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FORECASTING STUDIES OF THE FUTURE PROSPECTS OF THE AGRICULTURAL SECTOR DEVELOPMENT IN KAZAKHSTAN

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Abstract
The article examines the problems of applying the methods of planning and forecasting as a control at the level of the agriculture sector's societies that are objective necessity and are of scientific and practical interest.

Key words **–** agricultural sector, modeling, agriculture, production volume, forecasting, planning.

I. Introduction
The analysis, carried out by us over the years, suggests that the agricultural sector of Kazakhstan is not only one of the most important, but also one of the most problematic sectors of the national economy. For a long time it was possible to observe the decline in the agricultural production in all fields and regions. Since 2000 the slow recovery of the agricultural sector of Kazakhstan has begun. Since this period the development of the agricultural production and the areas of the processing industry of agricultural products, related to it, has been characterized by the trends towards sustainable development, that has stimulated the increase of the rural population welfare: the average monthly nominal wage has increased, the unemployment rate has declined. However, the pace of the development of the agricultural sector in the Independence years, hasn't provided even pre-reform volume of the agricultural production and its consumption per capita. That has become the result of the aggravation of the problem of food security, growth of the import dependency in a number of foods.

The economic relations, existing today in the agricultural sector, do not put the agricultural sector of Kazakhstan ahead as a single system, that shows itself in the disproportionate development of the fields of the agricultural sector, the production's isolation from the food market conditions, the contradiction of the infrastructure's state to needs of the agricultural market, in the local monopolism of a number of processing enterprises, etc. Scientific and information support of marketing activities is designed poorly, marketing in general is not considered as a tool to promote the steady development of agricultural industries.

In this regard, the introduction of the system of planning and forecasting based on the application of advanced management tools such as marketing, logistics and business planning, as well as searching of the ways to improve these processes, in agricultural enterprises is a scientific live issue and will allow the enterprises of the agricultural sector to manage own resources (1).

In the papers of Kondratyev N.D., Lichko K.P., Ternovykh K.S., Miloserdov V.V., Rudenko G.P. both theoretical and practical basis for planning and forecasting in the agricultural sector were reflected.The studying of the planning issues in the agricultural enterprises and methods of development of business plans are presented in the writings of Popov V.M., Lyapunov S., and Burov V.V., Romanova M.V., Bukhalkov M.I. and other authors.

II.Formulation of the Problem
The forecasting of the socio-economic development of the agricultural sector is based on the principles, techniques and methods used in the econometric model of forecasting.

The term "econometrics" was introduced into the scientific literature in 1926 by the Norwegian statistician Ragnar Frish to describe self-sufficient field of scientific research. As the main task the scientist proclaimed "the development of economic theory in its connection with statistics and mathematics." This development was very successful, because Frish R. and Tinbergen Ya. were awarded the Nobel Prize in 1969 (2).

The peculiarity of the agricultural sector as an object of forecasting arises from the fact that it includes a number of organically interrelated sectors of the national economy, but the primary one is agriculture. It is known that the process of agricultural production can be roughly divided into two periods: the first one is when the process of production is carried out by people and the other one - under the influence of natural forces.

In all foreign countries, there is a consensus that the agricultural sector as an important segment of the economy requires long-term forecasts and programs for its normal development. Only long-term forecasting makes it possible to invest the main fields of the agricultural sector wisely. It should be noted that the methodology of forecasting and planning of the agricultural sector in different countries depends on their production and economic and organizational singularities, historical, cultural and other existing traditions. In these countries there are their

own economic models. Thus, the American model focuses on achieving personal success, the Japanese is oriented towards the high national consciousness, the Swedish model assumes the divestiture of private capital for social needs (the public expenses are about 70% of GDP). In the German economic model at the center of any economic reforms is always a man. In Sweden and Germany the property inequality is reduced with the help of tough redistribution of national income. In Kazakhstan, in accordance with the system of the state planning, a new document "the forecasting of socio-economic development of Kazakhstan " is being worked out. It is assumed that it will ensure the harmonization of macro-economic, social and budgetary characteristics. To ensure the sustainable development of the agricultural sector goal-oriented programs are worked out. The analysis of carrying out of strategic objectives to achieve the sustainable parameters of agricultural growth has shown that there are some certain problems, both at the regional and at the macro level: the goal-oriented programs are not carried out, the appropriated funds are not drawn in full. In our opinion, the main reason for this is the quality of forecasting and analytical work of ministries and departments.

