

Value chain analysis of wheat in Moldova

Value chain analyses assist in informing policy dialogue and investment operations. They help the understanding of how agricultural, aquaculture and fisheries development fits within market dynamics. They permit an assessment of the value chains' impact on smallholders, businesses, society, and environment.

The European Commission has developed a standardised methodological framework for analysis (https://capacity4dev.europa.eu/projects/value-chain-analysis-for-development-vca4d_en) It aims to understand to what extent the value chain allows for inclusive economic growth and whether it is both socially and environmentally sustainable.

The value chain context

Moldova is a landlocked Eastern European country where wheat serves as a strategic staple for food security and is a key export commodity. The sector operates within a dualistic agrarian structure emerging from post-Soviet reforms, characterized by production taking place in farms (agricultural enterprises or family-owned peasant farms) with fragmented land ownership. There are more than 1.2 million landowners in Moldova, including 57% of privately owned agricultural land being rented. Farmers often pay in kind (with cereals) for

land rent, which is primarily used by landowners to feed household animals and poultry or for self-consumption.

While Moldova is a niche regional exporter, mainly exporting raw grain to Romania, its market position is constrained by limited processing capacity and high exposure to climatic risks, particularly drought. Recent volatility stemming from the war in Ukraine has significantly disrupted logistics and prices. Despite possessing fertile soils, the value chain (VC) faces structural weaknesses; it exports low-value raw material while importing processed flour and remains heavily dependent on imported inputs like fertilizers.

The European Union intervention

The European Union (EU) plays a key role in the Moldovan wheat VC through trade integration, financial investment, and regulatory alignment. Under the Deep and Comprehensive Free Trade Area (DCFTA), Moldovan producers benefit from preferential access to the EU market, which serves as a key destination for agri-food exports.

EU interventions focus on modernizing the sector to align with the *acquis communautaire* and the objectives of the Common Agricultural Policy (CAP). This includes building institutional capacities (including food safety, customs, digitalization), providing technical assistance and increasing access to finance to accelerate technological modernization and innovation. Furthermore, the EU supports capacity building for farmer associations and advances environmental sustainability by promoting integrated production and assisting the transition from the Emerald Network to the EU Natura 2000 framework, among other initiatives.



Functional analysis

Production

In the reference year (2023), approximately 1.6 million tonnes (t) of wheat were produced in Moldova, marking a strong harvest following a period of variability. National yields fluctuate significantly, ranging from lows of 1.9 t/ha during the 2020 drought to record highs of 4.6 t/ha in 2021.

Agricultural enterprises (AE) typically achieve higher yields and operate on a larger scale than Peasant farms (PF). However, small scale farming of wheat is economically unattractive, and mainly practiced for crop rotation purposes or household animal feed rather than for commercial sale. According to the VCA4D survey (2025) and data from the National Bureau of Statistics of Moldova, the average professional farm size in Moldova is approximately 331 ha, while the average area cultivated with wheat is 109 ha. Regionally, the North records the highest yields due to more favourable climatic conditions, while the South is frequently exposed to moisture deficits.

Despite these challenges, Moldova maintains a high self-sufficiency rate, typically exceeding 160%, which supports substantial exports. To combat climate risks, practices like no-till farming are expanding, offering resilience through improved soil moisture retention and lower input costs.

Processing and marketing/or trade

Moldova's wheat processing sector is dualistic, comprising large industrial mills supplying bakeries and retail, alongside declining small village mills that process mainly wheat from in-kind land payments for rural households. Industrial flour production averages 118,000 tonnes annually, with exports increasingly directed toward Romania, though the bakery sector continues to utilize imported flour for specific products.

Recently disrupted logistics shifted routes from Odessa (Ukraine) to the domestic Giurgiulești Port and road transport to Constanța,

Romania, which tripled transport costs. Consequently, Moldovan wheat typically trades at a 15–21% discount compared to global benchmarks. The trading landscape is concentrated, where input providers often function as exporters, accepting grain from farmers as repayment for “technical credits” used to purchase seeds and fertilisers.

Sub-chains

The wheat sector is divided into two primary sub-chains: the Export VC and the Processing VC. The Export VC primarily consists of traders who export wheat out of the country and dominates by volume, handling approximately 979,000 tonnes in 2023. The Processing VC comprises industrial mills supplying the commercial market and local service mills that process grain from in-kind payments for rural households. It handles lower volumes (approximately 575,000 tonnes).

