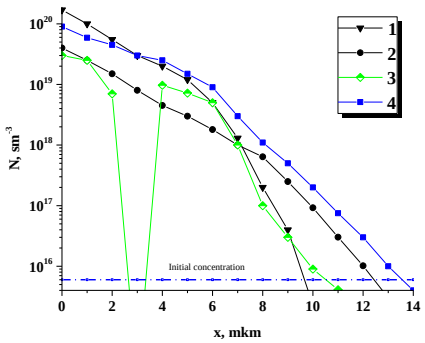

1-rasm. Kremniyda B va P elementlarining taqsimoti:(1) Fosfor va (2) bor elementlarining 1200 C da 2 soat diffuziyasidan keyingi taqsimoti. 3. Dastlab fosfor, ortidan bor diffuziya qilingan kremniyda zaryad tashuvchilar taqsimoti. 4. Fosfor elementlarining 1200 C da 2 soat qo'shimcha qizdirishdan keyingi taqsimoti.

Fosforning bor bilan oddiy kompensatsiyasi bilan bunday natija mumkin emas, chunki bu holda materialning sirtdagi o'tkazuvchanligi turi o'zgarmasligi kerak (8 mkm chuqurlikdagi material hajmi n-tipda bo'lishi kerak) edi. Natijada, sirtga yaqin sohada yoki elektroaktiv bor kontsentratsiyasining oshishi yoki elektroaktiv fosfor konsentratsiyasining pasayishi kuzatiladi.

Natijalarni muhokama qilish Bunday o'zgarishlar bir nechta sabablarga ko'ra bo'lishi mumkin:

1) Borning diffuziya koeffitsiyentining kristall hajmida fosfor ionlari ishtirokida ortishi, bu kremniy panjarasi fosfor ionlari ta'siri natijasida kengayishi (fosfor ionining diametri panjara doimiysidan katta) tufayli sodir bo'ladi, bu sirt yaqinidagi bor kontsentratsiyasining oshishiga olib keladi.

2) Kremniy panjarasining siqilishi tufayli bor ionlarini diffuziya qilish orqali fosfor ionlarini kristall hajmiga kirishi (bor ionining diametri panjara doimiysidan kichik), bu yuzaga yaqin fosfor kontsentratsiyasining pasayishiga olib keladi.

3) Diffuziya vaqtida kremniy panjarasida joylashgan neytral bor-fosforli komplekslarning hosil bo'lishi, bu tarqalish markazlari kontsentratsiyasining pasayishiga va zaryad tashuvchilarning harakatchanligining oshishiga, shuningdek ikkalasining diffuziya koeffitsientining pasayishiga olib keladi.

4) Bor va fosfor ionlarining elektrostatik o'zaro ta'siri diffuziya koeffitsientlarining pasayishiga olib keladi.

Tajriba natijalari shuni ko'rsatdiki kremniy tarkibida fosforning kontsentratsiyasi borning elektroaktiv konsentratsiyasining oshishiga olib keladi deb tasdiqlashga imkon beradi. Shunday qilib, fosfor va borning ketma-ket diffuziya qilinish sharoitida sirtdagi elektroaktiv bor atomlarining kontsentratsiyasi kuchsiz legirlangan kremniy uchun hisoblanganidan 2,5-3 baravar yuqori bo'ldi. Olingan eksperimental ma'lumotlar [5] ish natijalari bilan mos tushadi.

Olingan eksperimental natijalarni faqat fosfor va bor aralashmasi atomlarining o'zaro kompensatsiyasi bilan izohlash mumkin emas. Shuning uchun, bu hodisa diffuziya jarayonida fosfor va bor atomlari oqimlarining o'zaro ta'siri bilan bog'liq deb aytish mumkin.

Yuqorida ko'rsatilgandek, olingan natijalar [6] ning xulosalariga zid kelmaydi va shuni aytish mumkinki, kremniy panjarasidagi o'zaro ta'sir natijasida donor-akseptor $\{P^+B^-\}$ komplekslarining katta qismi paydo bo'ladi. $\{P^+B^-\}$ komplekslar faqat fosfor va bor atomlari bir-biriga yaqin bo'lganida mavjud, ya'ni ular kremniy kristalli panjarasida ikkita qo'shni joyni egallaydilar.