Existing in the world forecasts, for convenience can be divided into two groups: the forecasts of production volume of agricultural products and the forecasts of their consumption, for what is widely used the economical- mathematical apparatus. The method of constructing models is widely used by both the Government and private enterprises. It is recognized as an effective tool of control and as the guidance for making decision about complicated systems of production, transportation and distribution, as well as market analysis (3).

The shape of the model is a system of equations. Some of its member variables describe the costs, output and prices of various goods and services, as well as levels of income and employment in different industries and regions, while others are, for example, the levels of investment in new production capacity or the volume of exports and imports. The parameters included in the description of some equations are structural characteristics of the various parts of the economy.

The models differ in the breadth and level of detailing. There are models of certain manufacturing sectors such as agriculture and petrochemical industry, models of geographical regions and models of the economy in whole (3).

The modeling of economical processes, the elasticity coefficients, depending on prices of the sales of production and on the level of prices for the means of production, are widely used to predict the volume of agricultural production in the market conditions. The production costs have a considerable impact on the change of prices and production volumes due to the cost of raw materials, fertilizers, technical equipment, feed, transport tariffs, etc.

Farmers are quite difficult to adapt to the prices of the sales of products due to the market conditions. Thus, a relatively petty price increase in the grain market leads to the rapid overfilling of the last one. And vice-versa, when prices fall, farmers tend to increase the supply of grain to the market to keep the total income. The grain industry can adapt to the market more flexibly. It's harder to predict the situation in the animal husbandry, because an increase or decrease in prices for the products of this industry could lead to the production cycle. For example, a cycle of this kind has been lasting for about four- five years in the pig breeding and in the cattle breeding – for nine years. In the member-countries of the EU the state regulation of the national agricultural sector is realized and the development strategies for its development are worked out on the basis of forecasting. Every year within the common market is set one price for agricultural products. In these countries, a high level of purchasing prices is artificially underpinned and the export of agricultural products is strongly stimulated. The export subsidies as compared to domestic purchasing price for many types of products exceed 30%.

In the forecasting of the industrial and social trends at world level are widely used the methods of extrapolation of past years, the method of "Delphi", the balance method. Along with the forecasts in the world the goal-oriented programs are worked out. In this respect, the programs, developed by the United States Department of Agriculture (USDA) on a regular basis, in the countries of the western Europe: the plan of Manskholt, the forecasts of French scientists -Vedel, Bergman, the forecasts of a German scientist - Byukenkhof, etc. are of the greatest interest. Due to the development of economic and mathematical methods the final classification of the formalized methods has not been developed yet. Accumulated experiments on this problem can differentiate the formal methods into two distinct groups: the methods of predictive extrapolation and modeling techniques (4).

There are equations of pair(single-factor) and multiple (multi-factor) regressions. The first type of the models reflects the connection of an index with only one factor. In general, the single-factor regression model can be represented as:

$$Y_i = f(x_i, A), \qquad i = 1, \ldots, n \qquad (1)$$

where: y_i - the value of the modeled parameter in the period "i";
x_i - the factor value in the period "i";
A - constant coefficients (model parameters);
n – a number of periods for which the data is examined.
Parameters of the regression model are found from the minimization of the sum of squared deviations:

$$S = \sum_i (Y_i - f(x_i, A))^2 \to \min \qquad (2)$$

An important moment in constructing regression dependences was the choice of the function *f*, which sets the certain form of linking. Selecting the most acceptable form of linking we have resorted to the use of combined applying of the methods which use empirical and logical approaches.

The strength of link of an index with a factor was determined by the correlation coefficient:

$$r = \frac{\frac{1}{n}\sum y_i x_i - \bar{x}\bar{y}}{\sigma_x \sigma_y}, \qquad (3)$$

where $\sigma_x \sigma_y$ - the standard deviations, calculated by the formulas:

$$\sigma_x = \sqrt{\frac{1}{n-1}\sum (x_i - \bar{x})^2},$$

$$\sigma_y = \sqrt{\frac{1}{n-1}\sum (y_i - \bar{y})^2},$$

$\bar{x}, \bar{y}$ - the arithmetic mean value of the factor *x* and the index *y*.

The second type of models is the generalization of multiple-factor regression models. They allow us to assess the combined effect of several factors on the studied index.

The general form of multi-factor model:

$$Y_i = f(x_{1i}, x_{2i}, ..., x_{mi}, A), \quad i = 1, 2 \ldots, n \qquad (4)$$

where x_{ki} (k=1,2, …, *m*) - the value of the *k*- factor in the *i*-period;

m – a number of factors included in the model.