Governance

Governance is anchored by the Ministry of Agriculture and Food Industry (MAFI) and the Agency for Intervention and Payments in Agriculture (AIPA), operating under the National Strategy for Agricultural and Rural Development 2030. This strategy aligns with the EU Common Agricultural Policy, prioritising climate resilience, modernisation, and local processing.

The legal framework, specifically Law 71/2023 (under revision), directs subsidies to measures as irrigation, no-till machinery, and post-harvest infrastructure. Regulatory oversight is managed by the National Food Safety Agency (ANSA), which enforces safety standards and is progressively harmonising with the EU acquis.

Financial governance involves commercial banks and non-bank institutions, though access to credit remains uneven, often favouring larger enterprises while smaller producers rely on non-bank lenders. To address structural weaknesses, governance priorities for 2025–2030 focus on professionalising aggregation and storage, accelerating land consolidation around grain clusters, and institutionalising price transparency.

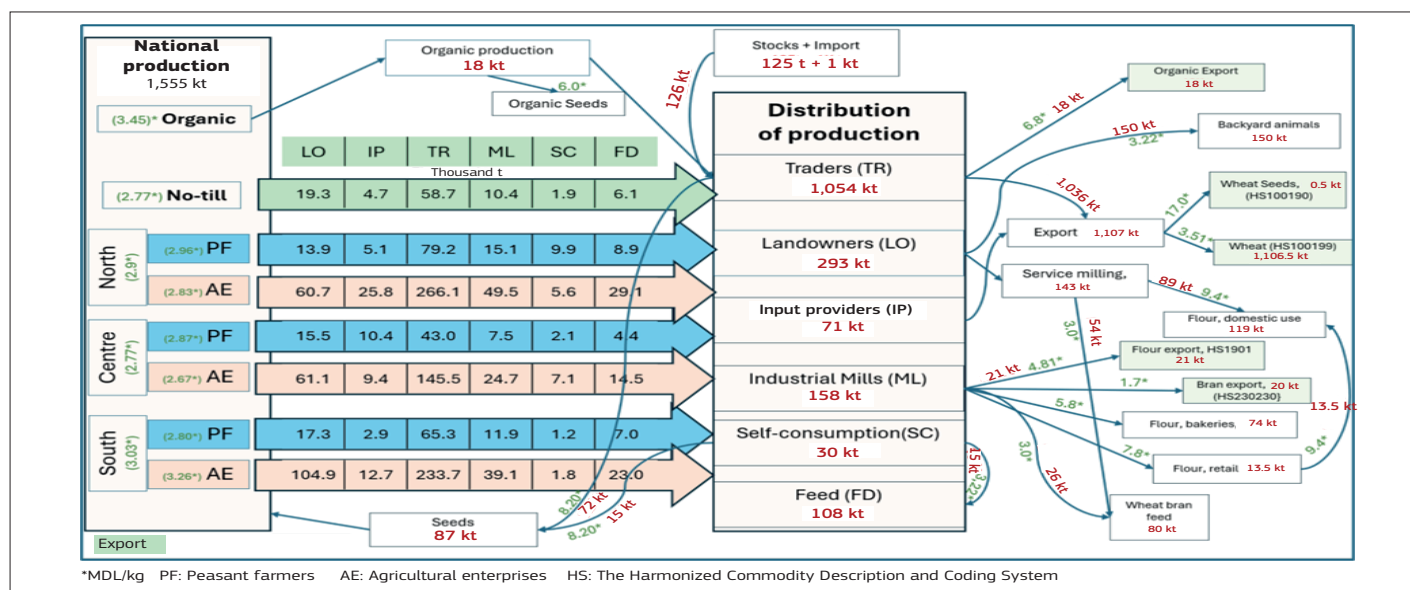


Figure 1: Flowchart of the VC

What is the contribution of the value chain to economic growth?

Financial viability for the actors

Financial viability within the Moldovan wheat sector in 2023 was highly uneven, heavily influenced by regional climatic conditions and global price volatility.

Farmers faced a severe cost-price squeeze. While producers in the North and those utilizing no-till or organic methods maintained positive margins through higher yields or reduced input costs, PF in the South and Centre recorded net losses of up to 20%. Structural issues, specifically a negative VAT balance (paying 20% on inputs while collecting 8% on sales), further drain farmer liquidity.

