



for



Value Chain Analysis of maize in Moldova

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The information and knowledge produced through the value chain studies are intended to support the Delegations of the European Union and their partners in improving policy dialogue, investing in value chains and better understanding the changes linked to their actions.

VCA4D uses a systematic methodological framework for analysing value chains in agriculture, livestock, fishery, aquaculture and agroforestry. More information including reports and communication material can be found at: <https://europa.eu/capacity4dev/value-chain-analysis-for-development-vca4d->

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TABLE OF CONTENTS

1. INTRODUCTION	22
2. FUNCTIONAL ANALYSIS	25
2.1 OVERVIEW OF THE GLOBAL MAIZE MARKET	25
2.2 MAIZE PRODUCTION IN MOLDOVA – RECENT DEVELOPMENTS	29
2.3 MAIZE FOOD BALANCE	32
2.4 ACTORS CONSIDERED IN THE MOLDOVA MAIZE VALUE CHAIN	33
2.5 FLOW CHART	47
2.6 GOVERNANCE	50
2.7 SWOT ANALYSIS	53
3. WHAT IS THE CONTRIBUTION OF THE VALUE CHAIN TO ECONOMIC GROWTH?	56
3.1 PROFITABILITY & SUSTAINABILITY OF ACTORS	56
3.2 TOTAL EFFECTS WITHIN THE NATIONAL ECONOMY	65
3.3 COMPETITIVENESS AND VIABILITY WITHIN THE INTERNATIONAL ECONOMY	70
3.5 ANSWER TO THE FRAMING QUESTION 1	72
4. IS THIS ECONOMIC GROWTH INCLUSIVE?	74
4.1 DISTRIBUTION OF INCOME AND VALUE ADDED AMONG VALUE-CHAIN ACTORS	74
4.2 LABOUR SHARE AND STRUCTURAL BARRIERS TO INCLUSIVITY	78
5. IS THE VALUE CHAIN SOCIALLY SUSTAINABLE?	81
5.1 WORKING CONDITIONS	81
5.2 LAND AND WATER RIGHTS	85
5.3 GENDER EQUALITY	89
5.4 FOOD AND NUTRITION SECURITY	94
5.5 SOCIAL CAPITAL	98
5.6 LIVING CONDITIONS	101
5.7 SOCIAL PROFILE ANALYSIS OF THE MAIZE VALUE CHAIN IN MOLDOVA	106
5.8 SYNTHESIS OF SOCIAL ANALYSIS	107
6. IS THE VALUE CHAIN ENVIRONMENTALLY SUSTAINABLE?	109
6.1 INTRODUCTION	109
6.2 LIFE CYCLE ASSESSMENT (LCA)	109
6.2.1 RESOURCES, ECOSYSTEM, HEALTH	109
6.2.2 CLIMATE CHANGE	117
6.3 BIODIVERSITY	122
7. SYNTHESIS & RECOMMENDATIONS	126
7.1 ANSWERING THE FRAMING QUESTIONS	126
7.2 FROM SWOT TO TOWS: STRATEGIC PRIORITIES FOR THE MAIZE VC	127
7.3 THE RISK ANALYSIS	128
7.4 RECOMMENDATIONS	129
7.5 REFERENCE LIST	131
8. APPENDIX	138
9.1 APPENDIX TO ENVIRONMENTAL ANALYSES (LCA)	138
9.2.1 LIFE CYCLE INVENTORY	138

List of Figures

Figure 1-1 Flow chart for maize in moldova, reference marketing year 2022/2023 (maize production, k tonnes) Note: PF – Peasant farmers, AE – Agricultural enterprises, LO – landowners, IP – input providers, TR – Traders, ML – Industrial mills, SC – Self-consumption, FD – Feed.	14
Figure 2-1. Global maize prices, USD/ton	27
Figure 2-2 Typical smaller scale (Peasant farm) storage, modern elevator originating from Türkiye.....	28
Figure 2-3 DISTRIBUTION of total production among different types of producers. 2016 – 2024, thousand tons	30
Figure 2-4. Production share of maize in agricultural enterprises and peasant farms, 2016 – 2024, % of total value	31
Figure 2-5. Average yield per hectare for maize, by types of ownership, tons	31
Figure 2-6 Balance of food resources and their use, maize, average values for 2019 – 2023, thousand tons	32
Figure 2-7: Trends of fertilisers imports (HS 31), Republic of Moldova, volume in kg, value in USD, 2015 – 2024.40	
Figure 2-8: Mineral fertilisers used in agricultural enterprises and in farms with more than 50ha (thousand tonne of active substances).	40
Figure 2-9 Pesticide use in Moldova in kg per ha of cropland.....	41
Figure 2-10 Volume and value of Pesticide imports in Moldova	41
Figure 2-11. Foreign trade with maize (HS 1005), 2015 – 2024, mil. USD.....	45
Figure 2-12. Average import and export price of maize (HS 100590), Republic of Moldova, USD/kg	45
Figure 2-13. Average import and export price of maize flour (HS 110220), Republic of Moldova, USD/kg.	46
Figure 2-14 From the left: local maize flour, agricultural market in Chisinau, imported maize flour, Moldova 2025.	46
Figure 2-15 Maize flow chart of Moldova, 2023	48
Figure 3-1 Actors of maize Value Chain, Moldova.....	57
Figure 3-2 Iurceanca production assortment, Moldova, 2025	Error! Bookmark not defined.
Figure 3-3 Export price vs. Constanta price (RO), 2023.	64
Figure 3-4 Intermediate consumption (IGS) breakdown, 2023, %, Moldova maize VC	66
Figure 3-6 Value Added (VA) distribution of the VC (direct), 2023, Moldova maize	68
Figure 3-7 Value Added contribution by individual type of actor, 2023	69
Figure 3-8 Value added over production, Moldova Maize, 2023.....	70
Figure 3-9 Top import and export countries for maize, HS 1005, 2023, %	70
Figure 4-1. Net operating profit distribution by actors, Maize, Moldova, thousands mdl, 2023	75
Figure 4-2. Moldova Land Distribution, GINI Coefficient, 2023 BNS Microdata	76
Figure 4-3. Direct VA distributions, Maize, Moldova, 2023.....	78
Figure 5-1: Social Profile Radar Diagram – Maize Value Chain in Moldova.....	107
Figure 6-1: Diesel consumption at the cultivation stage of maize VC, l/ha	111
Figure 6-2: Yield of maize according to the interview, t/ha, 2023	120

List of Tables

TABLE 2-1 MAIZE PRODUCTION IN LEADING PRODUCING COUNTRIES, 2023–2025 (IN MILLION TONNES).....	25
TABLE 2-2. MAIZE UTILIZATION AND FOOD USE.....	26
TABLE 2-3. TOP WORLD EXPORTERS AND IMPORTERS OF MAIZE, 2023 – 2025, MIL. TONS.....	26
TABLE 2-4 IMPORTANCE OF MAIZE IN THE CROP SECTOR OF MOLDOVA, 2018-2023, MOLDOVA.....	29
TABLE 1-5 DISTRIBUTION OF MAIZE PRODUCTION AMONG TYPICAL FARMS (20231)	34
TABLE 1-6 COMPARATIVE ANALYSIS OF BUSINESS PERFORMANCE BY REGION.....	35
TABLE 1-7 QUANTITY OF MAIZE FOR OWN CONSUMPTION, GIFT, BONUS FOR EMPLOYEES (AS A SHARE OF PRODUCTION).....	35
Table 2-8. Maize production, Agricultural enterprises, Moldova (2016 - 2024).....	36
TABLE 2-9. MAIZE PRODUCTION, PEASANT FARMERS, MOLDOVA (2016 - 2024).....	37
TABLE 2-10. MAIZE PRODUCTION, RURAL HOUSEHOLDS, MOLDOVA (2016 - 2024).....	38

