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THE EFFECT OF TEMPERATURE ON THE RATE OF CHEMICAL REACTIONS

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Annotation
Chemical reactions occur at different rates. Some of them happen in a thousandth of a second, while others happen in minutes, hours, days, months and years. It is also known that such reactions can occur quickly and slowly, depending on the conditions, for example, they can be rapid at high temperatures and slow at cold temperatures. The difference between the rates of these reactions can be large. The following article is devoted to the study of the effect of temperature on the rate of chemical reactions.

Keywords: chemical reaction, velocity, homogeneous, heterogeneous, reagent, catalyst, coefficient.

Introduction

The structural changes in economic management in our country and the economic and social problems that arise in this case determine the adoption of specific measures to improve the management system of the agro-industrial sector (AIC). The main factors of economic and social development of the country at the present stage can be economic methods of production management

As you know, the food problem has arisen and arises, in particular, from the unbalanced structure of sown areas. Among the measures needed to solve this problem, the most important, in our opinion, are the improvement of management methods of production and economic processes, the re-specialization of farms and areas to change the current situation in the production of food products. On the other hand, in connection with the transition to new forms of economic management and a multi-structured economy, the planning and management system of the agricultural sector should be focused on the preferential development of the social sphere.

In this regard, there is a need associated with the transformation of the agricultural sector and, above all, agriculture into a highly efficient, high-performance industry, and the most important condition for meeting these requirements is the rational allocation of production and improvement of the economic mechanism, as well as the use of new methods of farming. It is also necessary to adjust the complexity and target orientation in the use of investments, to ensure the development of all branches of the agro-industrial complex, primarily the processing industry, because the progressive world trend in the development of the agro-industrial complex is the accelerated growth of the processing branches in comparison with agriculture.

In terms of identifying new forms of economic relations, it is extremely important to correctly define the basic principles for regulating new forms of relations, in particular, rent-based ones, to solve other issues. Consequently, the most important indicator of the development of the agroindustrial complex is its structure and, in order to ensure its effective functioning, it is necessary not only to improve the structure of the agro-industrial complex production, but also to achieve maximum efficiency in the operation of each of its enterprises and to ensure the highest yield of final products.

The main purpose of the article is to research and develop optimization of the territorial location and development of interrelated production of the agro-industrial complex of the region in the conditions of strengthening the social orientation of the development of the economy.

An analysis of the current state of economic and social development of the Jizzakh region showed that it is located in the central part of Uzbekistan between the Syrdarya and Zeravshan rivers. The region produces 44,1% of the total volume of garments, 26,8% of knitwear and other types of industrial products of the republic. The industry of the region is represented by such important industries as chemical, light, food, etc. In the structure of marketable products of industries, the largest share is light industry (27,3%), chemical (5,6%).

Due to the favorable natural and climatic conditions, the agro-industrial complex of the region is represented by almost all sectors producing food and raw materials for industry. Occupying 8,1% of the territory of Uzbekistan produces about 12% of the gross agricultural output of the republic. In 2017, 502,9 thousand tons of grain, 221,8 thousand tons were produced in the region. cotton, 398,5 thousand tons of vegetables, 116,4 thousand tons of fruits and grapes, etc. Since agriculture is the core of the agro-industrial complex, the state of the entire agro-industrial complex and, first of all, of the food-producing industries will depend on the degree of its development. In this regard, when modeling the development and placement of the agroindustrial complex, it becomes important to conduct a causal analysis of the state of agricultural development, both in the past, in the present and in the future. On the other hand, in the optimal functioning of the agro-industrial complex as a single organizational and technological system, a large role is played by the processes of transportation, storage, processing and sale of raw materials (products), and the solution of issues of material and technical supply. Among them, the most important is the processing of raw materials, because of the same type of raw materials you can make various types of food.

