THE ROLE OF THE AIC IN THE SUSTAINABLE REGIONAL DEVELOPMENT: ECONOMIC ASSESSMENT

ӨҢІРЛЕРДІҢ ТҰРАҚТЫ ДАМУЫНДАҒЫ АӨК РӨЛІ: ЭКОНОМИКАЛЫҚ БАҒАЛАУ

РОЛЬ АПК В УСТОЙЧИВОМ РАЗВИТИИ РЕГИОНОВ: ЭКОНОМИЧЕСКАЯ ОЦЕНКА

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Abstract. *The goal* is to develop a model for assessing sustainable development of the region, depending on the state and changes in agricultural sector of Northern Kazakhstan. The article notes that one of the relevant problems of the agro-industrial complex is progressive transformations, in which this industry is fundamental. A brief study of the dynamics of the main averaged macroeconomic indicators for the northern regions of the republic over the past ten years is presented. Particular attention is paid to the need for modeling based on establishing an identity that reflects the influence of factors on the value of gross regional product (GRP) as the main indicator of economic growth. *Methods* – the study is associated with the study of statistical data and subsequent establishment of a linear correlation. The following *results* have been obtained: respective conceptual and categorical apparatus has been supplemented, the use of which allows building econometric systems; shows the existing methods for determining criteria in relation to indicators characterizing sustainability and stability of economy; correlation-regression analysis of the progressive movement of the GRP and factorial parameters was performed; significance of multiple correlation coefficient and regression equation was checked; analytical characteristics of multifactor relationships are considered and economic interpretation of the results is given. *Conclusions* – implementation of the recommended measures will achieve this goal. The formulated and supplemented author's proposals will provide further effective solution of the problems of socio-economic management in practice. The specificity of the regional aspect of these issues lies in the fact that implementation of projects and actions takes place within the boundaries of the territories, which is a direct task of the public structures of the region, while it is important to ensure rational use of the existing natural resource potential, taking into account promising opportunities that are the basis of economic component.

Аңдатпа. *Мақсаты* – Солтүстік Қазақстанның аграрлық секторындағы жағдай мен өзгерістерге байланысты өңірдің орнықты дамуын бағалау үшін модель әзірлеу. Мақалада

Agricultural policy: mechanism of implementation

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агроөнеркәсіптік кешеннің өзекті мәселелерінің бірі - бұл сала іргелі болып табылатын прогрессивті қайта құру болып табылады. Соңғы он жылдағы республиканың солтүстік облыстары бойынша негізгі орташаланған макроэкономикалық индикаторлардың динамикасына қысқаша зерттеу ұсынылған. Экономикалық өсудің басты индикаторы ретінде жалпы өңірлік өнімнің (ЖӨӨ) шамасына факторлардың әсерін көрсететін сәйкестікті белгілеу негізінде модельдеу қажеттілігіне ерекше назар аударылған. *Әдістері* - зерттеу статистикалық деректерді зерттеумен және кейіннен сызықтық корреляциялық байланыс орнатумен байланысты. Келесі *нәтижелер* алынды – тиісті тұжырымдамалық-категориялық аппарат толықтырылды, оның қолданылуы эконометрикалық жүйелерді құруға мүмкіндік беретін нәтижелер алынды; экономиканың тұрақтылығы мен тұрақтылығын сипаттайтын көрсеткіштерге қатысты критерийлерді анықтаудың қолданыстағы әдістері көрсетілген; ЖӨӨ-нің үдемелі қозғалысына және факторлық параметрлерге корреляциялық–регрессиялық талдау жасалды; бірнеше корреляция коэффициенті мен регрессия теңдеуінің маңыздылығы тексерілді; көп факторлы байланыстардың аналитикалық сипаттамалары қарастырылды және нәтижелердің экономикалық түсіндірмесі берілген. *Қортындылар* – ұсынылған шараларды іске асыру көрсетілген мақсатқа қол жеткізуге мүмкіндік береді. Тұжырымдалған және толықтырылған авторлық ұсыныстар іс жүзінде әлеуметтік-экономикалық басқару мәселелерін одан әрі тиімді шешуді қамтамасыз етеді. Осы мәселелердің өңірлік аспектісінің ерекшелігі мынада: жобалар мен іс-қимылдарды іске асыру аумақтар шекарасында жүреді, бұл өңірдің мемлекеттік құрылымдарының тікелей міндеті болып табылады, бұл ретте экономикалық құрамдас бөліктің негізі болып табылатын перспективалық мүмкіндіктерді ескере отырып, қолда бар табиғи-ресурстық әлеуетті ұтымды пайдалануды қамтамасыз ету маңызды.