TABLE 1-11 EXAMPLES OF CONTRACTUAL AGREEMENTS FOR IN-KIND PAYMENTS FOR LAND LEASE.....	39
TABLE 1-12 MOSTLY MENTIONED FERTILISERS, THEIR DOSES AND PRICES SOLD TO FARMERS BY INPUT PROVIDERS.....	41
TABLE 2-13. MOSTLY MENTIONED SEED TYPES, THEIR DOSES AND PRICES SOLD TO FARMERS BY INPUT PROVIDERS.....	42
TABLE 2-14. THE STRUCTURE OF INPUTS PER 1 HECTARE OF MAIZE	43
TABLE 2-15. IMPORT AND EXPORT DESTINATIONS FOR MOLDOVA MAIZE FLOUR (HS 110220), 2023 – 2024.....	46
TABLE 2-16 ETHANOL EXPORT, MOLDOVA, 2022-2025	46
TABLE 2-17. SWOT ANALYSIS FOR MAIZE, MOLDOVA, 2023	53
TABLE 2-18. SURVEY RESULTS FOR MAIZE, MOLDOVA, 2023.....	53
TABLE 1-2 CONSIDERED PRICING FOR THE ECONOMIC ANALYSES, MOLDOVA, REF. YEAR 2023.....	58
TABLE 1-3 PRODUCTION COSTS OF MAIZE AMONG FARMERS IN MOLDOVA, PER HA VALUES, 2023.....	59
TABLE 1-4 BALANCE OF VAT PAYMENT FROM ONE STANDARD MAIZE HECTARE, MOLDOVA, 2023.....	61
TABLE 1-5 THE ACCOUNT FOR THE SERVICE RURAL MAIZE MILLING, MOLDOVA, 2023.	62
TABLE 3-5 THE ACCOUNT FOR THE INDUSTRIAL MAIZE MILLING, MOLDOVA, 2023.	63
Table 3-6 Financial account for the maize traders (MDL/tonne), Moldova, 2023	64
TABLE 1-7 TOTAL CONSOLIDATED ACCOUNT FOR MOLDOVA MAIZE (THOUSANDS OF MDL), MOLDOVA, 2023	65
TABLE 1-8 CONSOLIDATED ACCOUNT OF THE MAIZE VALUE CHAIN, 2023, MOLDOVA (THOUSAND MDL.....	66)
TABLE 1-9 COST STRUCTURE OF MAIZE VALUE CHAIN, 2023, MOLDOVA.....	67
TABLE 1-10 VALUE ADDED (VA) DISTRIBUTION OF THE VC (DIRECT AND INDIRECT EFFECTS), 2023, MOLDOVA MAIZE.....	69
TABLE 1-11. TRADE EXPORT CONCENTRATION OF THE MAIZE (HS 1005), 2018 – 2024, %	71
TABLE 1-12 HOW PROFITABLE AND SUSTAINABLE ARE THE VC ACTIVITIES FOR THE ENTITIES INVOLVED? MAIZE - MOLDOVA, 2023.....	72
Table 4-1: Distribution of wages and creation of labour (in AWU), Moldova, thousand MLD, 2023	75
Table 4-2: Distribution of wages and creation of labour (in FTE), Moldova, 2023sa.....	75
Table 4-3: SALES TIMING AND SUBSIDIES BY FARM CATEGORY – MAIZE VALUE CHAIN.....	77
Table 4-4: Summary table of indicators for framing question 2	80
Table 5-1: Social indicators by farm category – maize VC	90
Table 6-1: INPUTS, REMOVAL AND BALANCE OF NUTRIENTS IN MAIZE VC (based on LCI and calculations)	110
Table 6-2: MINERAL FERTILIZERS AND PESTICIDES USED IN VALUE CHAIN (BASED ON LCI AND CALCULATIONS).....	116
Table 6-3: DIESEL CONSUMPTION, APPLIED NITROGEN AND YIELD ACROSS PRODUCTION SYSTEMS	117
Table 6-4 GROUPING OF PRODUCTION SYSTEMS BY DIESEL CONSUMPTION (LCI-BASED).....	118
Table 6-5: AREA, YIELD AND SHARE IN TOTAL ARABLE AREA ON MAIN CROPS PRODUCED IN MOLDOVA.....	119
Table 6-6: HYBRIDS CULTIVATED ACCORDING TO FAO AND RECOMMENDATION FOR ROM.....	121
Table 7-1 The TOWS Matrix for the Maize VC in Moldova	128
Table 7-2 The risk analyses of the maize value chain in MOLDOVA.	129

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ACRONYMS

AE	Agricultural Enterprise
AFA	Agrifood Chain Analyses Software
AIPA	The Agency of Intervention and Payments in Agriculture, Moldova
ANSA	The National Food Safety Agency, Moldova
AUAI	Water Users' Associations
CAP	Common Agricultural Policy
CI	Entrepreneurs' Cooperatives
CNAM	National Health Insurance Company
CO ₂ eq	Carbon Dioxide Equivalent
CZU Prague	Czech University of Life Sciences Prague
DALY	Disability-Adjusted Life Years
DAMEP	Department for Analysis, Monitoring, Evaluation and Policy
DCFTA	Deep and Comprehensive Free Trade Area
DRC	The Domestic Resource Cost
EPC	Effective Protection Coefficient
EU	European Union
EUR	Euro currency
FAO	The Food and Agriculture Organization of the United Nations
FD	Feed
FIBL	Research Institute of Organic Agriculture
FNDAMR/NARDF	National Fund for Agriculture and Rural Development
FOB	Free on board
GD	Government Decisions
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GIS	Geographical Information System
GP	Producer Groups
GT	Gospodării Țărănești (used synonymously with PF)
GWP	Global Warming Potential
HA	Hectare
HoReCa	hospitality industry
HP	Household Plots
HR	Human Resources
HS	The Harmonized Commodity Description and Coding System
IC	Intermediate consumption
ICCPR	International Covenant on Civil and Political Rights
ICESCR	International Covenant on Economic, Social, and Cultural Rights
IFAD	International Fund for Agricultural Development
IGS	Intermediate Goods and Services
ILO	International Labour Organization
IMP	Import
INTPA	International Partnerships
I-O	input-output
IP	Input providers
KII	Key Informant Interviews
LAGs	Local Action Groups
LCA	Life Cycle Assessment

LCI	Life Cycle Inventory
LCU	Livestock Unit
LO	Landowner
M&E	Monitoring and Evaluation
MAFI	Ministry of Agriculture and Food Industry
MDL	Moldovan leu
ML	Industrial mill
Mt	Million tonnes
NACE	The Statistical Classification of Economic Activities in the European Community
NBS	National Bureau of Statistics
NLP	National Land Program
NOP	Net Operating Profit
NPC	Nominal Protection Coefficient
NSARD	National Strategy for Agriculture and Rural Development
NUE	Nitrogen Use Efficiency
OHS	Occupational safety and health
P	Phosphorus
PF	Peasant Farmer (North, Centre, South), used synonymously with GT
PMR	Pridnestrovian Moldavian Republic
PPE	Personal Protective Equipment
PPP	Purchasing Power Parity
PSR	Producer Subsidy Ratio
RoM	Republic of Moldova
S	South region
SA	Joint Stock Companies
SC	Self consumptions
SHS	State Hydrometeorological Service
SNC	National Accounting Standard
SPEI	Standardized Precipitation-Evapotranspiration Index
SPS	Sanitary and Phytosanitary
SRLs	Limited Liability Companies
SSR	Soviet Socialist Republic
SWOT	Strengths, Weaknesses, Opportunities, Threats
T	Tonne(s)
TR	Trader
TUM	Technical University of Moldova
UA	Ukraine
UN	The United Nations
UNDP/GCF	United Nations Development Programme/Green Climate Fund
UNFCCC	The United Nations Framework Convention on Climate Change
USAID	The United States Agency for International Development
USDA	The United States Department of Agriculture
USSR	Union of Soviet Socialist Republics
VA	Value Added
VAT	Value added tax
VC	Value chain
VCA4D	Value Chain Analysis for Development
WHO	World Health Organization
YoY	Year-on-Year

EXECUTIVE SUMMARY

Functional Analysis

The Functional Analysis provides a detailed descriptive and contextual assessment of the maize value chain (VC) in the Republic of Moldova. It examines the international and national context of maize production, traces the movement of the commodity along the value chain, identifies the principal actors involved, and analyses the governance arrangements that influence sector performance. This assessment establishes the foundation for the subsequent economic, social, and environmental analyses presented in the report.

The analysis begins by positioning Moldova within the regional and global maize market. Particular attention is given to the volatility observed in recent years as a result of geopolitical tensions, disruptions in regional trade flows, and increasingly frequent climatic shocks. The consequences of the war in Ukraine, fluctuations in international grain demand, and the growing incidence of drought have significantly affected maize production, trade patterns, and price dynamics between 2022 and 2024. Within this context, Moldova has maintained its role as an important regional supplier of maize, although its export performance remains highly dependent on weather conditions and the functioning of transport corridors through neighbouring countries. The analysis also highlights that domestic maize prices are strongly influenced by developments on international markets, while local producers often face price discounts due to logistical constraints and limited bargaining power.