Traders experienced negative Net Operating Profit (NOP) for wheat exports in 2023 due to low global prices and high logistics costs. Their overall financial survival depends on diversifying into input supply and trading other commodities.

Processors (industrial mills) operated with narrow but positive margins of 3–8%. In contrast, landowners statistically captured the largest share of sector profit (186% of NOP). However, this primarily represents the opportunity cost of in-kind wheat payments used for household food security rather than generated cash income.

Impacts on the national economy

The wheat VC is a significant driver of the Moldovan economy, generating a total final production value of **6.2 billion MDL (€ 318 million)** in 2023. The VC created nearly **4.6 billion MDL (€ 235 million) in total VA**, contributing **1.5% to the national GDP** and **11% to the agricultural GDP**. Farmers are the primary contributors to the generation of the direct VA (Figure 2).

The sector is heavily export-oriented, maintaining a robust positive trade balance of **2.4 billion MDL (€ 122 million)**, which accounts for **5.6% of Moldova's total exports**. It also supports public finances with a positive balance of **255 million MDL (≈ € 13 million)**, meaning tax contributions exceed subsidies received. However, farmers face liquidity challenges

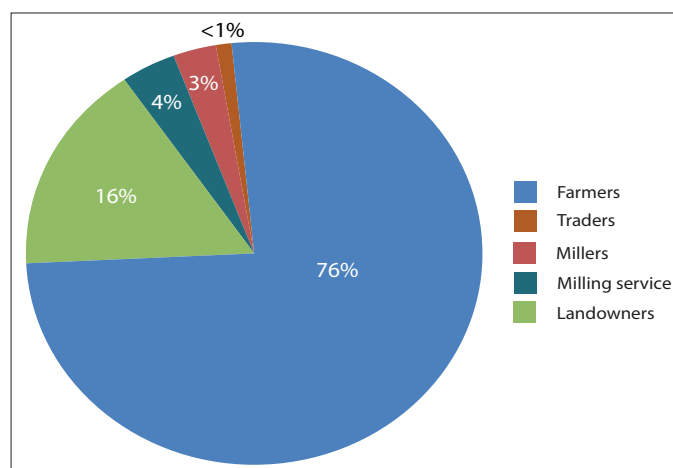


Figure 2: Generation of the direct VA by VC actors

due to approximately 150–200 million MDL (€ 7.6- million-€ 10 million) in unreturned VAT locked within fiscal institutions.

Despite relying on imported inputs like fertilizers and fuel, the VC achieves a high integration rate of **73.6%**, indicating that nearly three-quarters of its output value circulates within the domestic economy.

Viability in the international economy

The Moldovan wheat VC possesses a theoretical comparative advantage, evidenced by a **Domestic Resource Cost (DRC) ratio of 0.69**, indicating efficient use of domestic resources to generate foreign exchange. However, **this advantage is severely eroded by structural and macroeconomic distortions** that hamper true international competitiveness.

Moldovan wheat trades at a structural discount, typically priced 15–21% lower than the weighted average of major global exporters. Wheat flour faces an even steeper discount of 25–35%. These disparities are driven by inconsistent grain quality, limited bargaining power, and severe logistical constraints.

The VC also endures a cost-price squeeze. An overvalued exchange rate (estimated ~10% above equilibrium) reduces export revenue in local currency, while labour costs rise faster than productivity. Consequently, despite production efficiency, wheat trading frequently operated at a negative net margin in 2023, relying on cross-subsidization from input supplies to remain financially viable.

Comparison of sub-chains

The Export VC, despite handling higher volumes, generates lower VA (1,202 MDL/t, € 61/t) and reports a significant net operating loss of -16%. This segment incurs higher absolute costs for inputs and logistics while demonstrating lower financial efficiency.

In contrast, the Processing VC handles lower volumes yet achieves substantially higher VA (2,230 MDL/t, € 114/t) and strong positive margins. Although the Export VC currently dominates activity, the analysis indicates that the **processing VC offers a more viable and profitable pathway** for enhancing domestic value creation.

Moldova's wheat value chain contributes 1.5% to GDP, driving exports and rural employment. While production efficiency is high, price volatility, high logistics costs, and VAT imbalances strain liquidity. Traders and farmers from central-southern Moldova face losses, but the sector remains vital.

Is this economic growth inclusive?