Аннотация. *Цель* – разработка модели для оценки устойчивого развития региона в зависимости от состояния и изменений в аграрном секторе Северного Казахстана. В статье отмечается, что одной из актуальных проблем агропромышленного комплекса являются прогрессивные преобразования, в которых данная отрасль является основополагающей. Представлено краткое исследование динамики основных усредненных макроэкономических индикаторов по северным областям республики за последние десять лет. Особое внимание уделено необходимости моделирования на основе установления тождества, отражающего влияние факторов на величину валового регионального продукта (ВРП) как главного индикатора экономического роста. *Методы* – исследование связано с изучением статистических данных и последующим установлением линейной корреляционной связи. Получены следующие *результаты* – дополнен соответствующий понятийно-категориальный аппарат, применение которого позволяет строить эконометрические системы; показаны существующие методы определения критериев применительно к показателям, характеризующим устойчивость и стабильность экономики; выполнен корреляционно-регрессионный анализ поступательного движения ВРП и факторных параметров; осуществлена проверка значимости множественного коэффициента корреляции и уравнения регрессии; рассмотрены аналитические характеристики многофакторных связей и дана экономическая интерпретация итогов. *Выводы* – реализация рекомендуемых мер позволит достичь указанной цели. Сформулированные и дополненные авторские предложения обеспечат дальнейшее эффективное решение проблем социально-экономического управления на практике. Специфика регионального аспекта этих вопросов заключается в том, что реализация проектов и действий происходит в границах территорий, что является прямой задачей государственных структур региона, при этом важно обеспечение рационального использования имеющегося природно-ресурсного потенциала с учетом перспективных возможностей, являющихся основой экономической составляющей.

Introduction. The agricultural sector is an important socio-economic sphere in the Northern Kazakhstan, which includes the North Kazakhstan, Pavlodar, Akmola and Kostanay regions. It is a system-forming branch in the market economy of any country and the social life of society. Its sustainable development stabilizes the activities of other spheres, and also generally determines the state and development of the region's economy.

The statistical modeling that allows to assess the impact of changes in AIC at the regional level is paid a lot of attention in the scientific literature.

Some researchers come to the conclusion that economic development, food base and social welfare together form the agricultural sector and opportunities for potential development [1]. Others believe that the agricultural sector's development can be influenced by various factors depending on the location of the territory [2].

Several authors suppose that socio-economically stable and developed rural areas may become a food security base of any country [3], while others consider agriculture as a key industry that provides food security of the country [4].

The attention of some papers is focused on the importance of developing the «green» economy for the agro-industrial complex [5]. It is also considered that «green» aspects in terms of «green» nanomaterials' use for wastewater treatment [6]. In continuation of this topic the main aspects of the «green» economy with the next substantiation the reasons for low innovation activity in the agricultural sector among the economic entities have been studied [7], and economic benefits from the implementation of «green» economy measures have been substantiated [8].

In turn, some scientists note that the basic functionality of the AIC is influenced by such global challenges as macroeconomic shocks, exhaustion of the resource base of the natural environment, etc. [9]. This position has also proved under the consideration of the unstable development of the agricultural economy in a number of places on the planet and call for active support from the state [10].

Material and methods of research. Scientific literature comprises a number of various approaches that compare the impact of some factors on the rural territories.

Thus, some researchers estimate the influence of various factors on the dynamics of economic growth in different countries [11]. Others conclude that it is important to take into account various macroeconomic and social factors, along with political ones, in one multidimensional model of economic growth [12].

There is also a scientific opinion about importance of state support for small-scale farming in AIC [13]. On the other hand, further commencement of developing measures can promote to the formation of a favorable innovation environment by improving legal regulation and clarifying measures for stimulating innovation [14].

Some authors consider the model of the effect of participation in ecological public welfare of people living in the rural areas and work out internal mechanism aimed at the development of market ecosystem of the region [15].

Several researchers use predictive econometric models to assess and analyze the GRP indicators of the region and the population, which make it possible for the relevant stake holders to plan the managerial decisions aimed at the effective development of the region. The researchers selected exponential smoothing models that provide forecasting based on the past values of the studied feature [16].

The authors agree with the above presented scientific positions and note that today the analysis of the impact and modeling of relationships between values reflecting the agricultural development in the region as a whole is becoming particularly relevant.

Results and their discussion. In the study, the authors consider econometric models that make it possible to plan of the regional socio-economic ecosystem's sustainable development based on the obtained results.

The main issue of the researchers is the evaluation of the influence of independent features (exogenous factors) on the dependent indicator (endogenous factor) with the next substantiation of the relevant links and reserves available in them. The implementation of these reserves, along with the assessment of the influence of independent factors on dependent components, will ensure the effective implementation of regional strategies aimed at providing both the regional sustainable development and the growth of the people's quality of life.

Linear multivariate regression was chosen for the modelling. In general, multifactorial functions are of great practical importance, since almost all indicators depend on many factors. This is especially relevant for the agriculture, because the obtained dependencies are used in the analysis and planning of production. The main purpose of multiple regression is to build an appropriate model with a large number of factors, followed by determin-

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ing the impact of each of them individually and as a whole on the modeled indicator.