It is well known that not only industries and other service industries, but also non-production infrastructure sectors associated with the solution of the social problems of the village are of great importance for the effective functioning of the agro-industrial complex. In this plan, over the years, the plan for the introduction of student places has been fulfilled by 103,7%, hospitals and outpatient clinics - by 102,6%. The volume

of personal services rendered to the population over the years increased by almost 27%, including in the countryside - by 19,2%. At the same time, there are shortcomings in the plans for the introduction of kindergartens, other social, residential and cultural-educational facilities.

It should be noted that the current unbalanced structure of sown areas, the high proportion of industrial crops, reflecting the unilateral monocultural character of agricultural development in Central Asia and leading to insecurity of the population in food does not meet modern requirements, although in recent years some changes in the ratio of sown areas have been identified, technical and food crops. In modern conditions, the priority of the consumer and the regulation of the structure of production, the sequence of tasks being solved, their focus on the final result, the improvement of management of all processes and the improvement of the socioeconomic efficiency of the entire system are the main tasks of the functioning of the agroindustrial complex. The main criteria for the efficiency of the functioning of the agro-industrial complex should be the improvement of the mechanism for managing its sectors and the level of provision of the population in fresh and processed products with rational distribution and use of natural and economic resources. In accordance with this, the article discusses the fundamental approaches to modeling the socio-economic development of the agro-industrial complex of the region on the example of the region and solves specific problems associated with these approaches.

The structure of the regional agro-industrial complex is a complex economic-production controlled system, and a systematic approach serves as a general theoretical and methodological basis for the analysis and study of such a system of interacting and interrelated elements. This approach is designed to provide a comprehensive analysis of the development and interaction of both organizationally and technologically related sectors within the agro-industrial complex itself, and its inter-sectoral ties with other sectors of the economy. Consequently, the use of a systematic approach as the main method of studying complex dynamic systems allows not only to consider the structure of the agro-industrial complex as a complex system consisting of many elements (subsystems), but also to determine the “boundary” of the system’s functioning, conduct a comprehensive analysis of inter-branch relations and consider the agro-industrial complex as a single targeted a system that has both global and local goals and sub-goals. The main subsystems (elements) of this system are the production, transportation, processing, storage and sale of agricultural products. The specific features of the system under consideration are dynamism, purposefulness, hierarchy.

The effectiveness of the functioning of the system is determined by the improvement of the forms and methods of management and the rational distribution and use of active resources. One of the methods of improving the management system is the use of economic and mathematical methods in the organization, planning and

management of branches of the agro-industrial complex. At the same time, the assessment of the efficiency of the functioning of the system in mathematical modeling of socio-economic processes leads to the use of an integrated approach to determining the main components of the adopted criteria for the effectiveness of the functioning of the system. For example, if the efficiency of the functioning of the agro-industrial complex (global goal) refers to the degree of satisfaction of the needs of the population in fresh and processed products, the main local criteria for such efficiency may be production in physical and monetary terms, increased labor productivity, reduced production costs, and so on. d. In addition, expert judgment can be used in determining the performance of the system.

Basically, when modeling the development and placement of branches of the agro-industrial complex at the regional level, a system of models is built: econometric and mathematical, with the latter being optimization, imitating, etc. The econometric models can be attributed to the economic base model, multivariate analysis of yield (productivity), unit cost of production, forecasting models of individual indicators (sectors) of the development of the agro-industrial complex, etc. For example, to predict the fluctuations in the development of the agroindustrial complex of the region, an econometric model can be constructed consisting of a set of interrelated equations, each of which has the form

$$yit = f(xit, zkt, ut) \quad (1)$$

where yit –the endogenous variable at time t, which is a function of endogenous variables yit, exogenous yit, and estimated error yit.

Various functions (linear, cyclic, etc.) can be used to align the series of yields dynamics (productivity).

The desired parameters in equations (1), (2) are determined in a standard way.

The hierarchy of the regional agriculture management structure determines the block principle of modeling the development and placement of branches of the agro-industrial complex and the use of block linear programming methods. At the same time, the starting point for any economic task is: the study of production factors, the establishment of the boundaries of the system under study, taking into account all its elements and relations with the external environment.

