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PLANNING THE DEVELOPMENT OF AGRICULTURAL SECTOR OF KAZAKHSTAN: THEORETICAL APPROACHES

The article analyses various theoretical approaches to the planning of agricultural and food sectors in Kazakhstan. It is argued that the method of forecast scenarios is the most effective one. The pessimistic, moderately pessimistic, neutral, moderately optimistic and optimistic scenarios of long-term development of agriculture are presented. The results of the research and the calculations have allowed to draw a conclusion that the moderately optimistic scenario of the national agrofood sector is the most probable one.

Keywords: *agricultural and food sector; forecast scenarios; long-term planning; crop yield; productivity.*

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ПЛАНУВАННЯ РОЗВИТКУ АГРОПРОДОВОЛЬЧОЇ СФЕРИ КАЗАХСТАНУ: ТЕОРЕТИЧНІ ПІДХОДИ

У статті проаналізовано різні теоретичні підходи до планування розвитку агропродовольчої сфери Казахстану. Найбільш ефективною є методика прогнозних сценаріїв. Досліджено ймовірність реалізації в аграрному секторі країни песимістичного, помірно песимістичного, нейтрального, помірно оптимістичного та оптимістичного сценаріїв довгострокового розвитку. Результати дослідження та проведені розрахунки дозволили дійти висновку, що помірно-оптимістичний сценарій розвитку національної агропродовольчої сфери є найбільш ймовірним.

Ключові слова: *агропродовольча сфера; методика прогнозних сценаріїв; довгострокове планування; врожайність; продуктивність.*

Табл. 3. Літ. 15.

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ПЛАНИРОВАНИЕ РАЗВИТИЯ АГРОПРОДОВОЛЬСТВЕННОЙ СФЕРЫ КАЗАХСТАНА: ТЕОРЕТИЧЕСКИЕ ПОДХОДЫ

В статье проанализированы различные теоретические подходы к планированию развития агропродовольственной сферы Казахстана. Наиболее эффективной является методика прогнозных сценариев. Исследована вероятность реализации в аграрном секторе страны пессимистического, умеренно пессимистического, нейтрального, умеренно оптимистического и оптимистического сценариев долгосрочного развития. Результаты исследования и проведенные расчеты позволили сделать вывод о том, что умеренно оптимистический сценарий развития национальной агропродовольственной сферы является наиболее вероятным.

Ключевые слова: *агропродовольственная сфера; методика прогнозных сценариев; долгосрочное планирование; урожайность; продуктивность.*

Problem statement. Kazakhstan has real opportunities to produce a wide range of food products in the volume, that ensures not only food security of the country, but also the possibility of expanding the export potential of Kazakhstan both at the expense of raw materials and the realization of food products at the world markets. Currently, however, the food potential of the country is being used inefficiently. This is evidenced, first of all, by the irrational pattern of food products imports, most of which could be produced domestically. Under these conditions it's necessary to look

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for more appropriate scientific approaches to strategic management arrangement in the food sector on the basis of analysis improvement, planning and forecasting the progress trends at internal and external food markets, taking into consideration the influence of different factors.

Latest researches and publications analysis. While developing forecasts in different sectors in Kazakhstan the program target-oriented approach is widely used. The theory of target management is described in the works of P. Drucker (2001).

In his work "The tasks of management in XXI century" a comprehensive vision of target management problems under the modern conditions of globalization of production and economic activity is given (Drucker, 2007).

The ideas of target management in the context of the formation and development of the market economy are being widely used by the scientists of Kazakhstan (Kenzheguzin, 1999).

However, in spite of the depth and absolute significance of these developments for Kazakh economy, they don't adequately take into consideration the influence of numerous factors of socioeconomic environment and their uncertainty, in particular (Mazhitova, 2007).

The most appropriate from the existing methods and techniques of long-term socioeconomic forecast for the food sector is a method of alternative forecast scenarios (Medvedev, 2000). As the analysis of the works by foreign scientists shows, it is exactly the method of alternative forecast scenarios that reflects the needs of strategic forecasting in the complex set of conflicting trends in the global economy. It is recognized that under the conditions of fast and controversial changes it is no longer possible to use the methods of forecasting based only on the extrapolation of existing trends of technical, technological, economic and social development (Belov, 2001). The experts have doubts about the attempts of multivariate quantitative forecast of the dynamics of the world market's opportunities and the development trends in particular spheres of industrial and commercial activity (Mintzberg, 2001). The method of alternative forecast scenarios provides a holistic view of the socioeconomic systems' development with a limited number of strategic scenarios.

The main goal of this study is theoretical analysis and substantiation of the method of long-term planning development of the food sector in Kazakhstan.

