4.2 Optimization of production by agricultural business entities, taking into account the technical lack of equipment for raw materials supplies

Evaluation of economic processes reveals the problems of underdevelopment of mechanisms for adaptation of agricultural business entities in the market conditions of economic management in Ukraine. Technologies of diagnostics, modification, genesis and morphisms of the adaptive state make it possible to monitor the functioning of the economic mechanism of adaptation. The use of non-traditional economic and mathematical techniques and methods not only contributes to the development of the adaptation mechanism, but also methodologically substantiates the meaning of transformational transformations of the institutional system. Such subjects of agrarian business as agricultural cooperatives are a corporate type of management in the agrarian sector of the economy, so the diagnosis of the adaptive state of agricultural cooperatives needs special attention of researchers.

Studying the optimization of output by agricultural business entities, taking into account the technical non-equipment for raw material supplies, they considered it necessary to take into account the results of research by scientists Alexander W.P. [186], Chambers G.C., Pope R.D. [172], Chand R., Kaul J.K. [173], Fare R., Grosskopf S., Lee H.A. [174], Jensen H. [175], Keleberda T. [176], Kostyrko I. G. [177], Korinets R.Ya. [178], Lim H. [185], Lupenko Yu. O. [178], Malik M. Yo. [178, 179, 187], Mamchur V. A. [178, 180], Murova O.I., Trueblood M.A., Coble K.H. [181], Nerlove M. [188], Nitani M., Riding A.L. [182], Peterson W. [183], Rao M. J. [184], Shumway C.R. [185, 186], Shpykuliak O. H. [178, 187] and others. Izvestnye positsiya issledovatelei nehodymy for deistvennost mechanisms of adaptation, but not abundance in realization in the rynochnyh uslovyh Ukraine and trebuyut postoyannogo sovershenstvaniya. Analytics - cooperators, as well as, as well as investory, hotyat imet chetkoe znanie otnosytelno optimal release of production with the account of the tech is not voorugnosty selskohozyaystvennoy proizvodstvo. In the situation of the inconsistency of the economic mechanics, the adaptation of sozdanie, modification and submenuation of the nontraditional analistic apparatchikate is actualized to the maximum possible power. The perfection of diagnostic tools in identifying the adaptive

state of corporate-type agricultural business entities has a special meaning from the standpoint of transformational changes in the institutional system of market relations. The experience of foreign and domestic research, own conceptual foundations of the economic mechanism of adaptation, system analysis of models of adaptive diagnostics, modification, genesis and morphisms actualize the ability of analysts to correctly and accurately predict the optimal level of output.

The purpose of writing the article is to update the use of non-traditional analytical tools in the diagnosis of the adaptive state of agricultural business entities in Ukraine on the example of determining the functional dependence of the optimal output of products, taking into account the impact of technical equipment on raw material supplies.

The structural transformation of the agrarian sector of the economy is the foundation for the adaptation of the economic mechanism of functioning, the problems of the organization of which are laid down in the actions of those in power. The equivalence of intersectoral exchange is the guiding principle of the adaptation of the economic mechanism. Features of the structural transformation of the agricultural sector are revealed in the process of research by system analysis. Price, credit, tax, financial, organizational, and managerial and production relations are the main components of the adaptation of the economic mechanism for the functioning of agricultural business entities. Normative-legislatively fixed and structurally-functionally ensured integrity of the "provisions, norms and rules of the market game" in the conditions of a socially-oriented market economy (institutional structure of equivalent exchange) reveals the essence and features of the economic mechanism. Agricultural business entities (players) who use the "rules of the market game" form the framework of the organizational structure of adaptation.

It has been established that the economic mechanism of adaptation is an integrative set of forms and methods of survival, harmonization of ties and relations; subsystem of the economic mechanism of the state, which reveals the integrity of the formation of intra-economic, economic and market mechanisms for the functioning of agricultural business entities; a component of the economic policy of the state,

providing economic support and regulation. The constructed and substantiated logical structure of the concept of adaptation of the economic mechanism of functioning of agricultural business entities determines the features of the organization of the foundation for the adaptation of the economic mechanism of functioning; causal bases; basic patterns, driving forces and more. Maneuverability and flexibility in achieving the goals of the functioning of agricultural business entities is provided by the processes of active (passive) adaptation. Active adaptation is a change in the external environment in comparison with the own goals of functioning and the needs of agricultural business entities. Passive adaptation is a change in the internal environment of the functioning of agricultural business entities in comparison with the conditions of the external environment, as well as ensuring the conditions for maintaining competitiveness.