$a + bt$

$$a + bt + ct2$$

$$2\pi \quad 2\pi$$

$$a + bt + c \sin t + d \cos \quad t$$

$$N \quad N$$

$$yt = a + bt + c \; + d \sin 2\pi t + e \cos 2\pi t \quad (2)$$

From

$$t \quad N \quad N \quad \ldots$$

$aebt$
{ $ea+bt$

the point of view of modeling production and economic processes, a block-diagonal system is considered, consisting of a series of block-diagonal subsystems interconnected by inter-block constraints. On this basis, the developed economic-mathematical model of the development and placement of the AIC at the regional level in a matrix-vector form looks like:

Find extremum function

$$f(xtr) = \sum_{r\epsilon R} Ctrxtr\,, \quad t\epsilon T \qquad (3)$$

Under restrictions

Use of production resources

$$Art\ xtr \le Btr, \qquad t\epsilon T, \quad r\epsilon R \qquad (4)$$

Production of a guaranteed volume of s - type product

$$\sum_{r\epsilon R} Lrtxtr \ge Qst, \qquad t\epsilon T, \quad s\epsilon Mr \qquad (5)$$

The use of s - th type of raw materials in areas,

$$\sum_{r} Lrtxtr - \sum_{r,\gamma} Nst\gamma r = 0, \qquad s\epsilon Mr, r\epsilon R \qquad (6)$$

Storage of s - th type of raw materials,

$$\sum_{r,\theta} Nst\gamma r - \sum Nst\theta r = \sum Nst\gamma r\,, \qquad s\epsilon Mr, r\epsilon R, \theta\epsilon\Theta \qquad (7)$$

The distribution of s - th type of raw material after storage,

$$\sum_{r} Mst\gamma r = \sum_{r} Tst\gamma r + \sum_{r} Ust\gamma r\,, \qquad t\epsilon T, s\epsilon Mr, r\epsilon R \qquad (8)$$

Production of final products,

$$\sum_{s,r\epsilon R} \theta mstr \quad (Nst\gamma r + Tst\gamma r) \ge Qmt, \qquad t\epsilon T, s\epsilon Mr, r\epsilon R \qquad (9)$$

Implementation of the s-th type of product in fresh,

$$Ost, \qquad t\epsilon T, s\epsilon Mr, r\epsilon R \qquad (10)$$

Variables should not be negative

$$xtr \ge 0, \quad Nst\gamma r \ge 0 \qquad (11)$$

where $Art = \|aijtr\|$ - is the matrix of production costs; $Lrt = \|lsjt\|$ - productivity matrix (diagonal); $Ctr = \|cjtr\|$, $Btr = \|bitr\|$ - respectively, vectors of indicators of intensification of production and availability of production resources; Qst - the volume of production of s - th type of raw materials; $Nst\gamma r$ - the volume of the s - th type of raw materials used in the γ - th direction; $Pst\theta r$ - the volume of losses of the s - type of raw material at the θ - th storage method; $Mst\gamma r$ - net volume of s - th kind of raw

material after storage; $Tst\gamma r$, $Ust\gamma r$ - accordingly, the volumes of s - th kind of raw material going for processing and fresh sale after storage; Qmt - volume of the m first type of end product; Ost - the volume of the s -th type of raw material intended for fresh sale; jєJr - many industries; iєIr- many production resources; rєR - many objects of management; s,mєMr - many types of raw materials and end products; θєΘ - many ways to store raw materials; γ - the number of directions for the use of raw materials; tєT - many years of the study period under consideration.