Key research findings. In our opinion, to predict the development of the food sector 5 scenarios of long-term development, that allow to take into consideration the trends of production, distribution and consumption of food products should be used: pessimistic, moderately pessimistic, neutral, moderately optimistic and optimistic. Already at the stage of the selection of 5 alternative forecast scenarios their disparity should be noted, namely, pessimistic and neutral scenarios do not reflect the actual state of affairs in domestic agribusiness and, especially, long-term business prospects of Kazakhstani producers in the overall context of existing strategic challenges under the conditions of globalization. Only optimistic and moderately optimistic scenarios can be considered as the most realistic ones.

The expediency to take into consideration the low probability scenarios of the food sector's development is caused by that fact that positive factors can not be marked out without simultaneous consideration of the negative ones (though they can be absolutely different by their impact). If the factors of food sector's steadiness

are marked out, then risk factors should be taken into consideration, meanwhile positive factors should be considered together with negative trends.

The pessimistic scenario is based on finding the main adverse factors, and forecasting their joint impact on the development of national food industry. According to the pessimistic scenario the slow pace of the food sector is assumed. The decline of competitiveness of domestic producers of food products is predicted. The pessimistic scenario assumes the activation of the import of foreign food products after the accession of Kazakhstan to the Customs Union and the forthcoming accession to the WTO. In general, the development model forecasted with the help of pessimistic scenario is not able to realize the food potential of Kazakhstan. Therefore, this scenario is unacceptable from the standpoint of strategic objectives of the sustainable socioeconomic development.

Considering the moderately pessimistic scenario, it should be emphasized that the probability of its realization is slightly higher than for the pessimistic scenario. It corresponds with the extensively industrial model of the food sector. This model assumes the preservation of relatively low efficiency of the functioning of the agricultural sector compared to highly developed countries. This scenario shows that gradual renewal of production and technical base of the agriculture sector and holding special arrangements to raise crop yields, livestock sector's productivity and output capacity in the food industry can give satisfactory results. The extensively industrial model only partially solves the problem of food production capacity. There remains a fundamental problem of improving the quality of food at fair ratio of the price level and quality of food products (Morozova, 2000).

Neutral scenario assumes the use of intense industrial model of development of the food industry. In this model, deep modernization of all the subsystems of the food sector is carried out, fairly large horizontally integrated food companies are formed as the basis for intensive agricultural production and the formation of stable production technological and organizational and economic interrelations, covering the full cycle of food reproduction. At the same time integrated structures of large-scale agribusiness are formed establishing the connection on the contractual basis with the representatives of SME.

In accordance with the method of alternative forecast scenarios after the neutral a moderately optimistic scenario is examined. However, in our opinion, it would be better to go directly to the optimistic scenario, basing on the probability of its realization. Optimistic scenario assumes the implementation of global economic and social model of the food sector's development, including the comprehensive modernization of the food sector, complete saturation of the domestic food market with high quality and ecologically pure food, accelerated development of export potential with the active support of the state, the expansion of Kazakh food producers through joint ventures in other countries under the brands of Kazakhstan etc. (Pikulkina, 2000).

From our point of view, the choice of moderately optimistic scenario as the base to support long-term forecast of the food sector's development in Kazakhstan is the most realistic one. To support this choice some good reasons can be given. First, it is expedient to use the method of analogues. Namely, the modernization of the food sector under the similar climatic conditions in highly developed countries such as Canada and Australia took over 30–40 years, that means the long-term nature of

transformation processes of the agriculture even in the countries with developed market economy. Second, the accession to the WTO will considerably complicate the application of direct government support for domestic food producers, therefore, will slow down the formation of large capital-intensive processes of intersectoral food systems, capable of competing at foreign food markets. Third, the complete saturation of the national food market with high quality and ecologically clean products (as according to the optimistic scenario) is not very realistic because of the significant stratification of the population by income level.

Within the given scenario by 2030 Kazakhstan will achieve the level of the countries with developed market economies for the most of the parameters of intensive agriculture, livestock mechanization and automation of production processes in food industry, computerization of business and management processes. These positive changes will help intensify the production activities and ensure the achievement of global competitiveness in terms of crop yields and livestock productivity and output capacity in the food industry.

Table 1 shows the predicted quantitative targets of the production intensification, that have been calculated basing on the following criteria: first, to calculate each target of food production the leading countries have been chosen and the pace of development of the agricultural commodities markets in these countries is compared; and secondly, the indicators of producing countries, oriented mainly on intensive technologies in the agriculture have been used; and thirdly, the emphasis is on the countries that are major exporters of this type of food commodities at the market.