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REZYUME

Bu ishda kremniyga alohida bor, fosfor, ketma-ket bor va fosfor diffuziya qilingan 3 guruh namunalar o'rganildi. Buni o'rganishdan maqsad kremniyga ketma-ket diffuziya qilingan bor va fosforning o'zaro ta'siri va taqsimotini o'rganish. Natijada katta konsentratsiyada fosfor kiritilgan kremniyga borning diffuziyasi vaqtida elektroaktiv bor atomlari 2,5-3 marta ko'p fosfor atomlarini kompensatsiya qilib material o'tkazuvchanlik turini o'zgartirishi aniqlandi.

РЕЗЮМЕ

В этой работе исследованы и изучены 3 группы образцов диффузии в кремнии, отдельно фосфор и бор, последовательного диффузии фосфора и бора. Целью данного исследования является изучение взаимодействия и распределения фосфора и бора диффузии с кремнием. В результате было обнаружено, что при диффузии бора в кремний с высокой концентрацией фосфора атомы электроактивного бора компенсируются в 2,5-3 раза больше атомов фосфора и меняют тип проводимости материала.

SUMMARY

In this work investigated and studied 3 groups of of diffusion samples in silicon, separately phosphorus and boron, sequential diffusion of phosphorus and boron. The aim of this study is to study the interaction and distribution of phosphorus and boron diffusion of silicon. As a result, it was found that when boron diffuses into silicon with a high phosphorus concentration, the atoms of electroactive boron compensate 2,5-3 times more phosphorus atoms and change the type of material conductivity.

SIMULATION OF REPRODUCTION OF FIXED ASSETS AND CURRENT CAPITALS OF THE AGROINDUSTRIAL COMPLEX

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Таянч сўзлар: модел, моделлаштириш, агросаноат, оптималлаштириш, технология.
Ключевые слова: модель, моделирование, агропромышленность, оптимизация, технология.
Key words: model, modeling, agro-industry, optimization, technology.

1. Introduction. As shown by the results of the study, in the branches of the agro-industrial complex there are great potential opportunities to provide the domestic consumer market, increase the volume of exports in the form of finished products [1].

The main task of deepening economic reforms is to optimize the structure of production in agriculture and processing industries, taking into account the demand of both the internal and external markets. In a market economy, improving the quality of breeding varieties of agricultural crops and obtaining a high income is one of the main problems [2].

Research into the principles of preparation and assessment of the consequences of decisions made in the agro-industrial complex has shown that in the procedure for making decisions on the choice of the structure of production, it is necessary to substantiate the system of macroeconomic indicators. For this, it is necessary to formulate the functional tasks included in the decision-making process. In contrast to the usual solution of problems, experts are connected to this process, from whom it is possible to obtain information for input into the model. Based on this, it is possible to formulate a decision-making procedure for choosing the structure of production of products of the agro-industrial complex. For this purpose, a complex of decision-making models has been developed on the choice of the structure of production of products of the agro-industrial complex [3].

Using mathematical models and methods of their implementation, an information base has been developed and a dialogue system has been created, which serve as a reliable tool for developing the theoretical prerequisites for decision-making in the agricultural sector of the economy of the Republic. From an information point of view, the implementation of a system of models makes specific requirements for the development of a unified data bank and the corresponding software system. At the same time, the software allows the implementation of both individual models and the system as a whole, taking into account the possibility of expert intervention [2].

The development of a forecasting system for macroeconomic indicators such as the need for agricultural products, the volume and structure of production, as well as the sale of products for the automated management of agricultural facilities and services to the population in conditions of uncertainty of initial information is associated with the collection, storage, classification, updating, processing and delivery in a convenient for the user in the form of very large volumes of various analytical and summary information.

The established traditional methods do not include them in a unified system for forecasting macroeconomic indicators of agricultural production. To raise to a new qualitative level the provision of specialists in the agro-industrial complex with tools in the form of information and dialogue systems allows you to develop the most realistic management decisions that contribute to determining the optimal option for the development of production and sales of products in the sectoral sub-complexes of the agro-industrial complex.This is achieved through the development of a complex of applied programs and the creation of an integrated database of information and dialogue systems for forecasting at the macrolevel of indicators, taking into account the characteristics of breeding varieties of agricultural crops and animal breeds.