Modern agriculture in all regions of the North Kazakhstan is a key sustainable development factor, defining it as a complex integrated sphere of activity, part of the socio-economic system, in close cooperation with interrelated industries, as well as influencing the people's reproduction and the environment. The following main groups of indicators are considered:

● general indicators of the region, determination of the share of agriculture;

● the actual indicators of agriculture, divided into areas: crop production, animal husbandry, services (including production);

● indicators of investment and innovation activity of enterprises developing agriculture on the basis of certain means and innovations;

● indicators of the social sphere that provide general conditions for the production of goods, as well as the life of people (employment level, wages, income and expenses, etc.);

● environmental indicators.

The authors proposed a study in which an econometric model was constructed showing the influence of these factors to the dynamics of GRP in the region.

To build the econometric model, the following factorial features were selected:

▪ y – cumulative gross regional product in the Northern Kazakhstan, million tenge;

▪ x_1 – investments in fixed assets of agriculture, million tenge;

▪ x_2 – number of agricultural employees, people;

▪ x_3 – labor productivity in agriculture, thousand tenge;

▪ x_4 – acreage of oilseeds, thousand hectares;

▪ x_5 – salaries of agricultural employees, tenge.

To build a multiple regression model, data on these indicators for 2017-2021 were used (table).

Table – Cumulative gross regional product in the Northern Kazakhstan and factor values from 2017 to 2021

Year	Cumulative gross regional product, million tenge (y)	Investments in fixed assets of agriculture, million tenge (x_1)	Number of agricultural employees, thousand people (x_2)	Labor productivity in agriculture, thousand tenge (x_3)	Acreage of oilseeds, thousand hectares (x_4)	Salaries of agricultural employees, tenge (x_5)
2017	1 721 560,5	49 333,8	112,6	3 339,2	384,8	88 909,5
2018	1 931 957,5	43 596,2	102,8	3 810,3	472,7	96 528,8
2019	2 199 311,9	66 617,6	98,7	4 476,5	478,9	114 067,3
2020	2 462 047,5	73 837,9	95,4	6 176,4	488,9	132 001,5
2021	2 860 209,7	110 960,0	95,1	7 217,5	502,0	152 981,5
Calculated coefficients of correlation	0,92	0,94	0,93		0,96	0,93
Note: [17]						

After performing the necessary calculations, we have the following outcomes:

- for all factor indicators, the values of the pair correlation coefficients exceed 0,5, which shows the presence of a high direct closeness of the relationship between the exogenous factors and the endogenous indicator;

- the regression equation describing the dependence of the gross regional product of the regions of Northern Kazakhstan has the following form:

$$y = 202\ 814{,}1 + 1{,}0209 \cdot x_1 + 4{,}0612 \cdot x_2 + 22{,}1617 \cdot x_3 + 174{,}812 \cdot x_4 + 1{,}0941 \cdot x_5 \qquad (1)$$

The regression coefficients of the resulting function show that the increase in:

* investments in fixed assets of agriculture (x_1) by 1 million tenge increases GRP by 1,0209 million tenge;

* positive change of the number of agricultural workers (x_2) by 1 person increases the value of GRP by 4,0612 million tenge;

* the growth of labor productivity in agriculture (x_3) by 1 thousand tenge increases the GRP value by 22,1617 million tenge;

* an increase in the acreage of oilseeds (x_4) by 1 thousand hectares increases the GRP value by 174,812 million tenge;

* the increase in wages of employees employed in agriculture (x_5) by 1 tenge in-

creases the value of the gross regional product by 1,0941 million tenge.

These dependencies are explained by the replacement of labor resources with capital, the use of more powerful machinery in production and automation of production processes in crop and livestock production, as well as a growth of crops. The uptrend in the production of oilseeds is associated with an increase in purchase prices, which are more than 2,2 times higher than the purchase prices for cereals.

Conclusions. The authors conclude that in modern conditions the following measures are to be implemented:

1. Assessment the forecast indicators on a permanent basis, to develop and implement new mechanisms and tools aimed at the providing further sustainable economic development of the regions.

2. The multiple correlation coefficient R calculated for the regions of Northern Kazakhstan indicates that the resulting function (1) generates a sufficiently strong influence of the five factors selected by the authors on the cumulative gross regional product of the regions of Northern Kazakhstan. The total determination of R^2 was 0,9561. Consequently, the endogenous factor, the cumulative GRP of the regions, 95,61% depends on the selected exogenous factors and only 4,39% is explained by the influence of factors which were not taken into account under the modeling.

3. The change in the GRP value of the regions of Northern Kazakhstan is explained by variation of x_1 by 9,78%; due to variation of x_2 – by 6,07%; due to variation of x_3 – by 44,19%; due to variation of x_4 – by 23,71%; due to variation of x_5 – by 16,25%.

4. When developing territorial development programs, the inclusion of the results obtained is an important aspect, since they have a reliable character. This, in turn, should be a socio-economic catalyst and driver.

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Аграрлық саясат: іс жүзіне асыру механизмі

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