The adaptive approach in the management system is associated with the development and implementation of effective forms of reflection by the subject of agrarian business and its network structures of environmental influences. In the management system, adaptation measures include the optimization of resource maneuvering and the level of risk in the management decision-making system; ensuring high flexibility and maneuverability of the objectives of the strategies for the functioning of agricultural business entities; maximum convergence of economic interests of employees and the administration of agricultural business entities; use of economic and mathematical models and methods in the system of diagnostics of adaptive processes that increase the efficiency and efficiency of decisions; methodological integration of management tools and more.

The main components of the system for diagnosing the adaptive state of an agricultural business entity are subsystems of adaptive modeling, planning, forecasting and risk management of agricultural production. Among the many methods for diagnosing adaptive processes, the most effective is economic and mathematical modeling. The parameter of financial stability is equated in the diagnosis of the equilibrium economic state of an agrarian business entity with one of the basic parameters of survival in the conditions of a socially-oriented market economy of

Ukraine. Inhibiting factors in the development of the system of adaptation of the economic mechanism of functioning are the disparity of prices for products; non-transparency of schemes for the sale of agricultural products; non-compliance of the pricing system with the dynamics of production and sales, supply and demand, and the tax base of the country - the taxation system; lack of free access to financial and credit resources; low innovative and credit attractiveness, as well as a low level of tax attractiveness as an investment resource, etc.

The system of budget expenditures on the agricultural sector is imperfect to the same extent as the implemented dividend policy. Price-determining functions are not performed by the institutions of the infrastructure of the agrarian market. It is possible to change the effectiveness of tax policy only by replacing the taxation system with a system adequate to the requirements of a market economy. The inconsistency of regulatory processes and the lack of competition in Ukraine is confirmed by the crisis situations in the markets of meat, sugar, dairy products and petroleum products. However, the decrease in the level of economic performance of agricultural business entities is stimulated not only by this, but also by political uncertainty, activation of the turnover of funds in the shadow structures of the economy.

It has been determined that the change in the forms and methods of survival in the conditions of institutional instability is associated in integrative spiral integrity with the improvement of the parameters of the main components of the adaptation of the economic mechanism of functioning (credit, tax, financial, price, organizational-production relations; organizational-economic and managerial interactions of the internal and external environment; systems for diagnosing the economic state and behavior strategy; a mechanism for making managerial decisions to ensure adaptation status and competitive advantages, and others).

The effectiveness of the functioning of agricultural business entities directly depends on the level of adaptation of the economic mechanism of functioning to the conditions of market management. In the course of the study, a significant differentiation of indicators of economic efficiency of functioning of agrarian business entities of different organizational and legal forms of management has been

determined. Subjects of agrarian business with the greatest economic efficiency are distinguished by the greatest adaptive potential and cooperative and integration advantages.

We believe that adaptation should be understood as a form of reflection by the current subject of agrarian business and its network structures of the mechanisms of influence of the market environment, seeking to establish a balance in relations and relations of the market. The degree of involvement of an agrarian business entity in market forms of management reveals the degree of development of the mechanism for the functioning of adaptation. Diagnostics of adaptive management is comparable to the diagnosis of the adaptive state as the identification of the state of adaptive forms and functional structures of the current subject of agrarian business, the mechanisms of its functioning. Taking into account our own conceptual foundations and the results of previous scientific achievements, we will present a model of the impact of technical non-equipment on raw material supplies.

