

# Modern State and Forecast of Food Production in Kazakhstan

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## Abstract

Food industry along with agriculture plays a significant role in ensuring food security of the country. In addition, the condition of food provision in Kazakhstan is characterized by the threshold level of dependence on foreign market. The state has weak control over the food market; the country cannot feed itself on its own. Import reaches from 40% to 60% for majority of items in the consumer basket. Analysis of import flows shows that share of import in domestic consumption of major food items has already exceeded maximum permissible level for a long period of time. Such situation is very dangerous for the country's economy and deepens its significant dependence on the foreign market, increasing competitiveness both in domestic and foreign market. One of the reasons of current state is falling behind the domestic needs in food production, low efficiency of food industry enterprises, low competitiveness of domestic products, etc. Solution of the food industry problem requires large scale modernization, technical upgrading of enterprises, increase of the state support amounts up to the level adopted by the Customs Union Member States, improvement of the management methods and its focus on market laws.

**Keywords:** Agrarian Sector, Export, Food Industry, Food Provision, Food Security, Forecast, Import, Market

## 1. Introduction

Food industry being a structural element of the agrarian industrial complex plays an important role in ensuring food security of a state. Its development includes potential of ensuring food security, which is created as a response to possible threats of the food crisis, in order to overcome hunger and malnutrition, which are experienced in the world, particularly in the undeveloped countries, in the areas of military conflicts, in case of natural and economic disasters, social and economic crises, etc. In conditions of globalization food sector of our country as one of the parts of food security provided by the global community becomes a constituent part of the global food system.

Solution of the food security problems and high quality provision, available goods for population is one

of the most significant social and economic development problems at the current stage. Furthermore, there is an objective need to saturate the market with domestic products, which implies efficient functioning of the food industry enterprises because not only the quality of life of population, but also general economic development depend on volume of domestic food items production.

The role of the food industry is also justified by its ability to accumulate achievements of science, new technologies, define development of other sectors of economy and stimulate growth in labor productivity. It is necessary to note a significant multiplication effect related to the influence of food industry on agriculture, transport, wholesale and retail trade. This sector of economy has a great investment potential determined in particular with relatively low capital intensity and high turnover rates and return on investments.

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Functioning of the food industry enterprises in Kazakhstan requires accelerated solution of the tasks related to production modernization, full use of existing potential in the conditions of the growing competition in the food market. Structure of the food industry market includes enterprises and entities functioning in agrarian business, in wholesale and retail raw materials, semi-finished and finished goods trade, as well as foreign economic organizations, dealing with export and import transactions in the foreign food markets.

Food industry is a heterogeneous multilevel social-economic system, which is justified by great variety of both primary biotechnological production and vast range of products. Functional-structural design of the sector is characterized by high diversification of forms, methods and ways of organizing interaction of different players in production-economic activity:

- Within the sector a whole food production cycle is full filled from producing primary raw materials for final items manufacture to their final use both in households and public catering. The cycle covers all types and kinds of production and commercial activity, directly or indirectly related to satisfaction of the demand for food products among the population.
- Activity in food industry includes combination of different ways to satisfy the demands for certain products: from very simple to very complicated ones, related to the activity of multi-sectoral transnational food corporations.
- Food industry is characterized by big variety of economic structures and forms of production organization, distribution, exchange and final consumption. In modern conditions the development of large-scale agrarian business, based on developed market relations; the number of mixed economic forms is increasing, including those within the public-private entrepreneurship.
- The final stage of food production is characterized by increased homogeneity. In particular, there are many types of nutrition organization, which are created under the influence of economic, cultural, social factors, identifying the specifics of national cuisine, systems and regimes of food consumption.
- Process of functional-target differentiation of the industrial enterprises is actively performed in compliance with the purchasing power of different population strata, with individual and group preferences and tastes, as well as with gender and age, professional and other objective factors, which predefine the parameters of individual consumer's basket, as well as rational nutrition regimen.

## 2. Method

Methodological basis of the research included works in the field of economic theory, micro and macroeconomics. In course of research statistical, comparison, economic-mathematical modeling methods were used.

## 3. Results

As a result of the conducted market reforms, food industry of Kazakhstan has experienced major changes:

- There was a decrease in production volumes, caused by general economic peculiarities of the transition period, in which main attention was paid to macroeconomic regulation, and real sector of economy was out of picture of state governance, which led to decrease in production volumes in the country.
- A consequence of denationalization processes and property privatization was decrease in scale of state participation in the sector activities. Along with that new approaches to production management were developed based on modern framework adapted to market management.
- Adaptation of food industry to the conditions of market functioning resulted in structural changes. Significant changes happened, in particular, large capacity enterprises were unable to adapt and streamline efficient performance in new conditions due to the interrupted supply, and destruction of the existing supply chain. This has happened to large meat processing plants, poultry factories, agricultural units that have lost their leadership due to lack of mobility and working experience in the new conditions and were forced to go off the market.