The second component of the Functional Analysis examines the historical evolution of maize production in the Republic of Moldova. The review covers the transformation of the agricultural sector from the centrally planned production system established during the Soviet period to the market-oriented structure that emerged following independence. The legacy of collectivised agriculture, combined with the land privatisation process initiated after 1991, has shaped the current agricultural landscape. As a result, Moldova today exhibits a dual farm structure characterised by the coexistence of numerous small family farms and a smaller number of large agricultural enterprises that cultivate extensive areas through land leasing arrangements. The analysis also reviews long-term production trends, emphasising the increasing importance of maize as one of the country's leading field crops alongside wheat and sunflower. Particular attention is given to the substantial fluctuations in yields observed between years, largely reflecting differences in rainfall distribution and drought intensity.

The third major element focuses on the structure, commodity flows, and principal actors of the Moldovan maize VC. The analysis demonstrates that maize production significantly exceeds domestic consumption requirements in most years, making exports the primary outlet for a substantial share of national production. At the same time, maize plays a critical role in supporting domestic feed demand and the livestock sector. The principal actors identified within the value chain include **Farmers**, (categorised into Peasant Farms and Agricultural Enterprises, including NoTill and Organic archetypes), **Landowners** (primarily rural households who receive in-kind rent payments), **Input Providers** (who often act as de facto extension services and commodity traders via technical credit schemes), **Traders** (focused on export, mainly through Romania since 2022), **Maize Milling** (small local service mills).

Production systems vary considerably in terms of scale, technological adoption, access to irrigation, and management practices. Landowners, many of whom reside in rural communities, continue to derive income from leasing agricultural land to commercial operators. Input suppliers occupy a particularly influential position within the value chain, providing seeds, fertilisers, crop protection products, and technical advice. In many cases, these suppliers also offer technical credit arrangements, allowing farmers to access inputs in exchange for future grain deliveries. Grain traders constitute another critical segment of the value chain. Their activities are primarily

focused on aggregation and export, with Romania serving as the principal transit and export route for Moldovan maize.

The final component of the Functional Analysis examines governance structures, the institutional environment, and overall sector performance through a SWOT assessment. The governance analysis maps the key public institutions responsible for regulating and supporting the sector, including the Ministry of Agriculture and Food Industry (MAFI), the Agency for Intervention and Payments in Agriculture (AIPA), and the National Food Safety Agency (ANSA). It reviews the policy framework established under the National Strategy for Agricultural and Rural Development (NSARD 2030) and analyses the main regulatory and financial instruments affecting the maize sector, including agricultural support measures, taxation policies, and market regulations.

Figure 0-1 presents a flow chart of the Moldovan maize VC for the 2023 reference year. The national production of maize grain was **1,351 thousand tonnes** in a cultivated area of **489,000 ha**, which gives a **2.8 tonne of yield per ha**. The left side of the diagram illustrates the production stage and associated prices (denoted in MDL/kg with a '*'). The tables embedded within the arrows indicate the flow of maize (thousand tonnes) from producers to various recipients, including traders, landowners, input providers, industrial mills, and for self-consumption and feed use.

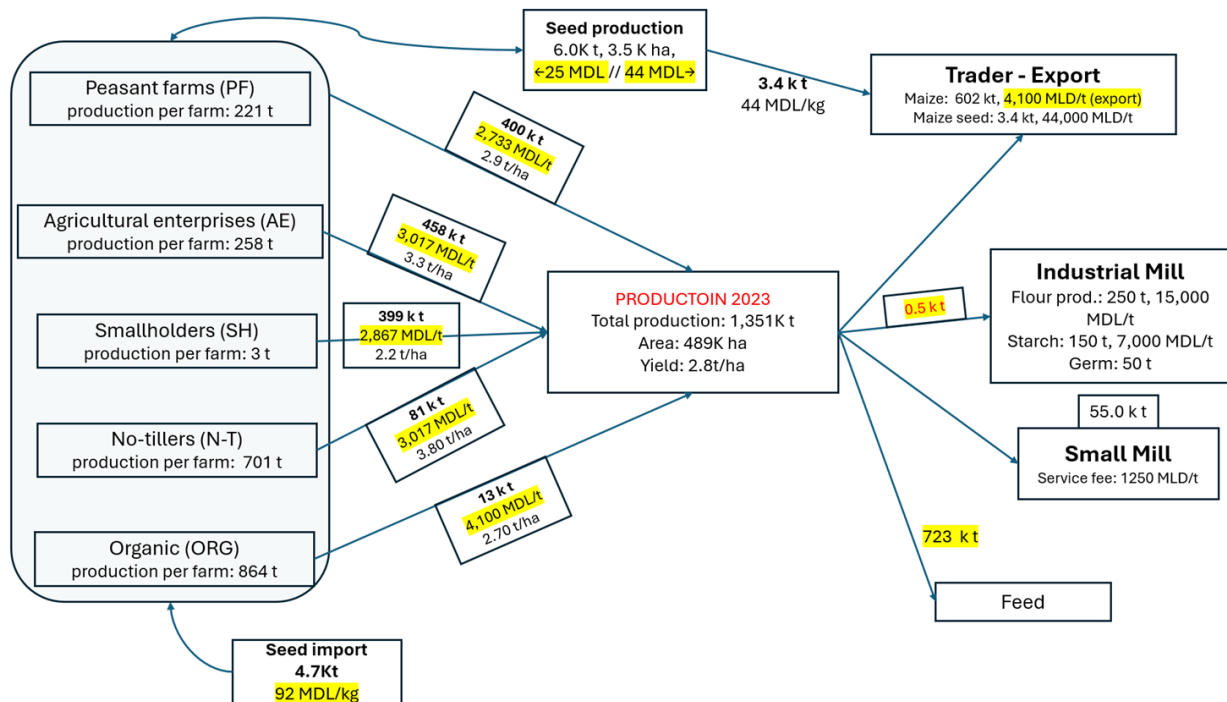


FIGURE 1-1 FLOW CHART FOR MAIZE IN MOLDOVA, REFERENCE MARKETING YEAR 2022/2023 (MAIZE PRODUCTION, K TONNES) NOTE: PF – PEASANT FARMERS, AE – AGRICULTURAL ENTERPRISES, LO – LANDOWNERS, IP – INPUT PROVIDERS, TR – TRADERS, ML – INDUSTRIAL MILLS, SC – SELF-CONSUMPTION, FD – FEED.

SOURCE: OWN ELABORATION BASED ON DATA FROM OWN SURVEY, NATIONAL BUREAU OF STATISTICS OF MOLDOVA, UN COMTRADE, EU COMEXT DATABASE, INTERVIEWS, AND OTHER LITERATURE AVAILABLE.

Framing Question 1: What is the contribution of the value chain to economic growth?

The economic analysis of the Moldovan maize VC was conducted using 2023 reference data, integrating official statistics, financial accounts, and extensive surveys of farmers. This study aimed to assess the profitability, the contribution to the national economy, and the international viability of the Moldovan maize sector. The research

segmented conventional producers into Peasant Farms (PF) and Agricultural Enterprises (AE) across the North, Centre, and South regions, alongside specific archetypes for No-Till and Organic farmers to accurately capture the sectoral diversity.

Profitability and Sustainability of Value Chain Actors

The financial performance of maize producers in 2023 was characterised by considerable economic pressure, reflecting a combination of depressed international maize prices, elevated production costs, and the adverse effects of severe drought conditions experienced in previous production seasons. These factors significantly reduced farm profitability across much of the sector and exposed the vulnerability of producers to both market and climatic shocks. Financial results indicate that many maize-producing farms experienced low or negative margins, particularly in regions most affected by moisture deficits and reduced yields. Small and medium-sized farms operating under conventional production systems were especially exposed due to their limited capacity to absorb increases in input costs and withstand fluctuations in market prices. The deterioration in profitability was further amplified by high expenditures on fertilisers, crop protection products, fuel, machinery services, and interest payments associated with production financing.

Sector-level financial indicators confirm the difficult operating environment faced by producers. A significant proportion of agricultural enterprises reported weak financial results, while profitability ratios remained below historical averages. The combination of volatile commodity markets and production risks has increased financial uncertainty throughout the maize value chain. Despite these challenges, certain categories of farms demonstrated greater resilience and achieved comparatively stronger financial outcomes. Large-scale agricultural enterprises, farms with access to irrigation, and producers adopting conservation agriculture practices, including no-till systems, generally performed better than conventional farms relying exclusively on rainfall. These production systems benefited from improved moisture retention, lower fuel consumption, reduced soil degradation, and greater production stability during periods of climatic stress.

Farms implementing resource-efficient technologies often recorded lower operational costs per hectare and were therefore better positioned to withstand periods of low market prices. Similarly, enterprises with diversified crop portfolios were able to partially offset losses in maize production through revenues generated from other agricultural activities. This highlights the importance of technological adaptation and diversification as key determinants of economic sustainability within the sector.