Distribution of income among the actors

While farmers generated most of the economic activity, accounting for 76% of total VA and paid 84% of all wages, they operated at a net loss in 2023, absorbing a -51% share of the NOP. Similarly, traders reported a negative NOP share of -57%, driven by high logistics costs associated with the war in Ukraine and low global wheat prices. However, these results should not be interpreted as representative of the longer-term trend of the VC, as they reflect the specific conditions of 2023, which was marked by exceptional external shocks and price volatility.

Conversely, landowners statistically obtain the largest share of the VC's profits (≈1.18 billion MDL, € 60 million), mainly through in-kind rent payments (wheat) received from farmers. These payments are largely used by households

for food consumption and animal feed rather than for cash income. Millers also remained profitable, capturing 21% of total NOPs.

Job creation and employment

The Moldovan wheat VC is a vital source of rural livelihood, supporting 8,378 full-time equivalent jobs in 2023. Farmers account for 84% of total labour compensation and generate more than 7,400 FTE jobs, while downstream actors like traders and millers employ far fewer people. Access to income-generating assets is also uneven, in land-use Gini coefficient of 0.44, with the largest 10% of farms controlling ~40% of the arable land.

Moldova's wheat value chain is vulnerable in terms of inclusiveness. Farmers generate most of the value, yet landowners capture the largest share from total profits. Profitability is constrained by war and rising costs.

Is the value chain socially sustainable?

Figure 3 and the following table provide an image of the main social consequences of the VC activities in six strategic domains.

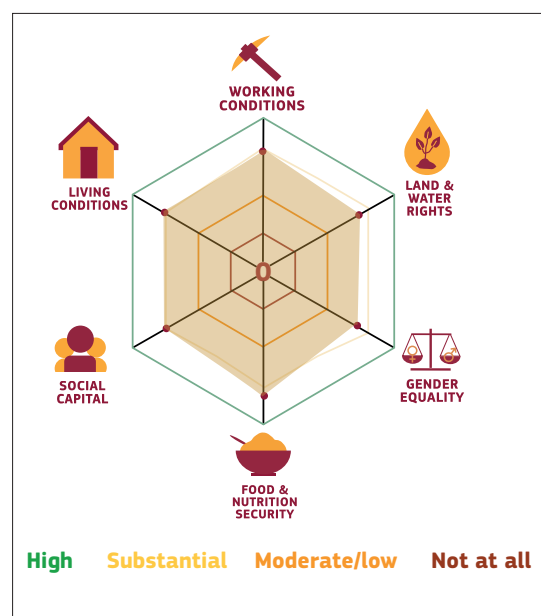


Figure 3 Social profile

Moldova's wheat value chain shows significant positive social outcomes but improvements are needed to ensure long-term sustainability especially in the domains of occupational safety, water governance, and climate resilience. Employment is relatively stable and food security at household level is not currently at risk. However, gender and youth inclusion remain limited, and small farmers face weaker social capital and resource access. Infrastructure gaps and limited extension services further constrain inclusive and sustainable development.

Working Conditions	- Formal contractual employment of permanent staff and informal, unprotected verbal agreements for seasonal workers. - Weak occupational safety standards and widespread neglect of Personal Protective Equipment (PPE) use during chemical application. - Below-average wages and an approximate 16% gender pay gap. - Severe labor shortages resulting from workforce aging and youth emigration. - Government-covered health insurance (limited) for permanent staff. - Partial salary payment for some permanent staff during the low season.
Land and Water Rights	- Ownership reflects post-Soviet reforms; farmers expand primarily through leasing, owners remain reluctant to sell due to heritage and financial security values. - Droughts, limited lack of irrigation infrastructure, partly depleted soils and poorly adapted input use (especially seeds) threatening yields. - Groundwater use for irrigation is legally permitted.
Gender Equality	- Male dominance in high-value mechanized roles and female concentration in lower-paid administrative or support tasks like cooking and cleaning. - Structural gender pay gap with qualified men earning ~14-16% more than women. - Limited female access to land, credit, and decision-making power due to traditional social norms.
Food and Nutrition Security	- High food availability ensured by wheat production and in-kind land rent payments supporting flour production and livestock feeding. - Increased poverty and future stability risks driven by war in Ukraine and climate change. - Significant role of AE in rural nutrition enhancement through the provision of daily meals and food gifts to their workers.
Social Capital	- High social capital and influential leadership in AE driving local political engagement and development, compared to limited social capital in PF. - Strong, trust-based relationships with input suppliers for technical credit access and relatively low trust in governmental institutions. - Advocacy and capacity building support provided by producer organizations.
Living Conditions	- High rural home ownership (99%) with universal electricity access, but inadequate indoor sanitation and central heating. - Aging Soviet-era public utilities and road infrastructure require significant upgrades. - Vital financial support from family members working abroad for home renovation and living standard improvement.