At various levels of government, for the purpose of state regulation of the development of the agricultural sector and the implementation of various projects in the sectoral subcomplexes of the agro-industrial complex and the sphere of public services, forecast and analytical data on the formation of the structure of production are used along with regulatory and reference and reporting and statistical data. The substantiation of forecast and analytical data is most effectively carried out on the basis of the construction and use of macroeconomic models for forecasting the choice of the structure of production. For the normal functioning of sectoral sub-complexes of the agro-industrial complex, it is necessary to ensure the reproduction of fixed assets and working capital of the agro-industrial complex [1,2].

2. Modeling the reproduction of fixed assets and working capital of the agro-industrial complex. We represent the equation of the dynamics of fixed capital in the form: $K_t = a_{11}K_{t-1} + a_{12}A_{t-1} + a_{13}P_{t-1} + I_{t-1}$, (1)

where K - fixed assets; A - depreciation charges; P - net profit; I - external investments; $a_{11} = (1-n), n$ - depreciation rate; a_{12} - part of depreciation charges used to restore property, plant and equipment; a_{13} - part of the net profit for the restoration of fixed assets. Let us denote by z^{-1} shift operator, $z^{-1}y_t = y_{t-1}$. Taking into account this designation, equation (1) can be represented as:

$K_t = a_{11}z^{-1}K_t + a_{12}A_{t-1} + a_{13}P_{t-1} + I_{t-1}$. (2)

We transform this equation:

$K_t(1-a_{11}z^{-1}) = a_{12}A_{t-1} + a_{13}P_{t-1} + I_{t-1}$,

$K_t = (a_{12}A_{t-1} + a_{13}P_{t-1} + I_{t-1})/(1-a_{11}z^{-1})$.

The last expression can be represented in the form of a block diagram (see Figure1).

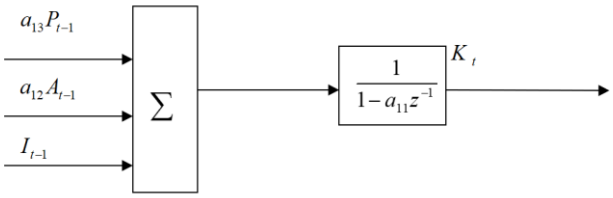

Figure 1. Model of reproduction of fixed assets.

Consider the dynamics of the reproduction of circulating assets. We will assume that due to inflation, the working capital of the sectoral sub-complexes of the agro-industrial complex is depreciated and part of the net profit is sent to restore them. With this in mind, the equation for the dynamics of working capital will look like:

$L_t = a_{21}L_{t-1} + a_{22}P_{t-1}$, (3)

whereL – working capital; $a_{21} = 1/(1+i)$; i – discount rate that takes into account inflationary depreciation of working capital; a_{22} - the share of net profit used to replenish working capital. The shift operator brings the difference equation (3) to the form:

$L_t = a_{21}z^{-1}L_t + a_{22}P_{t-1}$ (4)

Equation (4) will correspond to the structural diagram shown in Figure 2.

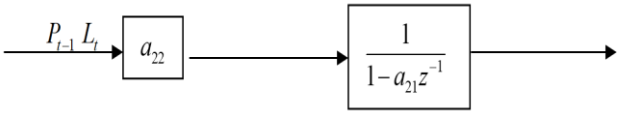

Figure 2. Working capital reproduction model.

The added value produced by the sectoral subcomplexes of the agro-industrial complex for a time equal to the duration of the production cycle is written using the production function $y = f(K,L)$.

This approach will allow us to improve the accuracy of the analysis and evaluate the real reproduction processes in the sectors of the agro-industrial complex.

3. Optimization of production products. In economics, functions are widely used that express the technological dependence between the results of the activity of a production facility and the costs of factors of production. Such functions are called production functions [3]. Many economic models use the Cobb-Douglas production function, which is given by the formula [4]:

$$y = a_0 L^{a1} K^{a2}, \quad (5)$$

where y - added value produced by sectoral sub-complexes of the agro-industrial complex for a time equal to the duration of the production cycle,

$a_0, a_1, a_2,$ - positive constants, L – working capital *K*-main capital.