A major structural constraint affecting the sustainability of maize producers is the Value Added Tax (VAT) system. Farmers are required to pay the standard 20% VAT on most agricultural inputs, including fuel, machinery services, fertilisers, and crop protection products, while sales of agricultural commodities are generally subject to a reduced VAT rate or zero-rated in the case of exports. This creates substantial negative VAT balances that accumulate over time and are not reimbursed promptly. As a result, significant amounts of working capital remain immobilised within the fiscal system, weakening farm liquidity and limiting the capacity of producers to finance seasonal operations and long-term investments. For financially vulnerable farms, these accumulated VAT credits represent a substantial burden that can exacerbate cash-flow difficulties and increase insolvency risks.

The financial performance of downstream actors presents a more diversified picture. Grain storage operators and drying facilities play a particularly important role in the maize value chain because harvested grain often requires drying before storage and marketing. However, profitability in this segment is highly sensitive to energy costs, utilisation rates, and annual harvest volumes. Facilities operating at high capacity generally achieve satisfactory margins, whereas smaller operators often struggle to recover fixed costs during years of low production.

According to key informant interviews and consultations with market participants, feed manufacturers are generally perceived as one of the more stable segments of the maize value chain. Stakeholders indicated that their economic performance benefits from the conversion of raw grain into higher-value feed products and from relatively stable domestic demand from the livestock sector. However, respondents also highlighted that the

long-term prospects of this segment remain closely linked to the development of Moldova's livestock industry, which has experienced a decline in recent years.

Grain traders continue to play a dominant role in the commercialisation of maize. Their profitability is strongly influenced by international market conditions, transportation costs, and access to export corridors. In recent years, traders have faced increased logistical costs associated with regional trade disruptions and the reorganisation of export routes. As a result, margins from maize trading have remained relatively modest and highly dependent on market timing and storage capacity. The financial sustainability of trading companies is generally strengthened through business diversification. In addition to grain trading, many companies generate revenues from the distribution of agricultural inputs, storage services, drying operations, and the marketing of other commodities such as sunflower and wheat. This diversification allows them to offset periods of weak profitability in maize trading activities.

Overall, the analysis indicates that economic sustainability within the maize value chain varies substantially across actor categories. Primary producers remain the most exposed to climatic and market risks, while actors involved in storage, processing, and value addition generally achieve more stable financial results. The findings suggest that improving farm-level resilience, expanding irrigation, promoting conservation agriculture, strengthening producer organisations, and increasing domestic processing capacity are essential measures for enhancing the long-term profitability and sustainability of the maize value chain in the Republic of Moldova.

Contribution to the National Economy

Based on its cultivated area, production volume, and economic importance within the crop sector, the maize value chain is estimated to have contributed approximately 8.2% of agricultural GDP and around 1.2% of total national GDP in 2023. Maize remained the largest cereal crop in Moldova, accounting for 52.9% of the total cereal area and producing 1.35 million tonnes of grain. Beyond its direct contribution to agricultural output, the sector generated additional economic value through its linkages with grain trading, transportation, storage, feed manufacturing, and livestock production, reinforcing its strategic role in the national economy. The value chain also generated a positive public balance of approximately MDL 340 million, reflecting its net contribution to public finances. Furthermore, the rate of integration into the national economy reached 76%, indicating that the majority of value added generated along the chain originates from domestic economic activities and inputs.

International Competitiveness and Viability

The viability analysis, based on international market benchmarks, indicates that the Moldovan maize sector maintains a comparative advantage, although its performance continues to be constrained by a range of macroeconomic, structural, and policy-related distortions. Despite favourable agroecological conditions and the strategic importance of maize within the national agricultural sector, producers face persistent challenges that weaken their competitiveness on export markets. A key structural constraint is the price discount applied to Moldovan maize relative to international reference markets. Owing to high transport costs, limited access to maritime export infrastructure, dependence on regional transit corridors, and relatively weak bargaining power within international supply chains, Moldovan maize is often marketed at prices below those received by producers in competing exporting countries. These disadvantages become particularly pronounced during periods of regional market oversupply or logistical disruption.

Key viability indicators for 2023 highlight the pressures affecting the sector:

- Macroeconomic and market distortions continue to reduce the financial performance of value chain actors. These distortions are linked to factors such as an overvalued exchange rate, rising costs of labour and capital, increasing dependence on imported agricultural inputs, and elevated transportation expenses.

- The combination of volatile international maize prices, climatic risks, and rising production costs has created a significant cost-price squeeze for producers. Although maize remains one of Moldova's most important export crops, profit margins at farm level have become increasingly vulnerable to fluctuations in yield and market conditions.
- The competitiveness of the sector is further constrained by limited domestic processing capacity. As a large share of production is exported as raw grain, opportunities to capture additional value within the national economy remain underexploited. Expanding processing industries linked to feed production, starch manufacturing, bio-based products, and livestock value chains could improve economic returns and strengthen the sector's resilience.

Comparison of Sub-Chains

The analysis identified two principal sub-chains within the Moldovan maize value chain: the export-oriented sub-chain and the domestic utilisation and processing sub-chain. The export-oriented sub-chain accounts for the largest share of maize marketed in Moldova, with the majority of production sold as raw grain to regional and international markets. Although this segment dominates in terms of volume, its financial performance is highly sensitive to international price fluctuations, transport costs, and climatic variability, resulting in relatively low and volatile profit margins. By contrast, the domestic utilisation and processing sub-chain handles smaller volumes but generates substantially higher value added through feed manufacturing, livestock production, and other processing activities. This segment benefits from stronger value retention within the national economy and generally achieves more stable economic returns. The comparison demonstrates that, while maize exports remain essential for generating foreign exchange earnings, greater investment in domestic processing and integration with downstream industries offers a more sustainable and profitable pathway for increasing value addition, strengthening rural economic development, and improving the overall resilience of the maize value chain.

Framing question 2: Is this economic growth inclusive?

The analysis in Chapter 4 assesses the distribution of profits, value added, employment, and social inclusion within the Moldovan maize VC. The findings confirm that while the VC is a crucial source of rural employment, the economic benefits are distributed highly asymmetrically, and the employment structure faces significant disparities and structural challenges.

Employment Challenges

The maize value chain is an important source of employment in rural areas of the Republic of Moldova, generating a substantial number of jobs in agricultural production, grain handling, storage, transportation, trade, and processing activities. The majority of employment is concentrated at farm level, where maize cultivation requires labour for field operations, machinery management, logistics, and administrative functions. However, the sector faces several structural labour challenges. One of the most significant is the shortage of skilled workers, particularly machinery operators, agronomists, irrigation specialists, and technical personnel capable of managing modern production technologies. Labour migration and the ageing of the rural population continue to reduce the availability of qualified workers, creating increasing pressure on agricultural enterprises. Gender disparities also remain evident within the sector. Men continue to dominate higher-paid technical and mechanisation-related positions, while women are more frequently employed in administrative and support functions. As a result, differences in remuneration and access to decision-making positions persist across parts of the value chain. The geographical distribution of employment opportunities is uneven. Farms located in the northern and central regions generally benefit from more favourable production conditions and higher productivity, whereas producers in southern Moldova face greater economic uncertainty due to recurrent droughts and water scarcity. These regional disparities influence both employment stability and income levels. Although permanent employees are generally engaged under formal labour arrangements, seasonal workers are often employed on a temporary basis, which may limit access to social protection and labour-related benefits. At

the same time, the maize value chain continues to play an important role in supporting rural livelihoods through income generation, land rental payments, and economic activity within farming communities.

Framing question 3: Is the value chain socially sustainable?

The social analysis examines the maize value chain from a broader societal perspective, assessing its contribution to rural livelihoods and social well-being. The assessment covers key social dimensions, including working conditions, living standards, land and water access, gender equality, social capital, food and nutrition security, and the challenges faced by farming households and agricultural workers. The findings are based on field observations, stakeholder consultations, surveys, and interviews conducted with farmers, employees, landowners, traders, and other actors participating in the maize value chain. The analysis highlights both the socio-economic importance of the sector and the constraints that continue to affect its inclusiveness, resilience, and long-term sustainability.

Working Conditions

Farmers and seasonal workers operate under conditions influenced by climate change, with extended working hours (particularly during heavy seasons) that often lack clear regulations regarding compensation. While formal contracts are common for permanent staff, seasonal workers are typically hired informally, with wages that vary seasonally. Safety measures, especially during fertilization and pesticide application, are insufficient in many farms. Recommendations include implementing clear regulations on working hours and safety protocols and enhancing the capacity of labour inspection agencies.

