

Forecasting and Planning of Agricultural Production of the Region

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Abstract— The article deals with the attempt to give scientific conclusion of available material and experience on forecasting the development of agricultural production taking into account specific peculiarities of the region and to formulate basic methodical regulations of short-term, medium-term and long-term forecasting. The four factor economic-mathematical model of forecasting volumes of production of agricultural production, considering not only the main productive factors (labour resources, land resources, main funds) but investment constituent as well has been proposed. This economic-mathematical model allows to find optimal variant of administrative decision which provides development of agrarian production and effective achievement of aims in the economy of the region. The complex of actions on realization of system of reforms in the agriculture of the Republic of Crimea which contains system analysis, modeling and using standard systems has been suggested.

Keywords— forecasting, planning, economic-mathematical model, correlation-regressive analysis, agricultural production, development of the region.

1. ECONOMY AND PRODUCTION

1.1. REGIONAL ECONOMY

From the point of view of anticrisis management of socio-economic development of certain region it is important to forecast changes of volumes of production in the sectors of regional economy. Reliability of forecasting is defined by the quality of appropriate economic-mathematical models and information. Forecasting of volumes of production in home agrarian sector, in particular at the level of regions has to be based on the information about its dynamics in the past and about changes of factors, defining production costs, and also maintenance of nature resource base and ecosystem.

A lot of research works of home and foreign authors have been devoted to the questions of forecasting economy. The scientific basis of knowledge, dealing with theoretical and methodological aspects of forecasting, its specifications in modern management, as well as considering branch aspects has been developed. The works of Eremenko O.V., Rudenko D.V. [1], Ganieva I.A. [2], Agapova T.N., Medvedeva N.A. [3], Folk O.V. [3], Baidakova A.N., Babkina O.N., Zvyagitseva O.S. [6], Ivanova N.V., Османова К.М. [18], Barishnikov N.G., Samigina D.Y. [15], Kuznetsov V.V., Gaivoronskaya N.F. [8] deal with theoretical and methodological fundamentals of forecasting. The problems of estimation of factors of production and technological

modification are fully presented in works of the following scientists: Mamonova M.E., Pestova A.A., Sabelnikova E.M., Apokina A.Y. [4], Zyukina D.A., Pogidayeva N.A. [17], Renaud-Gentié [20]. The increasing importance of economic-mathematical modeling and scenario forecasting, planning and analysis of economic processes has been marked in the works of scientists Samoilov V.N., Dronova M.V. [13], Suhanova I.F. [14], Shatohin M.V., Novoselsky S.O., Duplin V.V. [15], Norwood, F. Bailey, Jayson L. Lusk [19].

However, the problems of methodological and methodical provision of forecasting agricultural production taking into account innovative-investment impulse of development in a certain region have not been properly investigated. Besides, in spite of a great number of works on problems of forecasting of agricultural production, practical aspects of regional planning, which are necessary for the development of agriculture of the Republic of Crimea have not been properly investigated.

The aim of research has become solving of scientific problem connected with the development of theoretical and methodological principles of forecasting of agricultural production and the development of methodical and practical recommendations on justification of long-term prognoses of agricultural production of the Republic of Crimea and terms of their realization. Consequently, the basic task of the research is defining the set of factors influencing predominantly on the dynamics of agricultural production within the limits of the long agricultural cycle using multifactorial correlative analysis.

In modern economy forecasting plays an important role, which is stipulated by the practical significance of prognoses. In scientific literature much attention is given to the study of «future» namely to the notion “forecasting». More frequently this category is regarded on the basis of form of prediction.

Prediction is representation of future possible reality that is based on cognition of certain conformities of changes of nature and society. Taking into consideration aims of cognition of future different forms of predicting can be defined:

Hypothesis – is a scientific foresight on purely theoretical level. More often by hypothesis one may interpret opinion of one or more scientists (experts) in regard to changes of some indexes in future. The hypothesis gives qualitative description of the object which expresses its natural conformity.

Prognosis – is a scientific conclusion of different judgements about possible states of the given object in future.

In this case prognosis characterizes the future not only from qualitative but also from quantitative side. Prognosis is provided with greater reliability and certainty than hypothesis.