Is the value chain environmentally sustainable?

The environmental impacts of the wheat VC are measured through Life Cycle Assessment (LCA) considering three areas of protection: **resource depletion**, **ecosystem quality** and **human health**. LCA results also show the VC's impact on **climate change**.

Total impact on areas of protection

The total impact of the Moldovan wheat VC on the three main areas of protection is relatively modest per unit but cumulatively significant, with cultivation being the primary hotspot contributing 70–99% of all impacts.

- **Resource Depletion:** The sector generated a total marginal extraction cost of 481 million MDL (€ 24.5 million) (26.5 million USD 2013) for national grain production. This is driven largely by the consumption of non-renewable mineral fertilizers (nitrogen, phosphorus) and diesel fuel.
- **Ecosystem Quality:** The cumulative pressure on ecosystems was estimated at 39 species.yr (potentially disappeared species per year). This impact is almost entirely (99%) attributable to land use during cultivation, particularly where low yields increase the land required per unit of output, resulting in habitat conversion and biodiversity loss.
- **Human Health:** The total health burden was 780 Disability-Adjusted Life Years (DALYs), representing 780 years of healthy life lost. While driven by air emissions like ammonia and particulate matter from fertilizers and fuel, this impact is low, representing only about 2% of the health burden associated with general air pollution in Moldova.

Additionally, the sector contributed 490.5 thousand t of CO₂eq to climate change. Per unit of production, this places Moldovan wheat production at the lower end of European wheat emission intensities.

Impact per value chain stages

LCA results for the Moldova wheat VC indicate cultivation stage as the main driver of environmental impacts across all sub-chains. It accounts for 70% of resource depletion, 99% of ecosystem damage, and 85% of both human health impacts and greenhouse gas emissions. These impacts are primarily driven by the use of mineral fertilizers (especially nitrogen) and fuel for field operations. Downstream stages contribute significantly less:

- **Transport and Storage:** Generally contribute minor impacts (0–9%), although transport emissions rise in Export sub-chains due to longer distances to ports.
- **Milling:** Accounts for 1–21% of impacts, with higher shares in resource depletion (21%) and climate change (11%) due to electricity consumption.

Beyond the quantitative findings of the LCA, agronomic evidence further supports the advantages of no-tillage which improves soil health by increasing organic matter and carbon, enhancing structure, biological activity, moisture retention, and resilience to drought and heat. Crop residue retention adds mulching benefits, further reducing erosion.

Comparison of sub-chains

- **Industrial Milling:** While industrial mills consume more direct energy for grain processing, they are more efficient in terms of flour yields per kg of grain. This efficiency reduces the relative burden of cultivation per unit of flour.
- **Local Milling:** These operations have lower processing energy needs but lower grain-to-flour conversion efficiency. This inefficiency increases the amount of grain required per kg of flour, thereby increasing the embodied environmental impacts from the cultivation stage.
- **Export Chains:** The export of raw grain avoids processing impacts but incurs higher transport emissions; cultivation remains the dominant hotspot (83–92%).

Biodiversity

Biodiversity risks in the Moldovan wheat VC are characterized by the following:

- **Protected Areas:** There is minimal conflict between wheat cultivation and conservation zones. A GIS-based analysis of the Emerald Network reveals that these sites are predominantly forests or areas undergoing natural reforestation, with no significant evidence of agricultural encroachment.
- **Ecosystem Impact:** The cultivation stage is the primary hotspot, contributing 99% of the VC's total ecosystem damage. This is largely driven by land use; low yields, particularly in the South, require more land per unit of output, thereby increasing pressure on ecosystems.
- **Landscape Fragmentation:** Biodiversity is constrained by the limited presence of natural elements such as hedgerows, protective tree belts, and riparian buffers. This fragmentation reduces ecological connectivity for pollinators and wildlife.