According to the data of the Statistics Agency of the RK, 2, 263 entities produce food items in the country. The main share in the structure of food items production, including beverages, is taken by grain crops processing (30.0%), meat processing (10.3%), dairy (14.1%), fish processing (0.9%), fruit and vegetables (9.3%), fat and oil products (6.3%), beverages production (17.0%). Enterprises of the sector produced 5.2% of the republican industrial production volume and 22% of the processing industry production volume in 2014. Production capacities of processing industries are used inefficiently: Average annual capacities of meat and dairy producing enterprises are used only by 18.9%, sausage products – 32.9%, milk – 36%, butter – 39%.

The data of the Table 1 allow talking about negative trends in Kazakhstan's economy. In particular, for the

analyzed period of time the raw material focus of the economy was preserved, which is evidenced by the growing share of mining industry with decreased relative weight of processing industries.

**Table 1.** Structure of industrial production in the RK for the period of 2010-2014, %

Sectors	2010	2011	2012	2013	2014
Industry in general	100	100	100	100	100
Mining industry	52.2	56.4	55.8	61.3	63.3
Mechanical engineering	3.6	2.9	03.2	3.1	3.4
Textile and tailoring industry	0.6	0.24	00.3	0.15	0.11
Chemical industry	0.9	1.1	01.0	0.9	0.9
Food industry	6.2	6.1	06.9	5.7	5.2
Other	30.0	28.56	28.3	28.85	27.09

Source: Compiled and calculated according to the data of Annual Statistical Bulletin of 2015.

Adaptation process of the food industry to the market transition was accompanied by the changes that evidenced crisis conditions in the course of adaptation to the new functioning conditions. In the process of reforms there were significant changes which affected the scale and structure of production, relationship between supply and demand in the domestic market, creation of supply by means of goods of Kazakhstan and foreign origin, pricing of food items and other. Positions of previously efficient entities were lost. Share of the food industry has a persistent decreasing trend: From 6.2 % in 2010 to 5.2% in 2014. Market conditions added new organizational problems as well related to the structural deformations, resource unbalance, problems of domestic business survival, which had to compete with foreign producers not only in foreign markets, but domestic food markets as well<sup>1</sup>. First of all it is necessary to note that scale and

volume of production changed towards decrease. In many aspects it can be explained by the fact that basic parameters of potential development resources for the food industry have changed, caused by transformations, including appearance of private property. In particular, land resources were taken out of agricultural flow, which led to their decrease. Instead of large agricultural producers, who were supplying raw materials, came small producers, farmers and individual producers. Furthermore, food sector has lost significant part of processing capacities, which were previously in operation in the form of large meat and milk processing plants, etc<sup>2</sup>.

Table 2 shows data on volume of main food items production in the period of 1990 – 2011<sup>3</sup>. The data given in the table allow drawing certain conclusions. Thus, in 2011 there was a growth in production of all goods except sugar compared to 2000: Production of meat grew by 1.5 times, milk - by 1.4 times, eggs - by 2.2 times, potatoes - by 1.8 times, vegetables and gourds - by 2.5 times, flour - by 2.2 times, oil - by 8.4 times. However, comparison with 1990 shows that for all analyzed commodity items except for oil and flour there is a decrease, which demonstrates that it was not possible to reach the pre-reform level.

Lack of goods is compensated by their import. In 2014 the share of relative weight of imported food items out of all volume of import was 8.7%; however, there is a significant dependence on import for many strategic important goods, because their share is relatively high.

Development of the food industry market in Kazakhstan has its peculiarities. In order to perform economic assessment of the Kazakhstan food market development level it is necessary to analyze availability of food items for population. Table 3 shows data on consumption of main products per capita<sup>4</sup>.