K Let the dependence of the added value produced by the sectoral sub-complexes of the agro-industrial complex on resources has the form of the Cobb-Douglas production function: $y = a_0 K^{a1} L^{a2},$

Resource prices are set$C_K$and$C_L$and the total amount of funds C for production. To determine the amount of resources ***K*** and ***L***, at which the added value is maximal, we use the theorem [3-7]. Theorem 1 By solving the extremal problem $\prod_{i=1}^{n} x_i^{\beta_i} \to \max,$

with restrictions $\sum_{i=1}^{n} \alpha_i x_i = S, \ x_i > 0, \ x_i \in \mathbb{R},$

where $\beta_i > 0, \ \alpha_i > 0, \ \beta_i \in \mathbb{R}, \ \alpha_i \in \mathbb{R}, \ i = \overline{1,n},$

is the vector x^* with components

$$x_i^* = \frac{\beta_i S}{\alpha_i \beta}, \text{ where } \beta = \sum_{i=1}^{n} \beta_i. \quad (6)$$

The maximum value of the objective function μ calculated by the formula

$$\mu = \left(\frac{S}{\beta}\right)^{\beta} \prod_{i=1}^{n} \left(\frac{\beta_i}{\alpha_i}\right)^{\beta_i}. \quad (7)$$

Mathematical model of problem (5) can be written as follows: $y = a_0 K^{a_1} L^{a_2} \to \max,$

with restrictions $c_K K + c_L L = C, \ K \geq 0, \ L \geq 0.$

To solve this problem, we apply. Theorem 1 for

$n = 2, \ S = C, \ x_1 = K, \ x_2 = L, \ \beta_1 = a_1, \beta_2 = a_2, \ \alpha_1 = c_K, \ \alpha_1 = c_L.$

Optimal amounts of consumed resources K^* and L^* are calculated by the formulas (6):

$$K^* = \frac{a_1}{a_1 + a_2} \times \frac{C}{c_K}; \ L^* = \frac{a_2}{a_1 + a_2} \times \frac{C}{c_L}.$$

output y^* calculated by the formula (7):

$$y^* = a_0 \left(\frac{C}{a_1 + a_2}\right)^{a_1 + a_2} \left(\frac{a_1}{c_K}\right)^{a_1} \left(\frac{a_2}{c_L}\right)^{a_2}.$$

Let us now present a theorem, which deals with the inverse problem.

Theorem 2 By solving the extremal problem [3-7] $\sum_{i=1}^{n} \alpha_i x_i \to \min,$

with restrictions $\prod_{i=1}^{n} x_i^{\beta_i} = P,$ where $x_i > 0, \beta_i > 0, \beta_i \in \mathbb{R}, \alpha_i \in \mathbb{R}, i = \overline{1,n},$

is the only vector x^* with components

$$x_i^* = \frac{\beta_i}{\alpha_i}\left[P \prod_{i=1}^{n} \left(\frac{\alpha_i}{\beta_i}\right)^{\beta_i}\right]^{1/\beta} = \frac{\beta_i}{\alpha_i}\frac{\mu}{\beta}, \quad (8)$$

where $\beta = \sum_{i=1}^{n} \beta_i,$ objective function minimum μ is calculated by the formula:

$$\mu = \beta\left[P \prod_{i=1}^{n} \left(\frac{\alpha_i}{\beta_i}\right)^{\beta_i}\right]^{1/\beta}. \quad (9)$$

The next example considers the problem inverse to problem (5). To solve it, we use Theorem 2.

Let us find at what least cost of resources a given volume of output will be achieved.