The traditional functional dependence of commodity supply estimation is the Nerlove M. analysis model [188]. The researcher studied the economic conditions of American farmers in the period from 1909 to 1932, who were engaged in animal husbandry and crop production (corn, grain). Features of the use of equipment (or technical equipment) were revealed by the following equality:

$$Q_t = \pi_0 + \pi_1 \cdot P_{t-1} + \pi_2 \cdot Q_{t-1} + \pi_3 \cdot Q_{t-2} + \pi_4 \cdot Z_t + \pi_5 \cdot Z_{t-1} + v_t,$$

where is: Q_t – total value of agricultural output; π_i – structural coefficients of expectation, price lag and area in acres for 1 or 2 years; P_{t-1} – fixed price for delivered products in the period $t-1$; Q_{t-1}, Q_{t-2} – total value of agricultural output in periods $t-1, t-2$; Z_t, Z_{t-1} – variable intensity of deliveries during periods $t, t-1$; v_t – the remainder of the products.

The conceptual foundations of later studies (Murova O.I., Trueblood M.A., Coble K.H. [181]) are distinguished by the effectiveness of the dual theory of the functional system of raw material supply by the side function of profit. In practice, this is quite convenient in modeling the impact of the effects of technical equipment on

agricultural raw materials. In addition, this type of modeling allows you to determine the functional system of the time extension of agricultural output as follows:

$$\begin{cases} C(y,w) = \min wx \;\; s.t. \;\; D(y,w) = 1 \\ \gamma^{-\left(\frac{1}{k}\right)} = D(y,x) = D(\gamma \cdot y, x) \end{cases},$$

where is: $D(\gamma \cdot y, x)$ – function of temporary length of agricultural output; w – the price of consumed products; y – vector of products; x – vector of consumed products; k – the degree of the temporal extension function.

Taking into account the functional system of temporary length of agricultural output facilitates minimization of the consumption price, namely:

$$\begin{cases} C(y,w) = \min wx \;\; s.t. \;\; D(y,w) = \dfrac{1}{\theta} \\ \min wx \;\; s.t. \;\; \theta \cdot D(y,x) = 1 \\ \min wx \;\; s.t. \;\; D\left(\theta^{-k} \cdot y, x\right) = 1 \end{cases},$$

where is: θ – output performance of agricultural cooperatives $(1 \le \theta \le \infty)$. θ is a measure of productivity and one of the parameters of a functional system of temporal extent, characterized by a power dependence due to the duality of functional price determinations and time extension. If functionally the time length of agricultural output is revealed as:

$$C\left(\theta^{-k} \cdot y, w\right) = \theta^{-1} \cdot C(y,w),$$

then the receipt of the maximum possible profit can be determined by the solution of the system:

$$\begin{cases} \max_y \; p_i y_i - \theta^{-1} \cdot C(y_i, w_i) \\ p_i = \theta^{-1} \cdot \dfrac{\partial C}{\partial y_i} \Rightarrow \theta \cdot p_i = \dfrac{\partial C}{\partial y_i} \end{cases},$$

where is: p_i – profit of the agricultural cooperative; C – price of agricultural products.

This type of model is distinguished by the fact that the prices of the optimal level of output are already loaded with the conditions of the influence of technical equipment

on agricultural raw materials. We consider it necessary to determine the optimal level of output of agricultural cooperatives, taking into account the technical non-equipment for raw material supplies as follows:

$$\Pi^*\left(\theta\ p_i, w_i\right) = \max\ p_i \cdot y_i^* - \theta^{-1} \cdot C\left(y_i^*, w_i\right),$$

where is: y_i^* – optimal level of output of agricultural cooperatives.

In principle, in applied research, two approaches to measuring technical equipment are most often used: the analysis of the probability of the maximum possibility is SFA, and the analysis of the external situation is DEA. The SFA approach is distinguished by the action of econometric techniques, and DEA – by programming techniques. The use of DEA makes it possible to express technical equipment through nonparametric methods that can be used in subsequent econometric analysis without recourse to econometric measurement.

Probability study $\left(1 \le \theta \le \infty\right)$ Believes that the ratio of agricultural output to the highest possible level of agricultural output reflects technical armament. Taking into account this assumption and the DEA approach, let us define the problem of linear programming for the output of agricultural cooperatives, taking into account the technical performance in the following way:

$$\begin{cases} F\left(x_i, y_i \middle| C\right) = \max_{\theta,z} \theta\ \ s.t.\ \ \theta \cdot y_i \le z \cdot M \\ z \cdot N \le x_i \\ z_i \ge 0\ \ \forall\ i \end{cases},$$

where is: z – variable intensity of agricultural output; M – matrix $i \times m$ production of agricultural products; N – matrix $i \times n$ consumption of agricultural products.