As it can be seen from Table 3, in 2014 medical consumption norms were not achieved in the country

**Table 2.** Production volume of the main food items for the period of 1990-2014

Indicators	(Tsd. tons)					
	1990	1995	2000	2005	2013	2014
Meat and meat products expressed as meat units	1,524.4	985	622.6	838.7	937.4	939.4
Milk and dairy products expressed as milk units	5,642	4,619	3,730.2	4,749.2	5,381.2	5,232.5
Eggs and egg-products (mln pcs)	4,185	1,841	1,692.2	2,514.0	3,720.3	3,718.5
Potatoes	2,324	1,720	1693	2415	2756	3076.1
Vegetables and gourds	1,438	942	1652	2858	3310	4125.7
Flour	3,481.6	950.6	1,740.8	2,756.0	3,754.0	3,846.0
Oil	95	44	27.9	167.5	217.4	235.0
Sugar	319	113	279.7	528.8	363.0	275.4

Source: compiled and calculated according to the data of Annual Statistical Bulletin of 2015.

for all given items (meat, sugar, potatoes, etc). Compared to 2009 there is a certain growth of consumption. If in 1990 - 1995 the main problem was food items deficit, now the situation is different: Many products became unavailable not physically, but rather economically, i.e., households do not have enough funds for procurement of necessary amount of the main food items. For instance, average per capita meat consumption is a sign of the population's quality of life and directly depends on income, habits and culture. Meat consumption has been growing in Kazakhstan lately and is above China level (49.9 kg), but below EU level (80 kg) and USA level (113.4 kg). Comparison with the norms shows that per capita meat consumption is higher than national norms (48 kg), and the share of import in consumption is high. Furthermore the values of consumption norms in Kazakhstan compared to the Soviet Union values have decreased for all items. According to the experts' opinion, national consumption norms approved in 2008 are understated and require revision, because they define the nutrition at minimal level (2,137 kcal). Thus, every Kazakhstani citizen according to national norms should consume the following amount of food: Bread - 120 kg; meat - 48 kg; vegetables and gourds - 100 kg; fruit - 22 kg; eggs (units) - 139; fish products - 5 kg<sup>3,5</sup>. According to scientifically justified norms, consumption of the same products should be 108, 82, 146, 60, 292, 17 kg,

respectively. This inconsistency can be a sign that nutrition balance of the population is mainly preserved by means of starch containing products with decrease in proteins consumption, which shows nutritional imbalance and deficit of vitamins and microelements consumption. Dynamics of the agrarian products market development is given in Table 4.

Data on volume of production, export and import ratio and market capacity of agrarian production are provided in Table 4. The analysis of the table data shows that for the analyzed period growth of the production volume is observed. However, over the period it is possible to note the non-uniform development, being accompanied by increase and decrease in the production volume in different years (Table 4). For the same period it is possible to note stable growth of production export, however in recent years the export indicator decreased under the influence of the world financial crisis, and also climatic factors. A disturbing symptom is that import of agrarian production steadily grows and only in 2013 there was some decrease, food production import cost exceeds export cost by more than twice.

Such situation negatively influences food security of the country. According to the official data, basic needs of the domestic market in foodstuff are satisfied at the expense of a domestic production. However, it should be noted that the list of such goods on our observation does

**Table 3.** Average per capita consumption of main food products compared to medical norms

Food Items	Medical Consumption Norm (Kg/Year)	Years					
		2009	2010	2011	2012	2013	2014
Meat and meat products	82.3	37.1	40.8	40.8	51	53	66
eggs, units	260	114.1	120.8	119.6	129	130	150
Fish and fish products	18	8.6	9.1	9.2	9.4	9.2	9.1
Sugar	24	16.6	17.4	16.6	17.1	16.2	16.5
Oil	10	10.4	10.4	10.5	12.2	11.9	11.5
Vegetables, gourds	120	71.8	73.0	72.5	76	71	88
Potatoes	95	45.2	45.5	44.8	43	42	47
Milk	400	205.1	207.8	204	210	204	228

Source: compiled and calculated according to the data of Annual Statistical Bulletin of 2015.

**Table 4.** Dynamics of Kazakhstani agrarian market development in 2008-2013

Indicator	2008	2009	2010	2011	2012	2013
Volume of production, billion tenge	674.16	853.2	1,121.7	1,384.1	1,659.8	1442.6
Export, billion tenge	90.2	134.1	250.5	358.7	242.1	286.4
Import, billion tenge	169.3	209.5	278.8	359.9	363	340.1
Market capacity of billion tenge	753.26	928.6	1,150	1,385.3	1,780.7	1,496.3
Share of Kazakhstani production on the domestic market, %	77.5	77.4	75.8	74.0	79.6	77.3

Source: compiled and calculated according to the Industry Program6.

not allow speaking about ensuring food security at the expense of domestic production. Data on resources of the main foodstuff and its use are provided in Table 5.