Mathematical model of problem (5) will take the form: $C = c_L K + c_L L \to \min$

with restrictions

$$a_0 K^{a_1} L^{a_2} = y, K \geq 0, L \geq 0. \quad (10)$$

We transform constraint (10): $K^{a_1} L^{a_2} = \frac{y}{a_0}.$

To solve this problem, we use Theorem 2 for

$$n = 2, \ x_1 = K, \ x_2 = L, \ P = \frac{y}{a_0}, \ \alpha_1 = c_K, \ \alpha_2 = c_L, \ \beta_1 = a_1, \ \beta_1 = a_2.$$

Substituting the parameter valuesinto formula (8), we obtain the optimal amounts of resources:

$$K^* = \frac{a_1}{c_K}\left[\frac{y}{a_0}\left(\frac{c_K}{a_1}\right)^{a_1}\left(\frac{c_L}{a_2}\right)^{a_2}\right]^{\frac{1}{a_1+a_2}} =$$

$$= \left(\frac{y}{a_0}\right)^{\frac{1}{a_1+a_2}} c_K^{\frac{-a_2}{a_1+a_2}} c_L^{\frac{a_2}{a_1+a_2}} a_1^{\frac{a_2}{a_1+a_2}} a_2^{\frac{-a_2}{a_1+a_2}} =$$

$$= \left(\frac{y}{a_0}\right)^{\frac{1}{a_1+a_2}} \left(\frac{c_L}{c_K}\frac{a_1}{a_2}\right)^{\frac{a_2}{a_1+a_2}},$$

$$L^* = \frac{a_2}{c_L}\left[\frac{y}{a_0}\left(\frac{c_K}{a_1}\right)^{a_1}\left(\frac{c_L}{a_2}\right)^{a_2}\right]^{\frac{1}{a_1+a_2}} =$$

$$= \left(\frac{y}{a_0}\right)^{\frac{1}{a_1+a_2}} c_K^{\frac{a_1}{a_1+a_2}} c_L^{\frac{-a_1}{a_1+a_2}} a_1^{\frac{-a1}{a_1+a_2}} a_2^{\frac{a_1}{a_1+a_2}} =$$

$$= \left(\frac{y}{a_0}\right)^{\frac{1}{a_1+a_2}} \left(\frac{c_K}{c_L}\frac{a_2}{a_1}\right)^{\frac{a_1}{a_1+a_2}}.$$

Least cost C^* for resources are calculated by the formula (9):

$$C^* = (a_1 + a_2)\left(\frac{y}{a_0}\left(\frac{c_K}{a_1}\right)^{a_1}\left(\frac{c_L}{a_2}\right)^{a_2}\right)^{\frac{1}{a_1+a_2}}.$$

4. Conclusion. Thus, one of the priority directions for the development of the industrial sphere of sovereign Uzbekistan is the production and processing of agricultural products. As the results of the study have shown, these industries have great potential for supplying the domestic consumer market, increasing the volume of exports in the form of finished products [6-8].

The main task of deepening economic reforms is to optimize the structure of production in agriculture and processing industries, taking into account the demand of both the internal and external markets.

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РЕЗЮМЕ

Мақолада агросаноат мажмуасининг асосий фондлари ва айланма маблағларини такрор ишлаб чиқаришни моделлаштириш ва саноат маҳсулотларини оптималлаштириш кўриб чиқилади, ишлаб чиқариш объекти фаолияти натижалари ва ишлаб чиқариш омиллари харажатлари ўртасидаги технологик боғлиқлик ифодаланади. Агросаноат мажмуасида кенг фойдаланилади.

РЕЗЮМЕ

В статье рассматривается моделирование воспроизводства основных фондов и оборотных средств агропромышленного комплекса и оптимизация выпуска промышленной продукции, выражающее технологическую зависимость между результатами деятельности производственного объекта и затратами факторов производства, которые широко используется в агропромышленном комплексе.

SYMMARY

The paper examines the modeling of the reproduction of fixed assets and working capital of the agro-industrial complex and the optimization of industrial products, expressing the technological dependence between the results of the activity of a production facility and the costs of production factors, which are widely used in the agro-industrial complex.

SINFLARGA AJRATISH MASALASIDA ALOMATLARNING INFORMATIVLIGINI BAHOLASH VA ULARNI TANLASH

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Tayanch so'zlar: o'lchamni qisqartirish, alomatlarning informativligini baholash, alomatlarni tanlash, yashirin qonuniyatlarni qidirish, Naïve Bayes.

Ключевые слова: снижение размерности, оценка информативности признаков, выбор признаков, поиск скрытых закономерностей, Naïve Bayes.

