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### IMPROVING THE ORGANISATIONAL AND ECONOMIC MECHANISM FOR SUSTAINABLE DEVELOPMENT OF AGRICULTURAL ENTERPRISES

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#### Abstract

The article develops an organisational-economic mechanism for ensuring the sustainable development of agricultural enterprises. The mechanism consists of four functional blocks – organisational, economic, technological and institutional – together with an assessment and feedback link. The subjects of the mechanism, the relations between them and the matrix of interests are identified. Based on statistical data for the Republic of Karakalpakstan, three systemic defects of the existing mechanism are identified – institutional rigidity in livestock farming, growing territorial differentiation, and the absence of a feedback link – and ways of eliminating them are substantiated. A three-stage roadmap for implementing the mechanism is proposed.

**Keywords:** organisational-economic mechanism, sustainable development, agricultural enterprise, cooperation, feedback, coordination of interests, Karakalpakstan, agrarian management.



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### Introduction

The announcement of sustainable development goals and the development of methods for measuring them do not, in themselves, resolve the task. Translating goals into practice requires an enabling mechanism: a system of actors, instruments, resources and the relationships among them. It is precisely at this point that many programmes fail: objectives are correctly formulated and indicators are established, but the arrangements for achieving them remain unclear.

The concept of an organisational and economic mechanism is widely used in economic literature, although its meaning varies. Some studies reduce it to a set of financial instruments, whereas others equate it with a management structure. This study treats the mechanism as a systemic concept: an integrated arrangement that translates objectives into resources and actions, measures outcomes and adjusts itself accordingly.

Designing such a mechanism is particularly challenging in the Republic of Karakalpakstan. Agricultural production operates under three systemic constraints: scarce and unstable water resources, secondary soil salinisation and fragmented production among small farms. Each constraint requires specific measures, but addressing them separately is ineffective because they are interconnected and mutually reinforcing.

In practice, three typical mistakes arise in mechanism design. First, a list of instruments is mistaken for a mechanism: subsidies, loans and tax incentives are specified without defining their interconnections or who should apply them and in what sequence. Second, stakeholders' interests are neglected: although the mechanism may appear logically sound, participation may offer insufficient benefits to particular actors. Third, a feedback mechanism is omitted.

The third mistake has the most serious consequences. Without feedback, the mechanism remains an open-loop system: it exerts influence but does not measure



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outcomes and therefore cannot correct errors. Management theory characterises such systems as unstable because they deviate from their objectives when external conditions change, while those deviations remain undetected.

The purpose of this study is to develop an organisational and economic mechanism for ensuring the sustainable development of agricultural enterprises and to substantiate ways of implementing it under the conditions of the Republic of Karakalpakstan.

### Literature Review

The literature distinguishes three approaches to mechanisms for ensuring sustainable development. The first is the regulatory approach, which relies primarily on mandatory requirements and sanctions. The second is the incentive-based approach, which seeks to establish economic motivation. The third is the institutional approach, which focuses on changing the rules governing economic activity.

J. Pretty demonstrated that social capital and knowledge-exchange systems are as crucial as technological solutions in the transition towards sustainability [1]. This implies that education and advisory services should constitute a distinct component of the mechanism. D. Tilman and co-authors showed that economic incentives which disregard environmental costs can undermine the resource base [2].

Analysing farm restructuring in Uzbekistan, N. Djanibekov and co-authors reached an important conclusion: changes in organisational form do not automatically change economic behaviour if the incentive system remains unchanged [3]. This proposition is directly relevant to the present study: the organisational and economic blocks must function together.

M. Bekchanov and co-authors examined the socioeconomic conditions for adopting water-saving technologies in the lower reaches of the Amu Darya and



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showed that technological effectiveness depends on the institutional environment [4]. Consequently, the technological block cannot function independently of the institutional block.

The literature review indicates that individual elements of the mechanism have been studied extensively, whereas their interconnections as an integrated system and the role of feedback remain insufficiently explored. This article seeks to address that gap.

Two principal cooperation models are distinguished in the literature: production cooperatives, in which members pool resources, and service cooperatives, in which members retain their independence while using shared services. International experience suggests that the latter are more sustainable for small farms because they do not alter property relations and therefore encounter less resistance.