Land and Water Rights

Land tenure in the Republic of Moldova continues to reflect the legacy of post-independence land reforms, resulting in a fragmented ownership structure. Many agricultural producers cultivate land through leasing arrangements, while a significant number of rural households retain ownership of agricultural parcels as a long-term asset and source of security. The gradual increase in agricultural land values has encouraged landowners to maintain ownership, often preferring to lease land rather than sell it. Access to water represents one of the most critical challenges facing the maize value chain. As a crop highly sensitive to water stress during key growth stages, maize production is particularly vulnerable to recurring droughts and rising temperatures. Climate change has increased the frequency and severity of extreme weather events, resulting in substantial yield losses and income instability for producers. Existing irrigation infrastructure covers only a limited share of cultivated land and remains insufficient to meet the sector's adaptation needs. At the same time, groundwater resources remain underutilised due to technical, financial, and regulatory constraints. Improving access to irrigation water and modernising water management systems will be essential for ensuring the long-term viability of maize production in Moldova. Climate-related shocks also have wider economic implications, affecting farm liquidity, investment capacity, and the ability of agricultural enterprises to meet financial obligations towards employees, suppliers, and creditors.

Gender Equality and Inclusion

Gender equality has improved gradually in the Republic of Moldova over recent decades, with women increasingly participating in education, economic activities, and public life. Nevertheless, disparities remain, particularly in rural areas and within the agricultural sector. Women play an important role throughout the maize value chain, especially in farm management, accounting, administration, marketing, and family farming activities. However, they continue to face constraints related to access to land, finance, agricultural technologies, training opportunities, and participation in decision-making processes. Ownership of productive assets remains concentrated among men, limiting women's economic influence within many farming enterprises.

The maize sector remains characterised by a gender-based division of labour. Mechanised field operations, machinery management, and technical agricultural activities are predominantly performed by men, while women are more commonly employed in administrative, financial, and support functions. Although remuneration for similar positions has improved over time, differences in career opportunities and access to higher-value roles continue to exist. At the same time, examples of successful female farm managers and entrepreneurs demonstrate the growing contribution of women to agricultural development and rural economic resilience. Their increasing participation in producer organisations, training programmes, and agricultural businesses highlights the potential for greater gender inclusion within the sector. However, demographic trends, including migration and population ageing, continue to affect the availability of female labour and leadership in rural communities.

Food and Nutrition Security

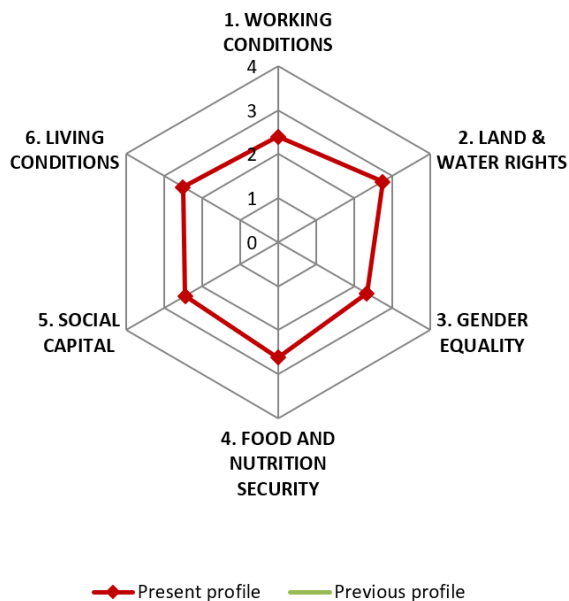
Maize contributes significantly to food and nutrition security in the Republic of Moldova, both directly and indirectly. Although human consumption of maize grain is relatively limited compared with wheat, the crop plays a fundamental role in supporting livestock production through the supply of feed grain. Most farmers interviewed reported no significant concerns regarding food availability within their households. In many rural communities, agricultural land rent is partially paid in kind, including maize and other cereals, which are subsequently used for feeding poultry, pigs, cattle, and other livestock. This contributes indirectly to household food security through the production of meat, milk, and eggs. The sector therefore plays an important role in maintaining the stability of domestic food systems and supporting rural household resilience.

Social Capital and Education

The level of social capital within the maize value chain varies among actor groups. Strong relationships are often observed between producers, input suppliers, traders, and local service providers. Agricultural enterprises generally benefit from more structured professional networks, while farmer associations increasingly contribute to representation, advocacy, and knowledge exchange. Knowledge transfer remains largely dependent on practical farming experience, peer learning, input suppliers, digital information platforms, and social networks. Although advisory and extension services exist, their coverage remains limited relative to sector needs. Strengthening agricultural extension systems, vocational training, and technology transfer mechanisms will be important for improving productivity, climate resilience, and innovation adoption within the maize sector. Educational investments are particularly important given the increasing complexity of modern maize production systems and the growing need for technical skills related to precision agriculture, irrigation management, and sustainable farming practices.

Living Conditions

The maize value chain contributes significantly to rural livelihoods and living standards. Most farming households own their homes and have access to basic services such as electricity and drinking water. Nevertheless, important infrastructure gaps remain in many rural areas, particularly regarding sewerage systems, road quality, heating infrastructure, healthcare services, and access to modern public utilities. Income generated through agricultural activities, including maize production, remains a key source of household welfare. However, many rural families continue to rely on remittances from relatives working abroad to supplement their income and maintain living standards. Migration therefore remains both an important source of financial support and a significant challenge for the long-term development of rural communities. Improving the profitability and resilience of the maize value chain could contribute to higher rural incomes, reduced migration pressures, and improved living conditions across Moldova's agricultural regions.



Framing question 4: Is the value chain environmentally sustainable?

The environmental assessment provides a comprehensive evaluation of the environmental performance and biodiversity implications of the maize value chain in the Republic of Moldova. The analysis combines Life Cycle Assessment (LCA), spatial analysis, secondary data sources, and stakeholder consultations to identify the main environmental hotspots and opportunities for improving sustainability throughout the value chain. The Life Cycle Assessment examined the environmental impacts associated with maize production, storage, drying, transport, and utilisation. The primary functional unit was defined as 1 kg of maize grain produced at farm gate, while an additional functional unit of 1 kg of maize grain delivered to the export point was used to assess the export-oriented sub-chain. The assessment focused on four major impact categories: resource depletion, ecosystem quality, human health, and climate change.

The **maize VC exhibits a moderate dependence on non-renewable resources**, particularly through the use of imported fertilisers, crop protection products, fuel, and mechanised field operations. Resource consumption is concentrated primarily at the cultivation stage, which accounts for the majority of energy use and input requirements. The analysis indicates that conservation agriculture systems, particularly no-till and minimum-tillage practices, significantly reduce resource consumption compared with conventional production systems. Lower fuel requirements, reduced soil disturbance, and more efficient nutrient management contribute to improved resource efficiency. However, the assessment also revealed consistently negative nutrient balances across all production systems, indicating that nutrient removals with harvested grain exceed nutrient inputs from fertilizers. This reliance on soil nutrient mining contributes to the progressive depletion of soil nutrient reserves and represents one of the main resource depletion challenges affecting the long-term sustainability of the maize value chain. The adoption of precision agriculture technologies and site-specific fertiliser application can further reduce unnecessary input use while maintaining productivity. The largest environmental pressures on ecosystem

quality originate from the cultivation phase. Key drivers include intensive soil cultivation, inefficient nutrient management, soil erosion, and the degradation of soil organic matter.

Environmental impacts are particularly pronounced in areas affected by recurrent drought, where lower yields result in a higher environmental footprint per unit of production. Inefficient fertiliser use can also contribute to nutrient losses and adverse impacts on surrounding ecosystems. Soil degradation particularly erosion and the loss of soil organic matter is among the most significant environmental concerns in Moldova's maize value chain. Conservation agriculture practices have demonstrated significant potential to improve ecosystem quality by increasing soil organic carbon, enhancing water retention, reducing erosion, and improving overall soil health. These benefits are particularly important for maize production in Moldova, given the increasing frequency of drought events and the vulnerability of agricultural soils to degradation. The overall environmental burden of maize production on human health remains relatively low when compared with many industrial activities. Nevertheless, stakeholder consultations identified concerns regarding occupational health and safety practices at farm level. The use of personal protective equipment (PPE) during the handling and application of crop protection products remains inconsistent across some farming operations. Insufficient awareness of occupational safety requirements and limited training continue to increase potential exposure risks for agricultural workers.