Key words: dimensionality reduction, assessment of the informativeness of features, feature selection, search hidden patterns, Naïve Bayes.

Kirish. Zamonaviy informatsion texnologiyalarni tibbiyotda qo'llash tibbiy informatsion tizim yordamida saqlanuvchi va qayta ishlanuvchi katta miqdordagi berilganlarni to'planishiga olib keladi. Bu berilganlar qaror qabul qilishda ishlatiladigan tibbiy bilimlarni o'zida saqlashi mumkin. Ushbu berilganlarni tadqiq qilish jarayonida o'lcham muammosi yuzaga keladi. Shuning uchun alomatlar fazosini qisqartirish va informativ alomatlar to'plamini ajratish tibbiy axborot tizimlari uchun aktual masalalardan biri bo'lib bormoqda.

Alomatlar fazosini qisqartirish yoki alomatlarni tanlash ko'pincha tibbiy prognoz modellarini qurishda va tahlil qilishda yuzaga keladi [1]. Tadqiq qilishda ishlatiladigan alomatlar miqdorini kamaytirish hisoblash murakkabligini pasaytirish [2], obyekt haqidagi qo'shimcha ma'lumotlarni olish uchun o'tkaziladigan tibbiy tadqiqotlar uchun zarur bo'lgan harajatlarni kamaytirish [3] uchun ishlatiladi.

Obyektni sinfga ajratish bo'yicha qaror qabul qilishda uni bir nechta alomatlari bo'yicha baholash va bu baholarni to'g'ri hisobga olish muammosi yuzaga keladi [4]. Bu muammo ikkita qism muammolarga ajratiladi: natijaviy qoidani ko'rinishini belgilash va alomatlarning muhimlilik koeffitsientini – vaznlarini [5] aniqlash.

Ma'lumotlar miqdori bo'yicha individual mustaqil xususiyatlarning ahamiyatini baholash zarur bo'lganda, statistik usullar keng qo'llaniladi: to'plangan chastotalar usuli, Shennon usuli va Kulbak usuli [6,7]. Intellektual qaror qabul qilish tizimlarida bu usullarni tanlash quyidagi sabablarga bog'liq: bu usullar axborot mazmunini o'lchashning juda oddiy algoritmlariga asoslangan, bu usullarni qo'llash natijalarini talqin qilish oson, berilganlarda tushurib qoldirilgan qiymatlar mavjud bo'lganda, alomatlar qiymatlari turli o'lchamda bo'lganda va ularning miqdori katta bo'lganda ham qo'llash mumkin [8,9].

Alomatlar informativligini baholash. Standart ravishda qo'yilgan obrazlarni anglash masalasi qaraladi. O'zaro kesishmaydigan $K_1 ... K_d$ (d>1) sinflar vakillarini o'z ichiga olgan $E_0 = \{S_1, ..., S_m\}$ obyektlar to'plami berilgan. Tanlanmaning mumkin bo'lgan obyekti n ta turli toifadagi $X = (x_1, ..., x_n)$ alomatlar (miqdoriy va nominal) bilan tavsiflangan bo'lib, ularning ξ tasi miqdoriy, n-ξ tasi nominal shkalalarda o'lchanadi.

Ishning maqsadi obyektlarni sinfga ajratishda alomatlarni tanlash uchun Shennon, Kulbak va [9] da taklif etilgan intervallarga ajratishning stoxostik usulini qo'llash va ularning solishtirma tahlilini o'tkazishdan iborat (intervallarga ajratishning stoxastik usulini CR1 deb nomlab ketiladi). Buning uchun quyidagilarni aniqlash zarur:

– alomatlarning informativligini baholash;
– sinfga ajratish uchun informativlik bahosi asosida alomatlarni tanlash.

Shennon usuli asosida alomatlar informativligini baholash. Shennon usuli alomatlarning turli gradatsiyalariga mos keluvchi ma'lumotlarning o'rtacha og'irligi sifatida informativlikni baholashni taklif qiladi. i-alomatning informativligi quyidagicha aniqlanadi:

$$I(\mathrm{x}_i) = 1 + \sum_{i=1}^{G} (\mathrm{P}_i \sum_{k=1}^{K} P_{i,k} * \log_k P_{i,k}) \qquad (1)$$