Plan is image of the future, complex system of measures aiming to achieve specific goals. Plan defines an object as a system of target indexes of some economic system, pointing methods and stages of their achievements and expectation of certain results. It is traditionally accepted that prognosis precedes planning and vice versa prognosis may follow planning defining probabilities of achieving scheduled points.

Planning and prognosing may use the same methods and techniques, they may be based on common informational basis. Prognosing is the research bases for planning. Substantial difference between prognosis and plan is in that prognosis and plan is in that prognosis characterizes probable change of object in future, and plan characterizes a certain standard (goal setting). The basic requirement to plans is obligatory supply of resources while prognoses can do by incomplete presence of resources. Thus hypothesis, prognosis and plan are closely interrelated and their interlink is prognosis [18].

Among present economic-mathematical models the methods of statistical (structural) modeling are successfully used in practice. Economic-mathematical are the models

which on the basis of using equations of regressions describe dependence between input and output data. In order to achieve effective modeling, it is necessary to formulate the aim of a certain model, being a simplified variant of real systems precisely. The general aim of modeling is study, explanation, design and forecasting.

Agricultural models are the basis for activity, management and interference into agricultural ecosystems. Namely they help to make a correct decision, they serve as an adviser in managing the system and they also enable to forecast the results of interference into system. The most interesting are multivariate models which enable to justify the influence of several factors on the object of prognoses. The research of various processes including economic ones, as a rule begins with their modeling, i.e. reflection of real process by means of proper mathematical tools. In this case equations or inequalities that reflect correlation between indexes and their influence on the value of the effective variable are compiled.

Yet's consider the of multivariable linear regression in MS Excel using function «LINEAR». The sought-for function looks like y – is production of agricultural and factors influencing it accordingly x_1, x_2, x_3, x_4 . Statistical data y, x_1, x_2, x_3, x_4 during the period 2012-2017 are presented in Table 1.

Table 1. Factors influencing on the volume of production of agricultural products in the Republic of Crimea

Factors	Name of factor
y	Products of agriculture, million rubles
x_1	Cost of capital assets, million rubles
x_2	The number of employed, thousands of people
x_3	Sown areas, thousands hectares
x_4	Investments in capital assets, million rubles

On the basis of calculation we will build multiple regression with the of function «LINEAR» in MS Excel, which will look as following:

$$y = x_1 + x_2 + x_3 + x_4 + \varepsilon \quad (1)$$

By the results of calculations, the first indicator of estimating the capacity of this model is the ratio of correlation R (from 0 to 1) that characterizes interrelation of values x and

their influence on y . If the value of the ratio is closer to 1, the influence of factors on the value of prognosis is great. In our case the ratio of correlation characterizes dependence of y to x and makes $R=0,99$.

Construction of productive function is conversion of real data model information on the base of statistical data by means of regressive analysis.

Table 2. Products of agriculture and resources used for their production in the Republic of Crimea [11].

Year	Cost of capital assents, mln. rub., (x_1)	Quantity of employed, thous. of people, (x_2)	Sown areas, thousands hectares, (x_3)	Investments in capital assets, mln. rub., (x_4)	Product of agricultural mln. rub., (y)
2012	24867,2	18,2	779,8	2330,9	65155,0
2013	25194,0	18,3	754,5	2242,0	65928,0
2014	19891,1	18,3	731,8	2406,7	47095,9
2015	22390,2	17,7	711,0	2141,2	63523,4
2016	35271,4	21,6	774,1	2169,1	67100,6
2017	35894,3	19,6	768,1	2344,5	57518,1

By modelling a four factor function we may make a conclusion about the influence of each factor of model on the result index – production of agricultural products.

$$y = -0,00692024 x_1 - 2688,704 x_2 + 255,949 x_3 - 76,6493 x_4 + 93585,96 \quad (2)$$

The developed productive function is a simulation model of the process of production by means of which it is possible

to define the expected results in case of change the applied resources. Therefore, forecasting of major indexes for a period, namely productive volume of agricultural production and justification of concept of development of branch and the region as a whole is a specific field of practical appliance.