Climate change represents the most significant environmental challenge affecting the maize value chain. The analysis shows that the sector is increasingly exposed to droughts, heat waves and growing climatic variability, which directly influence production stability and the efficiency with which natural resources are transformed into agricultural output. The findings suggest that the environmental sustainability of the value chain is becoming progressively dependent on its capacity to adapt to changing climatic conditions. At the same time, maize production contributes to greenhouse gas (GHG) emissions through fertiliser use, fuel consumption, and soil-related emissions. The cultivation stage accounts for the majority of emissions generated within the value chain. Nitrogen fertilisers are the principal source of GHG emissions, primarily through nitrous oxide ((N₂O)) released from agricultural soils. Fuel consumption associated with machinery operations represents a secondary source. The assessment indicates that conservation agriculture systems generally achieve lower emission intensities than conventional production systems. Reduced tillage lowers fuel consumption, while improved nutrient management reduces nitrogen losses and associated emissions.

The **biodiversity assessment** indicates that maize cultivation generally has limited direct overlap with protected natural areas. Most protected zones in Moldova consist of forests, wetlands, and semi-natural habitats that are not intensively cultivated. Nevertheless, agricultural intensification and landscape simplification have contributed to habitat fragmentation and declining biodiversity in some farming regions. The maintenance and restoration of landscape features such as shelterbelts, hedgerows, riparian buffers, grass strips, and agroforestry systems can play an important role in supporting biodiversity while simultaneously improving soil conservation and climate resilience. Moldova's progressive alignment with the European Union's environmental acquis, including the development of the Natura 2000 network, is expected to strengthen biodiversity protection and improve the management of environmentally sensitive areas.

1. INTRODUCTION

The Republic of Moldova is a small country in Eastern Europe, bordered by Romania to the west and Ukraine to the north, east and south. The country has an area of approximately 33,846 km² and a population of approximately 2.6 million. The capital is Chisinau, the country's largest city, which is the main cultural, economic and administrative centre. Moldova is characterised by its varied landscapes, dominated mainly by plains, hills and forests. The Dniester River, one of the most important watercourses in the region, crosses the eastern part of the country and constitutes an essential source of water and energy. The relief also includes picturesque areas with hills and extensive vineyards, favourable to the development of viticulture and wine production.

The economy of the Republic of Moldova is mainly based on agriculture, viticulture and the wine industry, with agricultural products being exported to numerous international markets. The wine sector is recognised for its long tradition and the quality of the wines produced. However, the national economy faces significant challenges, such as dependence on energy imports and labour migration. The agricultural sector is traditional in nature, focusing on the cultivation of cereals, vegetables, fruits and vines, with a strong tradition in the export of agricultural products. However, Moldovan agriculture faces numerous challenges, including unpredictable weather conditions, inefficient irrigation systems and limited access to financing. The level of productivity remains relatively low, and the degree of mechanization and adoption of modern technologies is insufficient.¹

In the last decade, various actions have been initiated to modernize the sector, but the investments made have not been sufficient to ensure sustainable growth. Even under these conditions, exports of agricultural and agri-food products continue to play an essential role in balancing the country's trade balance.

In recent years, agriculture has accounted for approximately 10–11% of Moldova's GDP (Statistical Data Bank, 2022), a significant share compared to many other European countries. Although the sector's contribution to GDP is important, the economy's dependence on agriculture makes the country vulnerable to fluctuations in international agricultural markets and adverse weather conditions. A poor agricultural year can significantly impact the pace of economic growth.

The COVID-19 pandemic has had a mixed impact on agriculture in the Republic of Moldova. In the initial stages, the sector was affected by movement restrictions and supply chain disruptions, which made access to inputs (seeds, fertilizers, fuel) and difficult markets. At the same time, limitations imposed on other sectors have turned agriculture into one of the few stable sources of income, generating constant domestic demand for local products.

However, the pandemic has led to an increase in input and material prices, and the effects have been felt in the long term through increased production costs and reduced access to foreign markets due to logistical bottlenecks.

The Government of the Republic of Moldova has adopted several measures to support the economic recovery and the agricultural sector (AIPA, 2022), including:

- Subsidies and direct aid for farmers: the state has provided financial support to farmers affected by drought and the pandemic, to compensate for part of the losses and facilitate investments in new technologies and equipment.
- Fiscal facilities: measures such as tax deferrals and exemptions have been implemented to support the business environment and the agricultural sector.
- Support for SMEs: small and medium-sized enterprises, heavily affected by the crisis, have benefited from credit lines and support programs from the state and international organizations.

¹ Litvin, A.. State of Art of Agriculture in Moldova in the process of EU integration. Agricultural Policy Monitoring: Country report – Republic of Moldova. The Regional Rural Development Standing Working Group in South East Europe (SWG) Blvd. Goce Delcev 18, MRTV Building, 12th floor, 1000 Skopje, North Macedonia. 2025. 30 pag. ISBN 978-608-4760-54-2. <https://seerural.org/wp-content/uploads/2025/01/State-of-Art-of-Agriculture-in-Moldova-in-the-process-of-EUintegration.pdf>

In February 2022, still reeling from the effects of the pandemic, the Republic of Moldova faced a new crisis generated by the conflict between Russia and Ukraine. The war led to a rapid increase in prices, and in 2022 Moldova recorded one of the highest inflation rates in Eastern Europe, exceeding 30% in certain periods. This phenomenon was fueled by the increase in energy and food prices, with a direct impact on the cost of living of the population and on the production costs of companies.

The conflict in Ukraine has exacerbated existing difficulties and generated new challenges for Moldovan agriculture, especially in terms of:

1. **Input prices:** fertilizers and fuel have increased significantly, given that Ukraine and Russia are important suppliers in the region, which has led to an increase in production costs.
2. **Export market:** trade routes were disrupted and export flows to neighbouring countries were affected, with many products being redirected along longer and more expensive routes.
3. **Access to finance:** economic uncertainty and geopolitical risks have led banks to become more cautious in granting loans for agricultural projects, limiting the capital available to farmers.
4. **Labor migration:** part of the active population has emigrated due to the crisis or in search of better opportunities, which has created difficulties in hiring seasonal workers.

The Russian invasion of Ukraine has highlighted the economic and agricultural vulnerabilities of the Republic of Moldova but has also accelerated the orientation towards the European market and the adaptation to new requirements regarding energy and food security.

Despite all these challenges, agriculture remains a strategic sector for the Republic of Moldova. Its future depends on adapting to climate change, modernizing infrastructure, improving access to financing, and diversifying markets. The integration of modern technologies and the development of irrigation capacities can contribute to stabilizing production and increasing competitiveness on the international market.

The Republic of Moldova has undergone significant economic and structural transformations over the past decade. Economic growth has been moderate but volatile, influenced by external shocks and climatic conditions. Gross Domestic Product (GDP) increased from EUR 7,022 million in 2015 to EUR 13,795 million in 2022, with a temporary contraction in 2020 caused by the COVID-19 pandemic. GDP per capita has also followed an upward trajectory during this period, reflecting gradual improvements in living standards. At the same time, employment in agriculture has slightly decreased, reflecting structural changes in the rural economy and increased labour migration. Despite these macroeconomic developments, agriculture continues to play an important role in the national economy. Within the agricultural sector, crop production is the dominant component, accounting for most of the total agricultural output. Among field crops, maize (*Zea mays* L.) occupies a central position, both in terms of cultivated area and contribution to total crop production. Maize occupies between one third and almost half of the total area cultivated with cereals, making it one of the key crops that shape the performance of the agricultural sector. The importance of maize is further reinforced by its multiple uses within the agri-food system. It serves as the main source of feed for livestock production, contributes significantly to rural household consumption, and is an important commodity in agricultural trade.

However, maize production in Moldova is strongly influenced by climate variability. Periods of drought or insufficient rainfall can significantly reduce yields, while favourable weather conditions can lead to substantial increases in production. This high sensitivity to weather conditions contributes to the volatility of overall agricultural production. In years with adequate rainfall, maize production increases considerably and stimulates the growth of the agricultural sector. In contrast, in drought years, reductions in maize yields often lead to a decrease in total crop production.

The dynamics observed in recent years illustrate this dependence on climatic conditions. Agricultural production stagnated between 2017 and 2020, partly due to adverse weather conditions that affected crop yields. In 2021, favourable climatic conditions led to a significant increase in agricultural production, largely driven by improved

cereal yields, including maize. In 2022, severe drought caused a decline in production, highlighting once again the vulnerability of Moldovan agriculture to climate risks. The year 2023, however, shows signs of recovery, supported by improved weather conditions and higher crop productivity.