This system is quite correlated with Farrell's functional dependence [174]. Without forgetting this fact, it is logical to define a quadratic dependence model for the demand function for the products of agricultural cooperatives. We have the following system:

$$\begin{cases} П = П\left(\left(\theta^* \cdot p\right), w\right) = \sum B_i \cdot \theta \cdot p_i + \sum B_i \cdot w_i + \sum B_{ij} \cdot \theta^2 \cdot p_i \cdot p_j + \sum B_{il} \cdot w_i \cdot w_l + \\ + \sum B_{ik} \cdot \theta \cdot p_i \cdot w_k + \sum \gamma_{il} \cdot \theta \cdot p_i \cdot L_d + \sum \gamma_{il} \cdot w_i \cdot L_d; \\ b_{ii} = B_{ii} \cdot \left(\frac{p_i}{y_i}\right);\ b_{ij} = B_{ij} \cdot \left(\frac{p_j}{y_i}\right); \end{cases},$$

where is: y_i – the amount of agricultural products produced; x_i – the amount of agricultural products in demand; L_d – the planned area of land sown in acres (land is represented as a fixed consumption); b_{ii} – elasticity of the cost of production; b_{ij} – elasticity of the cross-price of products; B_{ii} – i coefficient i equality; B_{ij} – i coefficient j equality; p_i – price i harvest of agricultural products, calculated according to the average level; p_j – price j harvest of agricultural products; y_i – the volume of agricultural products produced.

Technical non-armament changes the cross-price relationship. The cross-price relationship between consumptions does not change. Technical non-armament increases the elasticity of supply, but does not have a significant impact on the elasticity of consumer demand. The cost of consumer demand can be negative and positive.

Given the peculiarities of Hoteling's lemma, let's present the supply and demand function for the products of agricultural cooperatives in another way. The function of the sentence can be formalized as follows:

$$y_i = B_i \cdot \theta + \sum B_{ik} \cdot \theta \cdot w_k + \sum B_{ij} \cdot \theta^2 \cdot p_j + \gamma_{il} \cdot \theta \cdot L_d + u_i;$$

then the demand function is revealed as follows:

$$-x_i = B_i + \sum B_{il} \cdot w_l + \sum B_{ik} \cdot \theta \cdot p_i + \gamma_{il} \cdot L_d + v_i,$$

where is: u_i, v_i – possible errors in production supply and consumer demand.

The results of research of agricultural business entities in Ukraine confirm the identified functional dependencies. In particular, the growth of technical equipment is facilitated by the positive actions of the reform (privatization for entrepreneurs, trade liberality, price), and the reduction is facilitated by negative consequences (imperfect policy of state regulation, slow reforms of labor and credit markets, measures of land privatization).

The model of the influence of technical non-equipment on agricultural raw materials supply presented here is ready for applied use in diagnosing the adaptive state of agricultural business entities, in particular, as the implementation of non-traditional analytical tools. Tracked functional dependencies contribute to determining the impact of technical non-armament with the highest accuracy and truthfulness in any interval of time duration.

Thus, in the course of the study, it has been established that adaptation is a form of reflection by the current subject of agrarian business and its network structures of the mechanisms of influence of the market environment, which seeks to establish equilibrium in relations and relations of the market. Diagnostics of the adaptive state correlates with the determination of the state of the functional structures of the current subject of agrarian business, its mechanisms of functioning and adaptive forms of management. It is proved that the functional accounting of the influence of technical equipment on agricultural raw materials supplies strengthens the analytics of agricultural business entities. It has been substantiated that the improvement of non-traditional analytical tools enriches the methodology of the economic mechanism of adaptation and accelerates the processes of diagnostics of the adaptive state and transformational transformations in the country. The identified functional dependencies are recommended for practical application in the diagnosis of the state of agricultural business entities. The zone of proximal development of further scientific research correlates with the implementation of more specific calculations of the optimal output of products by agricultural business entities, taking into account the technical non-armament of raw material supplies in 2380 probable combinations of market environment conditions in Ukraine.