Import share in consumption is great for such goods as fowl - 68 %, animal fats - 98.3 %, fish, prepared and preserved - 99 %, vegetables - 85.5 %, fruits and nuts - 93 %, and also is essential for such goods as meat products, including sausages - 40 %, vegetable oils - 45 %, margarine - 56.5 %, dairy products - 27 %. In this regard it is expedient to analyze formation and use of resources of foodstuff<sup>5</sup>.

In our opinion, one of the problems of branch management is absence of competent planning and forecasting for medium-term and long-term prospect. The forecast defines expected options of economic development proceeding from a hypothesis that major factors and tendencies of the last period remain for a forecast period or that it is possible to prove and consider the direction of their changes in the considered prospect. The similar hypothesis is put forward proceeding from a lag effect of economic events and processes.

The lag effect in the social and economic phenomena is shown doubly: First, as a lag effect of interrelations, i.e., preservation of dependence, correlation of a predicted variable from a set of factorial signs; secondly, as a lag effect in the development of the separate parties of phenomena,

i.e., as some extent of preservation of their characters, rates, direction, volatility of the main quantitative indices throughout rather long time. To reveal the general tendency of growth of socio-economic factors during the analyzed period, smoothing of temporary ranks is carried out. It is caused by the fact that, in addition to the influence of the main factors on the settlement indicator level, numerous random factors operate, causing, thereby, the deviation of levels from the trend. The result of this influence is also formed by means of a residual casual component. At all methods of smoothing temporary ranks for the purpose of the main tendency identification proceeds, first of all, from the actual development of dynamics during the considered time.

In the methodical plan the main tool of any forecast is an extrapolation scheme. The essence of extrapolation consists in studying the forecast object development steady tendencies which developed in past and present and their postponement for the future. The tendency described by some function from time is called as a trend. Trend is a long tendency of change of economic indicators. Function represents the simplest mathematical-statistical (trend) model of the studied phenomenon<sup>6</sup>.

Forecasts on the basis of extrapolation of dynamics ranks are possible to present in the form of a certain function value:

**Table 5.** Resources and use of separate types of raw materials and goods for 2013

Description	Thous. tons					
	Production, Thous. Tons	Import, Thous. Tons	Export, Thous. Tons	Sales in Domestic Market (Capacity)	Own Production Share in Consumption	Import Share in Consumption
1	2	3	4	5	6	7
Meat and fowl, food offal, including:	872.7	156.3	2.9	1026.2	85%	15%
fowl	64.5	132.6	2.5	194.6	32%	68%
Fats of cattle, sheep, goats, pigs, tons	0.0.06	3.52	0	3.58	1.7%	98.3%
Meat products ready and tinned, including:	50.3	33.7	0	84.0.0	60%	40%
sausage products	40.5	28.4	0	68.9	59%	41%
Fish prepared and preserved	34.7	64.7	34.0.0	65.4	1.1%*	98.9%
Vegetables, except potatoes, processed mushrooms	13.6	70.1	1.7	82.0.0	14.5%	85.5%
Processed fruits and nuts	2.0.0	22.7	0.2	24.5	7%	93%
Vegetable oils	181.3	142.9	5.4	318.8	55%	45%
Margarine and similar products	34.6	34.7	7.9	61.4	43.5%	56.5%
Dairy products	380.3	144.4	0.8	523.9	72.4%	27.6%

Source: compiles and calculated according to the Statistics Yearbook of Kazakhstan, 2015



Where,

? - predicted value of dynamics rank.

l – look-ahead period.

$y_i$  – the rank level taken for the basis of extrapolation.

$a_j$  – parameter of trend equation.

Having made smoothing of a temporary rank by the least-square method, we receive a linear trend dependence of the form:

(1)

Extrapolation is carried out by substitution of value of the independent variable  $t$  corresponding to the size of the look-ahead period (forecast) in the trend equation. Extrapolation gives the chance to obtain forecast point value, i.e., an evaluation of the predicted indicator in a point on the equation, describing the tendency of the predicted indicator. It is an average evaluation for the predicted interval of time.

(2)

The size of a confidential interval of trend extrapolation is defined as follows:

**Table 6.** Data of a time-series during 2010-2013 for forecast calculation of foodstuff

Indicators	2010	2011	2012	2013
Meat and offal food, thous. tons	112.3	113.5	129.4	157.2
Grain, flour from grain rough grinding, thous. tons	40.2	43.2	40.7	50.2
Macaroni products, thous. tons	110.9	111.3	112.8	124.1
Vegetable oils, refined and non-refined, thous. tons	237.4	188.9	203.5	222.9
Milk processed, liquid and cream, thous. tons	261.1	265.5	250.7	295.9
Milk, firm forms, thous. tons	3.8	3.4	3.1	2.6
Butter, thous. tons	19.7	16.6	15.3	14.0
Cheese and cottage cheese, thous. tons	17.2	15.5	15.6	16.3
Fruit and vegetable juice, thous. liters	16,8035.1	122,509.5	13,6816.8	180,087.4
Sugar, thous. tons	373.1	480.9	337.7	347.3
Cognac, million litres	6.1	4.3	4.5	5.1
Vodka and alcoholic beverages, million litres	63.7	61.2	48.0.0	62.3
Beer, million litres	411.0.0	361.2	361.5	495.2
Nonalcoholic beverages, million litres	11127	2206.2	1029.8	1135.9