Research on feedback systems also emphasises the distinction between monitoring and evaluation. Monitoring observes processes and records changes in indicators; evaluation identifies the causes of change and examines the relationship between interventions and outcomes. The mechanism's capacity for self-correction depends particularly on the latter function.

### Research Methodology

The study employs a systems approach and organisational modelling. The mechanism was designed through the following sequence: defining the objective; identifying the functions required to achieve it; grouping functions into blocks; specifying actors and instruments for each block; describing inter-block relationships; and establishing a feedback loop.

Official data from the Statistics Department of the Republic of Karakalpakstan for 2015–2025 were used to identify deficiencies in the existing mechanism [10]. A



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deficiency is defined as a situation in which a particular function formally exists but statistical evidence shows that it does not produce the expected outcome.

A stakeholder-interest matrix was used to analyse relationships among actors. For each actor, the study identified its function within the mechanism, principal interest and potential points of conflict with other stakeholders. This analysis helps identify the mechanism's weakest links in advance.

The design followed four principles: each block must address a specific identified deficiency; information and resource flows between blocks must be defined; responsibility for each function must be assigned to a particular actor; and each outcome must be measurable by an indicator. These principles prevent the mechanism from becoming merely declarative.

The study is limited by the fact that the proposed mechanism is a theoretical design whose practical effectiveness requires pilot testing. Furthermore, the stakeholder-interest matrix is based on expert analysis and should be refined through surveys of the participants.

### **Analysis and Results**

The analysis begins with an assessment of the existing mechanism. Examination of statistical data made it possible to identify systemic deficiencies (Table 1).



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**Table 1 Systemic deficiencies of the existing organisational and economic mechanism**

| Deficiency                                  | Statistical evidence                                                                           | Cause                                                                       | Consequence                                                           |
|---------------------------------------------|------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|-----------------------------------------------------------------------|
| Institutional rigidity in livestock farming | 89.9% of output is produced by household farms; structural shift index over ten years: 0.038   | Cooperation mechanism has not been established; small farms lack incentives | More than half of gross output remains outside modernisation          |
| Increasing territorial differentiation      | Coefficient of variation increased from 67.7% to 75.0%; four districts produce 51.2% of output | Uniform measures across the republic; no zone-specific differentiation      | The Aral Sea zone falls further behind in absolute terms              |
| Absence of feedback                         | No unified enterprise-level sustainability assessment methodology has been introduced          | Monitoring focuses on volume rather than outcomes                           | Effectiveness is not measured; corrective actions are not implemented |
| Forced intensification                      | Cultivated area has declined by 7.5% since 2022                                                | Water scarcity and salinisation; insufficient land reclamation              | Progressive contraction of the production base                        |

The table reveals that the deficiencies are interconnected. Institutional rigidity in livestock farming is not accidental; it results from the absence of a functioning cooperation mechanism. Joining a cooperative is beneficial to a small household farm only if it provides cheaper access to feed, veterinary services or marketing channels. Without such services, cooperation remains merely formal.

Increasing territorial differentiation is also linked to the mechanism's design. When identical measures are applied across the republic, areas with more favourable initial conditions obtain better results, a well-established pattern in economic geography. Thus, formally equal policies generate unequal outcomes.

The third deficiency, the absence of feedback, is the most systemic. If monitoring focuses on output volumes, the mechanism cannot evaluate its own effectiveness or correct itself. As demonstrated by the preceding analysis, nominal growth



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substantially distorts the picture: a 6.49-fold nominal increase conceals real annual growth of only 4.0%.

The fourth deficiency, forced intensification, differs from the others because it arises from external factors. Nevertheless, it can reasonably be treated as a deficiency of the mechanism: the rate of land reclamation lags behind the withdrawal of land from cultivation, reflecting an inadequate speed of response.

The interaction of these deficiencies warrants particular attention. The absence of feedback directly contributes to the persistence of the other three: without measuring outcomes, neither stagnation in livestock farming nor increasing territorial differentiation is identified in time, and corrective measures are not implemented. In this sense, the third deficiency is fundamental.

This conclusion determines the sequence for improving the mechanism. An assessment and feedback system should first be established, followed by interventions in the other blocks. Reversing this sequence-implementing measures before introducing evaluation-risks inefficient resource expenditure.