Mitigation Strategies: Moldova is transitioning from the Emerald Network to the EU Natura 2000 framework to strengthen conservation standards.

Moldova's wheat value chain has a modest environmental footprint, but cultivation is the primary hotspot. It drives resource depletion, ecosystem damage, and emissions via fertilisers and fuel. Low yields increase environmental impacts, with no-tillage practices leading to lower overall impacts. Scaling up no-till requires better access to appropriate machinery and can be strengthened when combined with crop rotation, cover cropping, and contour farming tailored to local agro-climatic conditions.

Main findings and recommendations

SWOT Matrix

STRENGTHS	WEAKNESSES
- Established production base with deep local expertise and competitive costs. - Preferential EU market access via the DCFTA. - Government-subsidized access to modern machinery. - Agronomic benefits of wheat within diversified crop rotations. - Expanding no-till cultivation, improved soil health, lower environmental impact and stable yields through climate resilience. - Policy momentum for modernization and regulatory alignment.	- Fragmented land ownership hindering efficiency. - High climate vulnerability creating significant yield risks. - Dependency on imported inputs combined with poor nitrogen use efficiency increase emissions. - Limited local value addition due to inadequate post-harvest infrastructure. - Heavy reliance on few export markets and expensive transportation. - Insufficient governance regarding conservation agriculture and limited extension services. - Unsafe agrochemical handling and questionable statistical reporting.
OPPORTUNITIES	THREATS
- Scaling up climate-smart practices to enhance resilience against environmental shocks. - EU accession benefits, including external modernization funds and access to the single market. - Infrastructure investments linking to Romania (Constanța) to reduce export costs and diversify trade routes. - Expanding local compound feed manufacturing to absorb domestic wheat production. - Reintegrating crop-livestock systems to improve soil fertility and reduce dependency on external inputs.	- Ongoing war in Ukraine, causing continued logistical and market disruptions. - Overdependence on chemical inputs, which harms long-term soil health and environmental stability. - Demographic decline and labour shortages driven by high migration rates from rural areas. - Rising debt burdens and increasing credit dependency among farmers. - Loss of rural milling services, undermines local food resilience. - Currency appreciation, reducing international competitiveness.

Recommendations

Financial Stability and Market Structure

- Resolve VAT Liquidity Issues: Structural negative VAT balance (paying 20% on inputs while collecting 0–8% on sales) draining farm liquidity. The need for fund-unlocking measures to improve farmers' cash flow.
- Access to Finance: Facilitating access to affordable short-term loans to reduce farmers' heavy reliance on "technical credits" from input suppliers, thereby improving their bargaining power and financial independence.
- Market Transparency: Developing a transparent marketplace or auction system to ensure fair pricing and improve market efficiency.

Social Inclusion and Labour

- Support Workforce Development: Targeted grant schemes and incentives to attract young people into agriculture and cereal production, addressing workforce aging and youth emigration.
- Improve Occupational Safety: Urgent improvement of safety standards through agrochemical handling training and strengthened labour inspection capacity to enforce PPE use.
- Work on Labour Regulation and enforcement: Establishment of clear regulations on working hours, overtime, and compensation, particularly to protect seasonal workers during peak harvests.

Environmental Sustainability

- Promote Conservation Agriculture: Investment in scaling up no-till farming to reduce overall environmental impacts, enhance soil health and moisture retention, and increase climate resilience.
- Improve Fertilisation Management: Improving nitrogen use efficiency through soil testing and balanced fertilization to reduce greenhouse gas emissions and input costs while increasing crop yield.
- Livestock Integration: Policies support for livestock reintegration to close nutrient loops with manure and reduce reliance on synthetic fertilizers.
- Improve Biodiversity: Restore, maintain and increase hedgerows, tree belts and agroforestry in agricultural landscapes, while further promoting commitment to conservation areas to the EU Natura 2000 standard.

Modernization and Governance

- Value Addition: Diversification into domestic processing through modernized mills and bakeries, and establishment of a consistent quality identity ("Moldovan brand") to increase export value.
- Advancement of reforms by a dedicated working group to enable sustainable groundwater access, alongside the implementation of parallel long-term strategies (i.e., water harvesting and reservoir development, and the adoption of water-stress-resistant seeds) as part of a comprehensive water management approach.
- Digitalization: Acceleration of the Agency of Interventions and Payments in Agriculture (AIPA) digitalization.

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