The basic theses of concept are:

- the development of agricultural industry must be priority in the region;
- the development of agriculture must provide maintenance and recovery of ecosystem as a means of production and an important element of supplying system;
- trends on the markets of power and material and technical resources make the transition of agricultural production to power-and resource saving technologies indisputable;
- the development of agriculture must be oriented on the production of quality goods on international standards;
- the development of agriculture must be guided by bringing in intellectual and financial investments for modification of existing tools and purchasing new ones;
- state administration of agriculture must take place due to delivery of state and regional programs of the development of agriculture;
- technological modification of agrarian branch must provide substantial growth of productivity of human labour, increase of its scientific and intellectual capacity by attracting IT specialists.

2. CONCLUSION

Thus on the basis of research we can draw the following conclusions:

At the present stage of development of economy, the problems of making and perfection of forecasting of the whole system of material production on the basis of increase of scientific validity of prognoses are extraordinarily actual. Modeling of prognoses, defining the strategy of the development of the of the economy of the region with the perspective of considering probable variants is one of the ways of perfection of management of national economy including its important element – planning. The basis of all prognoses of the whole material production are branch and regional prognoses. Estimation of variants of the economy development is determined by the system of indexes of efficiency, where the indexes of production of goods have a major role.

Agriculture as one of the branches of material production occupying in average 13% in the structure of gross domestic product of the Republic of Crimea must develop on the basis of further increase of production of goods. Forecasting of production of goods in agriculture of the region has its own specific features which must be taken into account in methodology of its forecasting.

The development of agricultural production can be expressed by the system of agrarian indexes and their means of measurement reflecting quantitative and qualitative characteristics of production process. The analysis of the applied experimental indexes makes it possible to consider that the prognoses of production of agricultural goods have to

be founded on the following indicators: costs of capital assets, mln. rubles, number of the employed, thousands people, sown areas, thousands hectares, investments in capital assets, mln. rubles. This supposition has been confirmed on the basis of deterministic analysis of influence of factors on the volume of production of agricultural products as well. In the result of consideration indexes of production of plant-growing products in agricultural of the region period 2012-2017 the increasing tendency of its change has been revealed.

References

- [1] Eremenko Olga Viktorovna, Rudenko Danil Vladimirovich Conceptual approaches to forecasting the development of regional agriculture // Bulletin of the Kursk State Agricultural Academy. 2013. № 9. URL: <https://cyberleninka.ru/article/n/kontseptualnye-podhody-k-prognozirovaniyu-razvitiya-selskogo-hozyaystva-regiona>.
- [2] Ganieva IA Justification of the methodology for forecasting the long-term development of the agricultural economy // Achievements of science and technology of agroindustrial complex. 2012. № 9. URL: <https://cyberleninka.ru/article/n/obosnovanie-metodiki-prognozirovaniya-dolgosrochnogo-razvitiya-selskohozyaystvennoy-ekonomiki>.
- [3] Agapova Tatyana Nikolaevna, Medvedeva Natalia Alexandrovna, Volk Oleg Vladimirovich Prediction of crises in the regional system of agriculture // Molochnoiyskoy vestnik. 2015. № 3 (19). URL: <https://cyberleninka.ru/article/n/prognozirovanie-krizisov-v-regionalnoy-sisteme-selskogo-hozyaystva>.
- [4] Mamonov ME, Pestova AA, Sabelnikova EM, Apokin A.Yu. Approaches to the assessment of factors of production and technological development of national economies: a review of world practice // Problems of forecasting. 2015. №6. URL: <http://cyberleninka.ru/article/n/podhody-k-otsenke-faktorov-proizvodstva-i-tehnologicheskogo-razvitiya-natsionalnyh-ekonomik-obzor-mirovoy-praktiki>.
- [5] Burlankov Stepan Petrovich, Ivanova Natalia Vasilievna Forecasting production of agricultural production in the Republic of Mordovia // Izvestiya VUZ. The Volga region. Social Sciences. 2017. № 4 (44). URL: <https://cyberleninka.ru/article/n/prognozirovanie-proizvodstva-selskohozyaystvennoy-produktsii-v-respublike-mordoviya>.
- [6] Baidakov Andrei Nikolaevich, Babkina Olga, Zvyagintseva Olga, Zaporozhets Dmitry Vasilievich, Nazarenko Anton Vladimirovich Conjugated forecasting of the development of the economy of agriculture // Scientific Journal KubSAU - Scientific Journal of KubSAU. 2015. № 114. URL: <https://cyberleninka.ru/article/n/sopryazhennoe-prognozirovanie-razvitiya-ekonomiki-selskogo-hozyaystva>.
- [7] Medvedeva Natalya Aleksandrovna Conceptual approaches to forecasting the development of agriculture in the European North of Russia // Molochnoiyskoy vestnik. 2017. № 1 (25). URL: <https://cyberleninka.ru/article/n/kontseptualnye-podhody-k-prognozirovaniyu-razvitiya-selskogo-hozyaystva-evropeyskogo-severa-rossii>.
- [8] Kuznetsov Vladimir Vasilievich, Gayvoronskaya Nina Fedorovna Problems of Strategic Forecasting of Agricultural Development // Crimean Scientific Bulletin. 2017. №4. URL: <https://cyberleninka.ru/article/n/problemy-strategicheskogo-prognozirovaniya-razvitiya-selskogo-hozyaystva>.
- [9] Rudenko D.V. Interval approach to the definition of methods for forecasting the development of agriculture in the region // Tavrichesky scientific observer. 2015. № 3-2. URL: <https://cyberleninka.ru/article/n/intervalnyy-podhod-k-opredeleniyu-metodov-prognozirovaniya-razvitiya-selskogo-hozyaystva-v-regione>.
- [10] Law of the Republic of Crimea "On the Strategy of Social and Economic Development of the Republic of Crimea until 2030". Adopted by the State Council of the Crimea on December 28, 2016.
- [11] http://crimea.gks.ru/wps/wcm/connect/rosstat_ts/crimea/resources/f567070045b75677a610eedf35b80/%D0%9A%D1%80%D1%8B%D0%B