Given its extensive cultivated area, its role in feed supply and its contribution to agricultural production, maize represents a strategic crop within the Moldovan agri-food system. Its performance not only influences the dynamics of the agricultural sector, but also has implications for livestock production, feed availability and rural incomes. For this reason, the analysis of the maize sector provides important information on the overall resilience and development prospects of Moldovan agriculture. (Table 1-1)

Maize occupies over half of the total cereal area in Moldova ($\approx 53\text{--}60\%$), which confirms its dominant role in the cereal structure, ranging between 905 and 940 thousand ha and total production between 752 thousand tonnes and 2,130 thousand tonnes.

The structure and use of maize in the Republic of Moldova have been strongly influenced by the deep decline of the livestock sector that occurred during the economic transition of the 1990s. The abolition of large collective farms and the reduction of livestock populations significantly reduced domestic demand for feed. As a result, maize production has gradually shifted to export markets, with only a limited part being used for domestic processing. In recent years, agricultural policy has begun to address this structural imbalance. With financial and technical support from the European Union, the government has introduced programs aimed at **revitalising the livestock sector** and strengthening domestic feed supply chains. This strategy is driven not only by the objective of increasing livestock production, but also by the need to reduce dependence on imported feed and feed ingredients. As a result, maize is regaining its traditional function as a key raw material for animal feed within the national agri-food system.

Maize **plays a central role in crop rotation systems** and is fundamental to land lease arrangements, which are commonly remunerated in kind. Most of the land cultivated with maize is leased, and payments are typically made in grain and differs based on land quality and regional standards (more to be defined on land lease schemes in chapter that follows).

2. FUNCTIONAL ANALYSIS

2.1 Overview of the global maize market

2.1.1 Production in the global market

Maize is one of the world's most important cereal crops that is cultivated globally for human food, animal feed, biofuels, and obtaining industrial products like starch and sweeteners. At the global level, maize production has grown continuously due to technological advancements such as hybrid seeds, precision farming, and increased irrigation, but it is among the most important crops that remain vulnerable to climate variability and fluctuations.

Main maize producers are concentrated in Americas and Asia, accounting for over 80% of the global output. The U.S. and Brazil present high yields thanks to mechanized farming and double-cropping systems, while China's output benefits from government subsidies and improved varieties. Causes of variations across the globe include climate events like droughts on the one hand, or favourable rains on the other. Geopolitical factors, such as the Russia-Ukraine conflict, contributed to the decreased in Ukraine's output in 2024 by limiting its access to fields and inputs. Economically, strong production bolsters export revenues for some countries contributing to their GDP growth, while vulnerabilities highlight the need for climate-resilient varieties to mitigate risks to global supply chains.

TABLE 2-1 MAIZE PRODUCTION IN LEADING PRODUCING COUNTRIES, 2023–2025 (IN MILLION TONNES)

Country	2023	2024	2025 (forecast)	Change (2025/2024)
World	1,241.8	1,211.9	1,257.7	+3.8%
United States of America	389.7	377.6	401.8	+6.4%
China	289.1	295.1	298.2	+1.1%
Brazil	132.0	115.7	124.7	+7.8%
Argentina	41.4	57.4	52.5	-8.5%
India	38.1	39.2	39.5	+0.8%
Ukraine	31.0	25.0	28.0	+12%
Mexico	27.5	23.2	23.2	0%
Indonesia	20.0	15.1	15.2	+0.6%
Russian Federation	16.6	14.0	14.7	+5%
South Africa	16.4	13.4	15.3	+14.1%
Canada	15.1	15.3	15.1	+1.3%
European Union	66.0	67.0	68.0	+1.4%

Source: FAO database; FAO Food Outlook, June 2025.

2.1.2 Utilization and Trade

Maize is a versatile crop, with primary uses in animal feed (60-70%), human food (20-25%), and industrial applications like ethanol and starch (10-15%). In 2025/26, total utilization is forecasted at 1,243.7 million tonnes, up 1-2% from prior years. Per caput food use for 2025 – 2026 is forecasted for about 18.3 kg per year, with higher usages in Mexico, Egypt and Brazil.

Feed use of maize is forecast to grow by 0.5 percent (3.6 million tonnes) to 743.7 million tonnes in 2025/26. The bulk of the increase of maize feed use is expected to be concentrated in the United States. An increase of maize feed use is also anticipated in Brazil, supported by ample domestic supplies. In China (mainland), the leading user of maize for feed, maize feed use is anticipated to remain near last season's level.

TABLE 2-2. MAIZE UTILIZATION AND FOOD USE

	Total utilization			Per caput food use		
	2021/2022 – 2023/2024 average	2024/2025 estimates	2025/2026 forecasts	2021/2022 – 2023/2024 average	2024/2025 estimates	2025/2026 forecasts
	Million tons			Kg/year		
China	301.3	313.2	313.2	10.0	10.0	10.0
India	33.9	39.5	39.6	5.5	5.8	5.8
Egypt	15.7	15.3	14.8	38.2	36.9	36.3
Mexico	46.3	48.0	47.4	138.7	137.9	137.9
Argentina	21.5	20.6	18.5	7.0	7.0	7.0
Brazil	75	81.5	84.9	24.7	24.8	24.8
United States of America	314.5	321.1	324.8	15.7	15.5	15.5
EU	78.2	76.1	76.8	10.5	10.5	10.5
Ukraine	5.9	5.6	5.6	11.2	11.1	10.8
World	1,195.1	1,238.4	1,243.7	17.9	18.3	18.3

Source: FAO Food Outlook, June 2025

Maize plays a critical role in international trade as a key commodity for animal feed, human consumption, and biofuels, with trade volumes representing about 15–20% of annual production. Its trade is influenced by domestic surpluses, demand from import-dependent regions, and logistics via major ports in the Americas and Black Sea region.

TABLE 2-3. TOP WORLD EXPORTERS AND IMPORTERS OF MAIZE, 2023 – 2025, MIL. TONS

	Imports			Exports		
	2021/2022 – 2023/2024 average	2024/2025 estimates	2025/2026 forecasts	2021/2022 – 2023/2024 average	2024/2025 estimates	2025/2026 forecasts
ASIA	96.3	83.8	88.8	8.2	4.9	4.6
China	27.0	8.1	12.6	-	-	-
Iran	9.7	10.0	11.0	-	-	-
Japan	15.1	15.5	15.0	-	-	-
Republic of Korea	11.4	11.5	11.8	-	-	-
Vietnam	9.7	11.8	12.0	0.4	0.4	0.4
AFRICA	20.1	23.4	21.4	6.2	4.0	4.3
Egypt	8.2	8.1	7.5	-	-	-
Algeria	3.9	4.0	4.5	-	-	-
CENTRAL AMERICA & THE CARIBBEAN	27.4	31.5	29.9	0.3	0.2	0.2
Mexico	19.9	23.5	22.0	0.3	0.2	0.2
SOUTH AMERICA	16.4	17.8	18.0	78.1	78.0	73.7
Argentina	-	-	-	33.3	37.5	33.5
Brazil	2.2	2.0	1.8	41.5	38.4	38.0
NORTHERN AMERICA	4.5	2.8	2.8	56.3	67.7	69.5
United States of America	0.8	0.6	0.6	54.1	65.5	67.5
EUROPE	23.4	23.8	21.6	39.4	28.2	30.1
EU	20.2	20.0	18.3	5.0	2.8	4.2
Ukraine	-	-	-	27.2	21.5	21.0
OCEANIA	-	-	-	0.1	0.1	0.1
WORLD	188.1	183.0	182.5	188.6	183.0	182.5

Source: FAO Food Outlook, June 2025.

During 2023 – 2025, the maize top exporters are Brazil, the United States, Ukraine, and Argentina, while leading importers include Japan, Mexico, Republic of Korea, Vietnam, Egypt, China, the European Union, and Iran.

Analysis presents that exporters are overall major producers with surpluses, while importers are industrialized nations with intensive livestock sectors, but limited arable land. Trade volumes fluctuated by 2–5% annually, causes including demand growth for animal feed in Asia and biofuels in the U.S., alongside supply disruptions like Ukraine's war-affected exports in 2024, which diverted trade flows and raised shipping costs. Weather events, such as Argentina's 2023 drought reducing exports by 15%, also play a role. Overall, robust trade enhances global food security by redistributing surpluses, but vulnerabilities to climate and geopolitics underscore the need for diversified sourcing to stabilize markets.

The global maize trade is set to decline fractionally in 2025/26 (July/June), down 0.3 percent from 2024/25, reaching 182.5 million tonnes. On the import side, the decline is led by smaller purchases expected in Europe. Although imports by the European Union are seen falling, the bloc would remain the second largest maize importer in the world.