Table 1. **Predicted quantitative targets of the intensification of production of raw material industry in the food sector in Kazakhstan for the period up to 2030**

Types of production	Quantitative targets	
Crops production	centner/ha	
Wheat	22–33	
Corn and grain	60–70	
Rice	67–77	
Fruit and vegetable production	centner/ha	
Potatoes	280–375	
Major vegetable crops	280–380	
Melon and gourd cultivation	350–450	
Provender milling	centner/ha	
Corn for silage	240–280	
Fodder root crops	350–400	
Livestock farming		
Average live weight of cattle	kilogram	400–500
Average live weight of small cattle	kilogram	55–65
Average annual yield of milk	kilogram	4700–5600
Average annual egg production	pieces	235–265

Notes: The initial data are the indicators of the strategic development of the Republic of Kazakhstan for the period up to 2030, as the formation of the forward-looking quantitative benchmarks intensification of resource-based industries in the food sector.
Sources: http://faostat.fao.org/site, http://www.agr.gs.ca, http://www.fas.usda.gov/grain.

Here is a fragment of the calculation of predicted quantitative targets in the food sector in Kazakhstan for the period up to 2030, that shows the method of the forecast development. The basis for the mathematical apparatus is a trend model of econom-

ic dynamics. Its main objective is to develop the forecast of the studied process for a future period.

After finding the linear regression equation, both the evaluation of the significance of the equation as a whole and individual parameters is carried out. The evaluation of the significance of the regression equation as a whole is given using the Fisher coefficient F-test.

As a result of the above mentioned calculation algorithm the models of predictive trends for certain types of food raw materials have been found. For example, the trend model for wheat yields is as follows (Table 2).

Table 2. **Forecasts of wheat yields (for leading countries and relevant markets)**

Calculation index	Country	Trend model equation	Average squared error of estimation	Coefficient of determination, r^2_{yx}	the Fisher coefficient F-test	F-test table	Darbin and Watson coefficient, d
Crop yield, centner/ha	the USA	Yt = 22.279 + 1.008 t	1.495	0.498	1.319	5.990	2.959
	Canada	Yt = 15.366 + 1.827 t	1.192	0.867	12.117	5.990	3.030
	Australia	Yt = 8.866 + 2.084 t	1.160	0.901	17.211	5.990	1.582
	Russia	Yt = 11.193 + 1.069 t	1.838	0.843	15.739	5.990	3.808
	Argentina	Yt = 12.188 + 2.298 t	1.369	0.887	14.832	5.990	2.468

Notes: The main goal is to develop a forecast of the process being studied for a coming period. To carry out predictive calculations we choose the polynomial view of the growth curve.
Sources: http://faostat.fao.org/site, http://www.agr.gs.ca, http://www.fas.usda.gov/grain.

According to the results of obtained predicted values, we can conclude that the quantitative target of wheat yields in Kazakhstan by 2030 will be within the range of 22 to 33 kg/ha (Table 3).

Table 3. **Wheat yields,** *centner/ ha*

	The USA	Canada	Australia	Russia	Argentina	midband
2010	29,335	28,154	23,454	18,673	28,272	21,84
range:						
- lower	26,293	25,730	21,094	14.935	25,488	
- upper	32,376	30,578	25,814	22.412	31,056	
2015	30,343	29,981	25,538	19,742	30,57	23,28
range:						
- lower	26,848	27,196	22,827	15.446	27,371	
- upper	33,837	32,765	28,249	24.037	33,769	
2020	31,351	31,808	27,622	20,810	32,867	24,72
range:						
- lower	27,451	28,700	24,597	16.017	29,298	
- upper	35,250	34,915	30,647	25.604	36,437	
2025	32,359	33,635	29,706	23,879	35,165	30,95
range:						
- lower	28,021	30,178	26,341	16.547	31,194	
- upper	36,697	37,091	33,071	27.211	39,136	
2030	33,367	35,461	31,79	27,948	37,463	33,20
range:						
- lower	28,570	31,639	28,069	21.051	33,072	
- upper	38,164	39,284	35,511	32.844	41,854	

Notes: Calculated on the data of wheat yields (at the relevant markets).
Sources: http://faostat.fao.org/site, http://www.agr.gs.ca, http://www.fas.usda.gov/grain.

Conclusions. Analyzing the above information, it should be noted that comprehensive renewal of the food sector of Kazakhstan requires searching for new forms and methods of strategic management that consider a complex set of multiple factors of market interaction. The comparison of 5 key forecast scenarios suggests that the moderately optimistic scenario in the context of sustainable economic growth should be recognized as the most likely long-term development planning of agricultural and food sector of Kazakhstan. According to the moderately optimistic scenario we can predict the full implementation of progressive eco-humanistic development of the food sector by 2030, focused on meeting the needs of Kazakhstan population in high-quality and ecologically clean food.

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