In the construction of multiple-factor models in addition to the problem of choosing the function *f*, which sets the form of dependence, there appears the problem of selection of the most important factors to include in the model , which was solved by applying the procedures of inclusion and exclusion of the factors.

The quality of regression models can be judged by the values of the coefficient of correlation and coefficient of determination for the one-factor model and the values of the coefficient of multiple correlation and the total coefficient of determination for multiple regression models. The closer the absolute values of these coefficients to 1, the closer the link between the studied parameter and selected factors, and therefore more confidently we can judge about the adequacy of the model, which includes the most influencing factors.

The checking of the significance of the regression model was performed using the Fisher F-test, the estimated value of which is the ratio of the variance of the initial series of observations of the studied index and unbiased estimator of the variance of the residual sequence for this model:

$$F_{расч} = \frac{\sigma_y^2 - S_{ocm}^2}{S_{ocm}^2} \qquad (5)$$

where $S_{îñò}^2 = \frac{1}{n-m-1}\sum (y_i - \hat{y}_i)^2$,

$\bar{Y}_i$ - the value of the studied index calculated by the model.

Thus, the forecast of consumption of goods is closely connected with the volume of its production and with the forecast of the income level of the population (Table 1):

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Table-1 Insert Here

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III. Results

In this article we have presented the forecasting models, which can realize econometric approaches to the forecasting process. In the study the basic methods of the correlated regression analysis have been applied, a number of the specific issues related to the qualitative analysis of economic variables and the characteristics of their application in the agricultural sector have been disclosed, the construction of regression models, based on the regression equations, or on the system of the regression equations that connect the values of endogenous (output, dependent) and exogenous (input, independent) variables has been carried out.

The purpose of the trend's analysis has become the time series decomposition of the studied economic factor on the main components, the measurement of the evolution of each component in the past and its extrapolation in the future. The method is based on the idea of stability of cause-and-effect relations of the evolution and regularity of the environmental factors evolution that makes it possible to use extrapolation.

The method is in decomposing of time series into five components:

1. structural component, or long-term trend, usually associated with the life cycle;
2. cyclic component corresponding to the fluctuations of the relative long-term trend under the influence of medium-term fluctuations in economic activity;
3. seasonal component, or short-term periodic fluctuations, caused by various reasons;
4. random component, which reflects the cumulative activity of poorly-studied complex processes which can not be represented in a quantitative manner.

For each component a parameter based on the observed regularities: long-term growth rate, market fluctuations, seasonal factors, specific factors is calculated, then these parameters are used for making forecast (5).

It is clear that this prediction is useful only as a short-term, for the period during of which it can be assumed that the characteristics of the studied phenomena do not significantly alter. This requirement often becomes realistic as a result of the environment inertia. The tables 2 and 3 are made to predict a number of qualitative and quantitative indicators of the development of the agricultural sector of Kazakhstan:

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Table-2 Insert Here

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Table-3 Insert Here

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The main weakness of these methods is that they do not allow to predict the evolution of demand with great certainty, as are unable to foresee any "turning points". At best, they are able to take quickly into the consideration the change which has already occurred. Therefore, they are called "adaptive predictive model." However, for many of the problems of managing this "a posteriori" forecast is useful, if there is sufficient time for adaptation and the factors determining the level of sales, are not subject to abrupt changes (5).

IV.Conclusion

Thus, in conclusion, we can infer that the only acceptable scenario that can ensure sustainable development and achievement of strategic key points on the development of the agricultural sector in the coming years, is improving of planning and forecasting system. In the development of agricultural economic policy all efforts of the Kazakh scientists and managers at all levels of management should be aimed at it.

To restore the industrial and social infrastructure, along with the budgetary funds substantial private investments will be probably required, including funds and holding companies, which carry out economic activities in a particular area. This can be achieved by making for them favorable credit conditions and taxation, up to a temporary exemption from income taxes under the condition of major investments in rural development.

The global crisis has set before Kazakhstan a difficult task of more efficient and effective positioning of its economy in the long term, of refusing the orientation for only raw material export and the orientation toward the steady growth through innovative development. In this regard, the scenario forecasting estimates of the factors influencing on the development of the whole economy and its individual branches are required.

The scenario conditions of crisis and post-crisis version we can still imagine hard to predict and they will depend entirely on the further development in the domestic and global economies and, therefore, emerging risks and threats.