Source: compiles and calculated according to the Statistics Yearbook of Kazakhstan, 2015

**Table 7.** Look-ahead values of indicators of food production for 2015-2018

Indicators	2015	2016	2017	2018
1	2	3	4	5
Meat and offal food, thous. tons	133.17	142.7	152.23	161.76
Grain, flour from grain rough grinding, thous. tons	49.29	53.22	57.15	61.08
Macaroni products, thous. tons	143.47	153.72	163.97	174.22
Vegetable oils, refined and non-refined, thous. tons	219.16	224.72	230.28	235.84
Milk processed, liquid and cream, thous. tons	278.42	293.54	308.66	323.78
Milk, firm forms, thous. tons	2.34	1.9	1.46	1.02
Butter, thous. tons	14.46	13.3	12.14	10.98
Cheese and cottage cheese, thous. tons	14.88	14.58	14.28	13.98
Fruit and vegetable juice, thous. liters	147.8	153.6	159.4	165.2
Sugar, thous. tons	380.26	353.37	326.48	299.59
Cognac, million litres	4.1	3.7	3.3	2.9
Vodka and alcoholic beverages, million litres	53.76	51.1	48.44	45.78
Beer, million litres	385.3	392.45	399.6	406.75
Nonalcoholic beverages, million litres	1171.92	1236.39	1300.86	1365.33

Source: compiles and calculated according to the Statistics Yearbook of Kazakhstan, 2015

$$t = n, \quad l = 1, 2, \dots, L \quad (3)$$

where,

? - point prediction for the moment  $(t+l)$ .

$S_y$  - trend standard error.

? - multiplier, determined by the table with set probability.

Value of  $K^*$  depends only on observation number (number of  $n$  rank levels) and  $l$  (look-ahead period).

With growth of  $n$  values of  $K^*$  decrease, and increase with growth of  $l$  -. Therefore, rather reliable forecast turns out at rather large number of observation (for a linear trend, for example, at least 6 and look-ahead period is not so big. For the same  $n$  with growth of  $l$  confidential interval of forecasting increases.

Standard error of forecasting indicator  $S_y$  evaluation is defined by formulae:

(4)

Where,

? - level actual value.

? - accounting estimate of corresponding indicator on the model.

$n$  - range.

$m$  - number of parameters depending on  $f(t)$ .

Correlation ratio of indicator and agent was defined by correlation index:

(5)

Where,

? - mean-square deviations, calculated on formulas.

(6)

(7)

Where,

? - arithmetical mean of agent  $x$  and indicator  $y$ .

Let us illustrate the use of this method as exemplified by forecasting food production in the Republic of Kazakhstan. For carrying out calculations we will use data of a time-series during 2010-2013 presented in Table 6.

Look-ahead values of indicators of food production for 2015-2018 are presented in Table 7.

The obtained look-ahead data allow saying that preservation of the developed tendencies essentially will not change situation in the branch and will not affect considerably food security. It is necessary to improve management, to take the emergency thought-over measures for business development in the food industry that is possible only with reasonable state regulation of agriculture, as well, with obligatory observance of

interests of agricultural producers and processors. The logic of further economic transformations demands transition to the new quality of growth in the agrarian sphere, connected with formation of rational structure of agrobusiness, increase in the level of agrotechnologies, transition to the marketing strategy of agricultural production, import substitution in the domestic market, activation of export to the countries of the near and far abroad.

## 4. Discussion

Thus, specifics of functioning of the food industry production market, ensuring food security, demands implementation of a number of actions among which it is necessary to distinguish:

- Implementation of modernization, construction of new and reconstruction of the operating enterprises in the sector in the shortest terms.
- Acceleration of updating fixed assets of the processing facilities, reduction of terms for development of capacities returned to service.
- Strengthening of the state support of the agricultural enterprises as source of qualitative raw materials for processing.
- Increase in the amount of the state support up to level resolved in the Customs Union.
- Development of the integration processes providing possibility of expansion of production sales markets.

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