The structure of the proposed organisational and economic mechanism, designed to eliminate the identified deficiencies, is presented in Figure 1.

The four functional blocks in Figure 1 are designed to complement one another. The organisational block brings producers together and establishes service structures, addressing fragmentation in livestock farming. The economic block creates financial incentives: preferential financing, water tariffs, insurance and subsidies make sustainable practices economically attractive.



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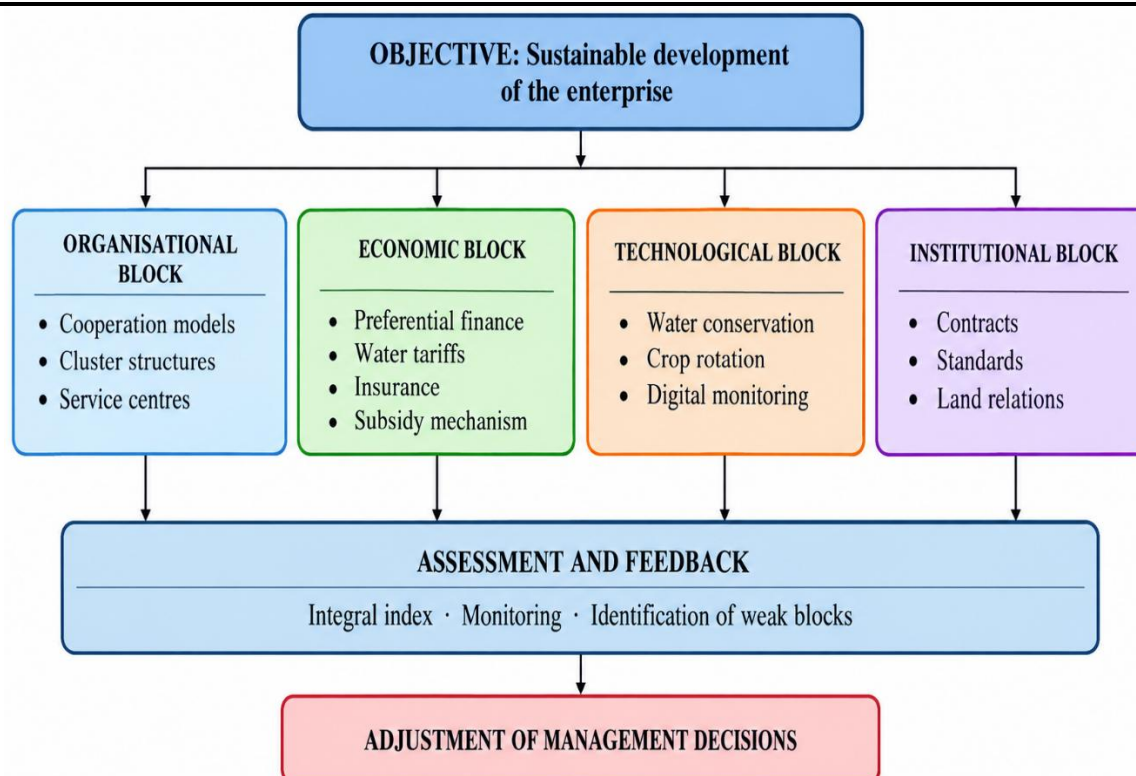


**Figure 1. Organisational and economic mechanism for the sustainable development of agricultural enterprises**

The technological block encompasses water conservation, crop rotation and digital monitoring. The institutional block provides the legal foundation for the other three through contracts, standards and land relations. This arrangement is deliberate: institutional arrangements change most slowly and therefore define the boundaries within which other blocks operate. The most important element of the figure is the assessment and feedback block at the bottom. It receives information from all four functional blocks, measures outcomes using an integral index, identifies weak blocks and signals the need to adjust management decisions. The dashed return



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path closes the control loop. In current practice, this loop is absent, as noted in the third deficiency.

Interdependence between blocks also deserves attention. Technological instruments cannot be introduced without financing from the economic block; economic incentives are ineffective unless delivered to small farms through the organisational block; and the organisational block cannot be established without the legal foundation provided by the institutional block. The blocks therefore form an interconnected chain whose weakest link determines overall effectiveness.