C+%D0%B2+%D1%86%D0%B8%D1%84%D1%80%D0%B0%D1%85.2017.pdf

- [12] Samoïlov VN Theoretical bases of business planning of agricultural organizations / VN Samoïlov // Agrarian education and science. - 2016. - No. 2. - P. 57.
- [13] Dronova, M. V. Efficiency of realizing business projects of diversified activities in rural areas / M. V. Dronova, TI Sorokina // Agro-Food Policy of Russia. - 2016. - No. 5. - P. 48-51.
- [14] Sukhanova, IF Indicative planning of the region's food supply: the identified features and the possibility of application / IF Sukhanova, SM Baskakov // Agrarian Scientific Journal. - 2016. - №4. - P. 94-98.
- [15] Baryshnikov NG, Samygin D. Yu. Diagnostics of the forecasts of the development of agriculture // Niva of the Volga Region. 2013. № 3 (28). URL: <https://cyberleninka.ru/article/n/diagnostika-prognozov-razvitiya-selskogo-hozyaystva>.
- [16] Shatokhin Mikhail Viktorovich, Novoselsky Svyatoslav Olegovich, Duplin Vitaliy Viktorovich Planning of complex sustainable development of the agro-industrial complex of the region // Bulletin of the Kursk State Agricultural Academy. 2013. №3. URL: <https://cyberleninka.ru/article/n/planirovanie-kompleksnogo-ustoychivogo-razvitiya-apk-regiona>.
- [17] Zyukin Danil Alekseevich, Pozhidaeva Natalia Aleksandrovna Estimation of prospects of development of an agricultural production on an innovative scenario on the basis of the nonlinear econometric model // the Bulletin of the Kursk state agricultural academy. 2014. №5. URL: <https://cyberleninka.ru/article/n/otsenka-perspektiv-razvitiya-selskohozyaystvennogo-proizvodstva-po-innovatsionnomu-stsenariyu-na-osnove-nelineynoy>.
- [18] Osmanov K.M. Economic forecasting of achievement of quality and execution of managerial decisions / Osmanov K.M. // Modernization of the accounting and analytical system of enterprise management: call. monogr.- Simferopol: DIAPI, 2015.- P. 90-103.
- [19] Norwood, F. Bailey, and Jayson L. Lusk. Agricultural marketing and price analysis. Waveland Press, 2018.
- [20] Renaud-Gentié et al. (2014). Choosing the most representative technical management routes within diverse management practices: Application to vineyards in the Loire Valley for environmental and quality assessment. European Journal of Agronomy, 56, 19-36. <http://dx.doi.org/10.1016/j.eja>.