Model (3) - (11) has a block diagonal form, and its implementation was carried out by block linear programming methods. The task model includes restrictions on the use of natural and material resources, feed, fertilizers, fixed production assets, capital investments and the production and distribution of raw materials, the distribution of gross and marketable products, etc. The dimension of the extended matrix of the problem is (min) = (314x500). The distribution of variables by industry: crop production - (x1, x2, ..., x13), livestock - (x14, x16, x18), additional - (x13, x15, ..., x33) (regional blocks), the volume of raw materials production (products) - (x481, x482, ..., x498), gross output and current expenses - (x499, x500) (regional block). The calculations were carried out on a computer. Yield (productivity) and other indicators were modeled using functions (2) and production functions. In particular, the following models were obtained for cotton and grain conditions of Jizzakh region and Dustlik district:

cotton (Dustlik district)

$$3{,}69e0{,}049t$$

$$2{,}67t0{,}301$$

$$14{,}87 - 0\ ,98$$

$$t$$

$$yit = \ 1/(0{,}097 - 0{,}0023t)$$

$$t/(0{,}049 + 0{,}0251t)$$

$$10{,}97 + 3{,}45lnt$$

$$\{ \quad e3{,}0312 - 0396t$$

grain (Jizzakh region) $31{,}69 + 0{,}076t$

$$5{,}67$$

$$28{,}67 + 0{,}67t + \quad t$$

$$24{,}87 + 0{,}98t + 4{,}46 \sin \ \pi t + 6{,}87 \cos 2\pi t$$

$$N \qquad N$$

$$yit== \ 31{,}98 + 3{,}87t - 2\ ,74 - 0{,}27\sin 2\pi t + 7{,}68 \cos 2\pi t \qquad (12)$$

$$13{,}17t - 0{,}33t + 0{,}N07t2 \quad N$$

$$14{,}15 + 3{,}45lnt + 1{,}98\sin 2\ \pi t + 2{,}89 \cos 2\pi t$$

$$N \qquad N$$

Based on the implementation of three statistical tasks at two “time points”, three options were obtained for the development and deployment of the agro-industrial complex of the Jizzakh region. Analysis of the obtained variants of social and economic development of the region for the period up to 2025 shows that the obtained numerical results, without pretending to be final and to a high degree reliable, on the one hand, can serve as baseline data for the preparation of scientifically based forecasts of the development of agro-industrial sector. On the other hand, the developed methodology for multivariate calculations using economic-mathematical methods can be used in the practice of analyzing, planning and managing the sectors of the agro-industrial complex.

According to the options received and on the basis of the obligatory condition of the task of developing and locating agricultural production and other branches of the agro-industrial complex, certain changes in the structure of agricultural crops may occur in the long term to achieve the necessary level of satisfaction of the food needs of the population. For example, if the sown area of grain and leguminous crops in 2025 and 2030. compared with the annual data for 2016-2018. will increase by 5,7 and 6,8%, respectively, then cotton crops over this period, on the contrary, will decrease by 1,7 and 4,1%, respectively. In addition, food and feed crops can be significantly increased, and these changes can occur in all districts of the region.

If the increase in the sown area of the food industry is due to the achievement of the level of food supply to the population, the reduction in cotton sowing should not have an effect on the production of the required amount of raw cotton for the economy. For example, while ensuring the output of raw cotton from 1 hectare of sowing in the range of 31–34 centners, it is possible to obtain from the same areas 220–232 thousand tons of cotton, which is respectively 2,9 and 4,7% more than in previous periods. At the same time, the placement of branches of agricultural production, as before, occurs mainly in those areas where there are the most favorable conditions for the placement and production of each type of food product. In other words, there will be no significant changes in the distribution of agricultural production in the districts of the region.

Although in the future the existing structure of development of livestock production sectors will be preserved, at the same time, with a slight increase in the number of livestock and poultry and an increase in their productivity, there are favorable conditions for increasing the production of livestock products. This, above all, can contribute to increasing the productivity of livestock and poultry, and according to calculations, the milk yield from 1 head of a feed cow in 2015 should average 4761 kg, 2025 - 4812 - 4901 kg, wool – 3,1 – 3,3 and 3,55 – 3,63 kg, eggs - 190 - 200 and 210 - 221 pieces, respectively. This makes it possible to increase milk production to 430,5 – 450,1 thousand tons, meat - to 155,4 – 160,7 thousand tons, etc. Moreover, per capita food production, according to the results, is markedly increasing, although the growth

of some food products (for example, melon, meat, milk) does not meet the demand of the population for these products.