In Karakalpakstan, the organisational block is the weakest link because a livestock cooperation mechanism has not yet been effectively established. Additional technological or financial investment will therefore fail to deliver the expected results until this block is strengthened: resources will concentrate among large producers, while the segment accounting for approximately half of gross output remains unchanged.

The importance of feedback can be illustrated by a subsidy for water-saving technology. The technology may be introduced and water consumption reduced, or the subsidy may be received without effective use of the technology. Without feedback, both cases appear identical in administrative reporting. Measuring an environmental indicator such as water intensity makes the difference immediately visible.

Specific instruments are assigned to each block (Table 2).



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**Table 2 Instruments of the mechanism's blocks and the deficiencies they address**

| Block                   | Main instruments                                                                       | Deficiency addressed                                | Outcome indicator                                                |
|-------------------------|----------------------------------------------------------------------------------------|-----------------------------------------------------|------------------------------------------------------------------|
| Organisational          | Service cooperatives; cluster structures; advisory centres                             | Institutional rigidity in livestock farming         | Share of organisations and cooperatives; marketability of output |
| Economic                | Preferential financing; volume-based water tariffs; crop insurance; targeted subsidies | Low investment in technology                        | Investment activity; insurance coverage                          |
| Technological           | Drip irrigation; crop rotation; salt-tolerant varieties; digital monitoring            | Forced intensification; excessive water consumption | Water intensity; yield per hectare                               |
| Institutional           | Long-term contracts; quality standards; improved land relations                        | Legal uncertainty affecting all blocks              | Contract duration; share of standardised output                  |
| Assessment and feedback | Integral index; district-level monitoring; identification of weak blocks               | Absence of feedback                                 | Dynamics of integral index; frequency of adjustments             |

The table shows that each block responds to a clearly identified deficiency, a central principle of mechanism design. A block that does not address any established problem creates an unnecessary burden; conversely, a deficiency without a responsible block remains unresolved.

The outcome-indicator column links the mechanism to the assessment system. At least two indicators are assigned to each block, all forming part of the indicator system developed in earlier research. This allows the mechanism and assessment methodology to operate as a unified framework.

The composition of the instruments reveals an important asymmetry. Instruments in the technological and organisational blocks are concrete and directly measurable, whereas those in the institutional block are broader and their effects



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are indirect. This is a natural characteristic of institutional change; overlooking it can lead to the neglect of this block, a common practical error.

The actors involved in the mechanism and their relationships are presented in Figure 2.

