the population. The flour and grain industry is represented by a large number of small-capacity mills, the production of flour is aimed at meeting domestic regional needs, as well as large factories with a developed production infrastructure

The efficiency of the processing complex development is determined primarily by the ability of its branches to meet the needs of the population in the products of grain processing.

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