Food production per capita in the Jizzakh region for the future (kg)

Cash type	Fakt for 2018	Options for model calculations			Calculation options in % to the actual for 2019		
		1	2	3	1	2	3
Potatoes	50,7	52,7	56,2	60,4	103,9	106,7	107,5
Vegetables	300,8	305,6	317,2	334,4	101,6	103,8	105,4
Melons	204,0	211,3	223,4	241,0	103,6	105,7	107,9
Fruits and berries	65,7	68,7	73,3	79,4	104,6	106,7	108,3
Grapes	22,2	24,7	28,6	34,1	111,4	115,8	119,2
Meat	153,4	172,9	198,6	232,6	112,7	114,9	117,1
Milk	427,2	441,7	476,6	520,9	103,4	107,9	109,3

It should be noted that, along with economic factors, social factors, such as the construction of housing, schools and kindergartens, healthcare facilities, culture, life, etc., play an important role in the development of the agroindustrial complex. Calculations showed that the total housing stock of the Jizzakh region in 2020 and 2025 can reach respectively 24693 and 27200 thousand square meters, which is much more than in the past years.

In general, as the results of calculations show, all three options have a practical orientation. But the greatest preference should be given to the third option, since the results of this option are of the greatest interest in many parameters of the socio-economic development of the agroindustrial complex in 2020, reaching 1680000 million sum, and in 2025 - 1834600 million sum, including agriculture, respectively – 1420700 – 1531600 million sum.

Conclusions

1. The study of the current state of development of the branches of the agro-industrial sector in conjunction with other sectors of the economy showed that the main direction in improving the efficiency of the agro-industrial complex is the use of economic management methods, ensuring freedom of action and entrepreneurship in organizing production, processing, storage and sale of raw materials. In addition, the effectiveness of the functioning of the system is directly related to the elimination of excessive centralization of management, the lack of direct links between science and production, and the insufficient development of social infrastructure facilities.
2. The most important issue of improving the planning and management of the processes of socio-economic development of the agro-industrial complex of the region and providing the population with food and social and living standards in rural areas

is the accelerated development of agriculture and other branches of the agro-industrial complex based on a comprehensive analysis of inter-farm and inter-farm production relations, improvement of planned indicators , the use of economic methods of management of production, transport and social welfare processes.

3. A complex of economic-statistical and mathematical models of forecasting and optimal development and territorial distribution of agro-industrial production is proposed, taking into account the creation and effective use of the database. The implementation of the developed set of models and modeling techniques allows you to make science-based decisions on the socioeconomic development of the region based on the analysis of various alternative options.

4. Experimental calculations carried out on a computer using the developed models:

a) determine the results of a rational combination of agricultural sectors and other branches of the agro-industrial complex and, on this basis, improve the structure of sown areas and the processes of production, distribution and use of agricultural products; sources of tasks for the production of intermediate and final products and various options for making practical decisions; internal reserves of the production of raw materials and final products of the agroindustrial complex, quantitative and qualitative assessment of production resources, providing the population with food, etc .;

b) show that by improving the mechanism for managing production, technological and transport processes, rational distribution and use of strategic resources, using economic planning methods, it is possible to ensure the efficiency of the system and, on this basis, increasing the production of raw materials, organizing transportation, storage, processing and implementation agricultural products.

5. The results of theoretical studies on economic and mathematical modeling of the development and location of agro-industrial sectors and experimental calculations presented in the article make it possible to draw a conclusion about the feasibility of using the developed methodology and model of development and placement at the regional and district levels for practical purposes, and it can provide a positive economic effect.

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