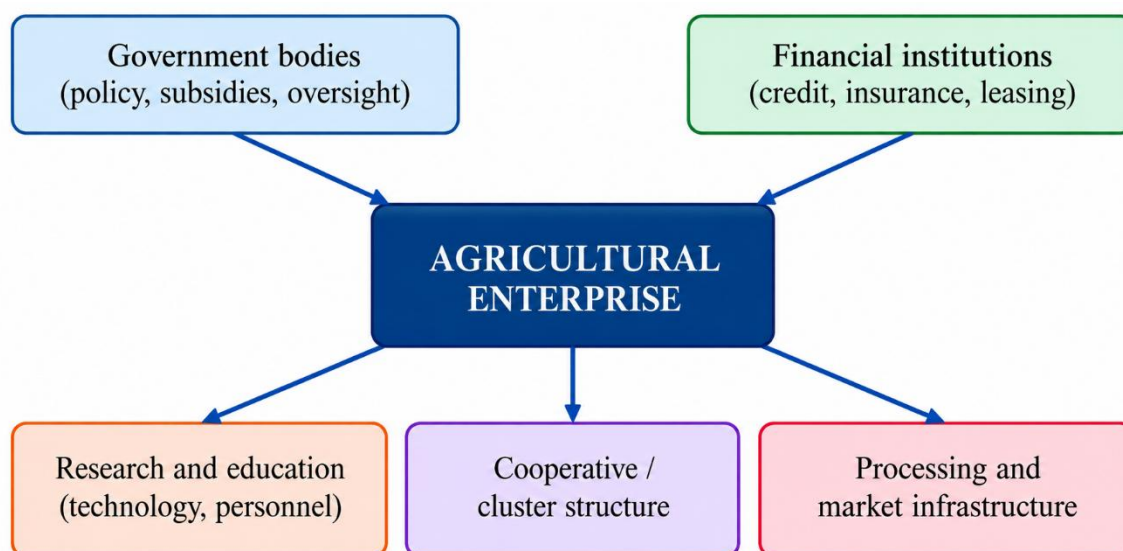


**Figure 2. Actors in the organisational and economic mechanism and their relationships**

The enterprise occupies the central position in the diagram and interacts with four external actors. Government bodies perform policy-making, subsidy and oversight functions; financial institutions provide credit, insurance and leasing; research and educational institutions supply technology and human resources; and processing and market infrastructure establish channels for selling output.

The arrows represent two-way relationships. The enterprise receives resources and services from external actors and, in return, provides products, information and



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payments. Such reciprocity is essential to sustainability: a one-way flow, such as subsidies alone, creates dependence and becomes ineffective in the long term.

The separate identification of research and educational institutions is justified. As the preceding research shows, innovation-related factors have considerable influence, but they do not reach enterprises automatically. Technology-transfer channels, advisory services and workforce training are indispensable elements of the mechanism.

The cooperative or cluster structure shown at the bottom of the diagram plays a special intermediary role between the enterprise and external actors. An individual small farm may be refused finance because of collateral and reporting requirements; applying through a cooperative spreads risk and improves access to credit. The same reasoning applies to technology adoption and market access.

This intermediary is critical to the functioning of the mechanism. Given that small household farms produce 89.9% of livestock output, the other blocks cannot effectively reach this segment without a cooperative structure. Subsidies, technologies and credit would otherwise remain concentrated among larger producers.

A stakeholder-interest matrix was developed to assess the compatibility of participants' interests (Table 3).

**Table 3 Matrix of functions and interests of the mechanism's actors**

| Actor             | Function within the mechanism                | Principal interest                                      | Potential conflict of interests                                                |
|-------------------|----------------------------------------------|---------------------------------------------------------|--------------------------------------------------------------------------------|
| Government bodies | Policy-making, subsidy allocation, oversight | Food security, employment, environmental sustainability | Short-term output targets may conflict with long-term environmental objectives |



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|                                       |                                             |                                             |                                                           |
|---------------------------------------|---------------------------------------------|---------------------------------------------|-----------------------------------------------------------|
| Agricultural enterprise               | Production and technology adoption          | Profit, cost reduction, risk mitigation     | Environmental requirements increase short-term costs      |
| Household farm                        | Livestock production                        | Family income and food supply               | Concern that joining a cooperative restricts independence |
| Financial institutions                | Credit, insurance and leasing               | Loan repayment and risk minimisation        | High transaction costs of serving small farms             |
| Research and educational institutions | Technology, personnel and advisory services | Research outcomes and financing             | Research priorities may not fully match practical needs   |
| Processing enterprises                | Purchase and processing of raw materials    | Stable supply of high-quality raw materials | Conflicts with producers over raw-material prices         |

The matrix identifies the mechanism's weakest links. The most serious conflict arises within public administration, between short-term output targets and long-term environmental objectives. If reporting prioritises gross output, local authorities have stronger incentives to increase production than to reduce water use. This contradiction should be resolved within the mechanism by incorporating environmental indicators into the assessment system.

The second major conflict concerns household farms. Resistance to cooperation often stems not from economic calculations but from fear of losing independence. Rooted in historical experience, this concern cannot be overcome through financial incentives alone. A service-cooperative model offers a solution: farms retain full ownership independence and purchase only the services they need.

The third conflict concerns financial institutions and has an objective economic basis: transaction costs of serving small farms are high relative to loan size. Cooperative intermediation within the organisational block can address this problem by combining numerous small applications into a larger one, thereby substantially reducing transaction costs.



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The general conclusion from the matrix is that stakeholders' interests do not fully coincide, which is natural. The mechanism is intended not to make those interests identical but to coordinate them by creating conditions under which contributing to the common objective is beneficial to each participant.

Three practical coordination instruments are available: economic incentives, which make sustainable practices profitable; institutional rules, which restrict harmful practices; and information, which demonstrates the benefits of participation. The last instrument is frequently overlooked, although resistance to cooperation among household farms often reflects insufficient information and trust.