List of Used Sources

[1] Gitinova E.M. Planning and forecasting of the agricultural sector in the market conditions. / / Proceedings of the 3rd International Practical Conference "Scientific potential of the world - 2006." - Dnepropetrovsk, 2006.
[2] Antokhonova I.V. Methods of the forcast of the socio-economic processes:
Textbook. - Ulan-Ude : Publishing house VSGTU, 2004.
[3] Forecasting and planning in the market conditions: Textbook for universities. Ed. Morozova T.G., Pikulkina A.V. - M: UNITY-DATA,1999 - 318 p.
[4] Forecast and planning of the economy: Textbook / Borisevich V.I., Kandaurova G.A. - Mn.: Publishing house "Ekoperspektiva", 2000. – 432 p.
[5] Granberg A.G. Statistical modeling and forecasting / Ed. Granberg A.G. - M: Finances and Statistics, 1990-383p.

Annexure

Table 1 - Predictive regression models of socio-economic factors of the agricultural sector in Kazakhstan

№	Factor	Model equation	Description of equation		
			The standard deviation, Sy	Correlation coefficient, R^2	The Fisher cofficient, F
1	Nominal income of the population, in tenge	Yt = 2475.143 + 3840.274 t	1989.355	0.951	56.480
2	Structure of the consumers expenditure of the population (consumer products) in %	Yt = 51.536 - 1.369 t	1.964	0.697	5.668
3	Consumer Price Index for provisions	Yt = 106.436 + 0.939 t	5.444	0.613	7.065
4	Crop yield: cereals and leguminous plants, in centner /hectare	Yt = 10.061 + 0.231 t	1.470	0.437	6.115
5	Livestock yield (cattle), in kg - average weight of a head	Yt = 296.643 + 1.024 t	3.989	0.487	7.246
6	Total volume of retail turnover (provisions), in billion of tenge	Yt = 200.800 + 83.400 t	37.853	0.962	74.236
7	Investments in the fixed capital according to the fields of usage, in million of tenge (agriculture)	Yt = 10145.679 + 8568.655 t	5344.236	0.930	38.293
8	The composition of household consumption expenditure and their structure (on the average per capita), in tenge	Yt = 17569.321 + 9427.845 t	8161.657	0.871	18.869
9	Indexes of prices and rates for consumer goods and services in % (all goods and services)	Yt = 104.768 + 0.899 t	3.131	0.655	8.147
10	Goods turnover per capit including provisions, in tenge	Yt = 15309.536 + 4839.214 t	2140.800	0.964	78.256
11	Structure of the consumers expenditure of the population (consumer products) in %	$Y = 44.180 + 0.015 X_1 + 0.073 X_3$	56.693	0.6873	6.0909
12	Crop yield: cereals and leguminous plants, in centner /hectare	$Y = 11.967 – 0.029 X_1$	11.100	0.2187	120.301
13	Bird and livestock yield (cattle), in kg - average weight of a head	$Y = 310.860 – 0.317 X_1$	301.249	0.802	10.6783
14	Nominal income of the population, in tenge	$Y = 2105.847 – 40.032 X_1 + 25.828 X_2$	576.1023	0.8157	4.9691

Table 2 – Forecast of trend models of regression analysis

Factor	2011	2012	2013	2015
Nominal income of the population, in tenge	40877,881	44718,155	48558,429	52398,702
Structure of the consumers expenditure of the population (consumer products) in %	37,845	36,476	35,107	33,738
Consumer Price Index for provisions	115,829	116,768	117,707	118,646
Crop yield: cereals and leguminous plants,in centner /hectare	12,370	12,601	12,832	13,063
Bird and livestock yield (cattle), in kg - average weight of a head	306,881	307,905	308,929	309,952
Total volume of retail turnover (provisions), in billion of tenge	1034,800	1118,200	1201,600	1285,000
Investments in the fixed capital according to the fields of usage, in million of tenge (agriculture)	95832,226	104400,881	112969,536	121538,190
The composition of household consumption expenditure and their structure (on the average per capita), in tenge	111847,774	121275,619	130703,464	140131,310
Indexes of prices and rates for consumer goods and services in % (all goods and services)	113,756	114,655	115,554	116,452
Goods turnover per capita, including provisions, in tenge	63701,679	68540,893	73380,107	78219,321

Table 3 – Forecast for multivariate regression models

Factor	2011	2012	2013	2015
Structure of the consumers expenditure of the population (consumer products) in %	61,854	62,793	63,731	64,670
Crop yield: cereals and leguminous plants, in centner /hectare	11,772	11,894	12,016	12,138
Bird and livestock yield (cattle), in kg - average weight of a head	308,696	310,050	311,403	312,757
Nominal income of the population, in tenge	910,338	971,108	1031,879	1092,648