A three-stage roadmap is proposed for implementing the mechanism (Table 4).

**Table 4 Roadmap for implementing the organisational and economic mechanism**

| Stage                          | Main tasks                                                                                                                          | Expected outcome                                                                    | Time frame |
|--------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|------------|
| Stage I: Foundation            | Introduce the assessment methodology; establish district baselines; develop legal and tax incentives for cooperatives               | Baseline sustainability map; operational feedback mechanism                         | Years 1-2  |
| Stage II: Pilot implementation | Establish pilot cooperatives in three zones; gradually introduce water accounting; link crop-rotation recommendations to incentives | Reduced water intensity in pilot areas; increased marketability of livestock output | Years 2-4  |
| Stage III: Scaling up          | Extend pilot results throughout the republic; introduce differentiated programmes by zone; digitalise monitoring                    | Stabilisation of territorial differentiation; growth in the integral index          | Years 4-7  |

The roadmap begins by activating the feedback mechanism. This sequence is justified because the effectiveness of subsequent interventions cannot be measured, and mistakes cannot be detected promptly, without an assessment system. Baseline measurements also provide a reference point for evaluating later results.



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The second stage uses pilot implementation because territorial conditions vary substantially. Introducing a uniform solution across the republic would therefore be risky. Pilots in three zones will help identify appropriate models for each zone and reduce the costs of mistakes during wider implementation.

Zone-specific differentiation in the third stage directly addresses the previously identified increase in territorial disparities. Intensive horticulture and processing clusters are appropriate priorities in the southern zone; innovation and educational potential in the central zone; and salt-tolerant crops, extensive livestock farming and fisheries in the northern zone.

The financial implications of the roadmap must also be considered. The first stage is relatively inexpensive because it consists mainly of methodological and regulatory work. The second requires limited investment in pilot projects. The third is the most resource-intensive, but pilot results will already have provided evidence on expected investment effectiveness.

This allocation reduces financing risk: the largest expenditures occur at the best-substantiated stage. In practice, the opposite often happens: major investment is committed at the outset without pilot testing, and results fall short of expectations. An important feature of the roadmap is that stages are conditional upon one another. Each subsequent stage is adjusted in light of the preceding stage's results. This extends the feedback principle beyond routine management to the implementation process itself.

A set of criteria is also required to assess the mechanism. The proposed approach uses three: effectiveness (the extent to which target indicators are achieved), efficiency (the relationship between results and resources used) and sustainability (whether results persist after external support ends). The last is particularly important because it measures the mechanism's capacity for self-sufficiency.



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The mechanism also has limitations. First, it cannot influence external natural conditions, especially the water-supply regime, but can only facilitate adaptation. Second, the success of cooperation depends on trust among participants, which cannot be created administratively. Third, feedback requires a database of environmental indicators that has not yet been fully developed.

### Conclusions and Recommendations

First, analysis of statistical data for the Republic of Karakalpakstan identified four systemic deficiencies in the existing organisational and economic mechanism: institutional rigidity in livestock farming, increasing territorial differentiation, the absence of feedback and forced intensification. These deficiencies are interconnected, making isolated solutions ineffective.

Second, a mechanism was developed comprising four functional blocks-organisational, economic, technological and institutional-together with an assessment and feedback component. Its distinctive feature is the feedback loop, which creates a closed-loop, self-correcting system.

Third, the stakeholder-interest matrix identified three main areas of conflict: tensions between short- and long-term goals within public administration, household farms' resistance to cooperation and financial institutions' transaction costs when serving small farms. All three can be addressed within the mechanism. Fourth, the cooperative or cluster structure is the crucial intermediary component. Without it, subsidies, technology and credit cannot reach small farms, even though this segment accounts for 89.9% of livestock output.

Fifth, a three-stage implementation roadmap was proposed. Stage one establishes assessment and feedback; stage two conducts pilot projects in three zones; and stage three scales up the results using differentiated approaches tailored to each zone.



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Sixth, three criteria are proposed for evaluating the mechanism: effectiveness, efficiency and sustainability. The last criterion-the persistence of results after external support is withdrawn-is decisive.

Future research will elaborate the specific instruments within individual blocks, particularly the design of cluster and cooperative models and the assessment of their economic efficiency.

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