2.1.3. Prices in global market

At the world level, among the major coarse grains, maize prices increased the most in 2024/25, reflecting the fall in production and stocks, especially among major exporters, reaching 8.4 percent above their year-earlier value by May 2025 but remaining 13.2 percent below their average value. The Chicago Board of Trade (CBOT) maize futures for delivery in December 2025, which is the benchmark delivery month for the new United States of America crop, averaged USD 163/tonne in May, down 8.0 percent from the previous year's level.

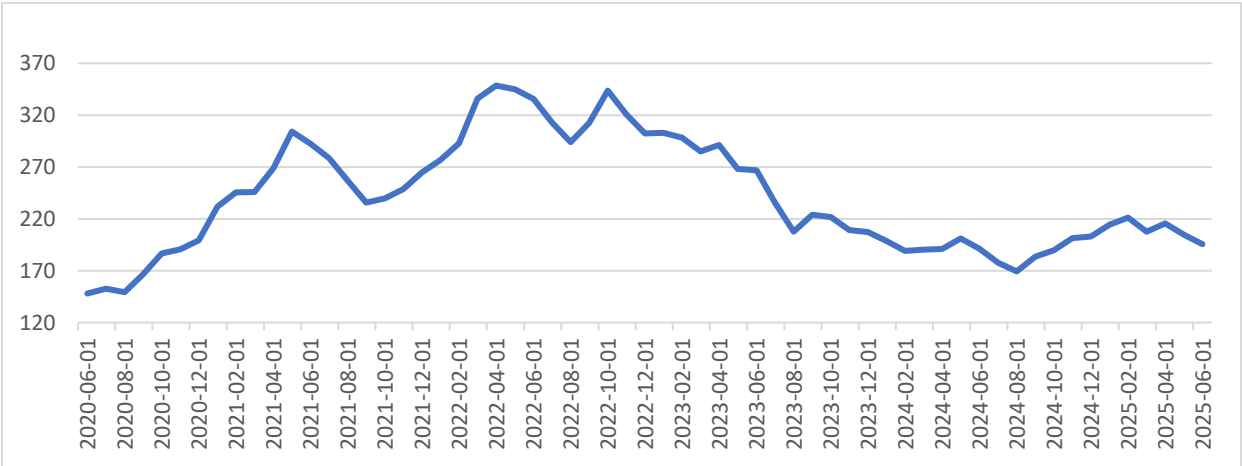


FIGURE 2-1. GLOBAL MAIZE PRICES, USD/TON
 Source: International Monetary Fund, Global price of Maize [PWHEAMTUSDM], retrieved from FRED, Federal Reserve Bank of St. Louis; <https://fred.stlouisfed.org/series/PWHEAMTUSDM>, October 13, 2025

2.1.4. Position of Moldova

International market developments do not directly translate into domestic prices in the Republic of Moldova. The local corn market is influenced not only by global price trends, but also by exchange rate fluctuations and domestic supply conditions. As corn exports are usually denominated in US dollars or euros, the exchange rate of the Moldovan leu (MDL) plays a crucial role in determining farm gate prices. In recent years, the average farm gate price of corn in Moldova has generally ranged between 2,500 and 3,500 Moldovan lei per tonne, depending

on the harvest year and market conditions. Converted using the average exchange rate (approximately 17-19 Moldovan lei per US dollar), this corresponds to approximately 140-190 US dollars per tonne, which places Moldovan corn prices generally in line with international market levels. However, in years with severe droughts – such as 2020 and 2022 – domestic prices have increased significantly due to reduced supply, even when global prices have remained relatively stable.

Exchange rate dynamics are therefore an important factor shaping producers' incomes. A depreciation of the Moldovan leu tends to increase the value of corn exports in local currency, potentially improving farmers' incomes, while an appreciation of the national currency can reduce export competitiveness. Therefore, both global price movements and exchange rate fluctuations need to be considered when analysing corn price dynamics and market incentives in Moldova.

Although modest in size compared to the world's largest maize producers, such as the United States, Brazil or Argentina, the Republic of Moldova occupies a relevant niche in the regional corn market in Eastern Europe and the Black Sea basin. Favourable agroclimatic conditions, fertile chernozem soils and geographical proximity to the main grain trading centres - in particular Romania and other EU markets - support the production and export potential of corn. However, Moldova's position in the international corn market remains constrained by a relatively small production base, limited storage and logistics infrastructure and high exposure to climate variability, especially drought.

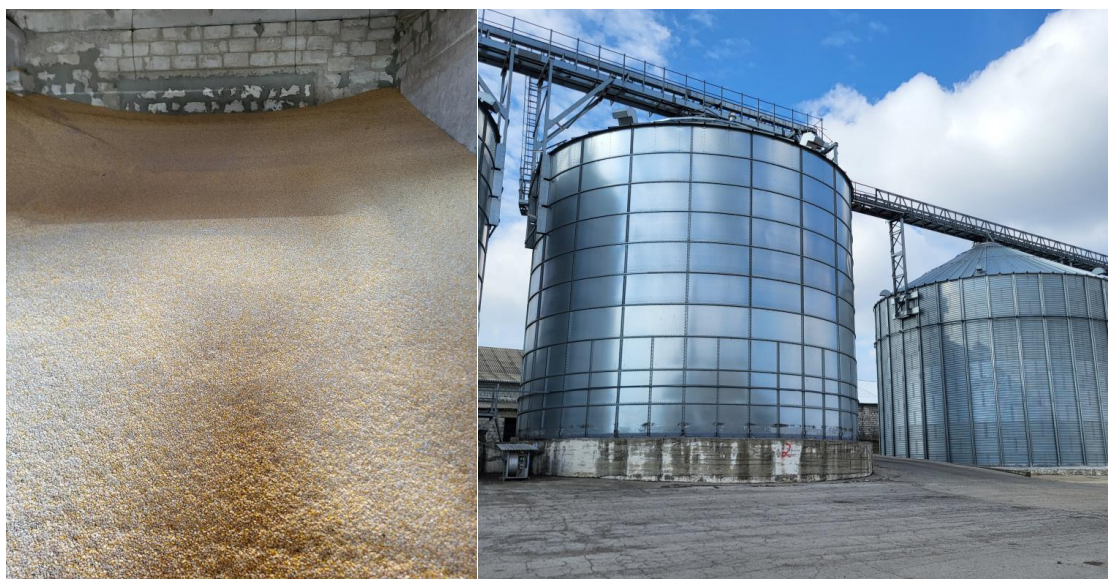


FIGURE 2-2 TYPICAL SMALLER SCALE (PEASANT FARM) STORAGE, MODERN ELEVATOR ORIGINATING FROM TÜRKIYE.

Maize is one of the most important crops in Moldovan agriculture, occupying more than half of the total cereal area in most years. In 2023, corn production reached approximately 1.35 million tons, grown on approximately 489 thousand hectares. Over the past decade, the area under maize has remained relatively stable, generally fluctuating between 490 and 550 thousand hectares, while yields have shown considerable interannual variability. For example, yields have reached over 5 t/ha in favourable years such as 2021, while they have decreased to around 1.4 t/ha in drought years such as 2020 and 2022. These large fluctuations highlight the sensitivity of maize production to weather conditions and water availability.

TABLE 2-4 IMPORTANCE OF MAIZE IN THE CROP SECTOR OF MOLDOVA, 2018-2023, MOLDOVA

	Units	2018	2019	2020	2021	2022	2023	2024
Total cereal area	thousand ha	930	915	905	940	910	925	945.4
Maize area	thousand ha	491.4	495.3	546.4	522.3	526.0	489.1	462.5
Share of maize in cereal area	%	52.8	54.1	60.4	55.6	57.8	52.9	48.9
Maize production	thousand tons	2,073.8	2,129.9	785.2	2,792.7	752.3	1,351.5	716.9
Yield	t per ha	3.70	4.33	1.87	5.74	1.74	2.8	1.62

Source: Statistical databank for Moldova, 2024

Maize occupies over half of the total cereal area in Moldova ($\approx 53\text{--}60\%$), which confirms its dominant role in the cereal structure.

Climatic variability, especially drought, is the main factor affecting maize productivity in Moldova. Studies focusing on drought indicators, such as the Standardized Precipitation-Evapotranspiration Index (SPEI), demonstrate a strong relationship between water deficit and yield variability in rainfed farming systems in Eastern Europe. In Moldova, severe drought episodes have repeatedly led to significant reductions in maize yields and total production. Historical data indicate that drought events occur every 3-10 years, and climate projections suggest that both the frequency and intensity of droughts are likely to increase, posing additional risks to maize production and farm incomes.

Despite these production risks, maize is an important export commodity for the Republic of Moldova. In years with favourable harvests, a substantial part of the maize harvest is exported, mainly to neighbouring countries and the European Union. Romania is the dominant trading partner, benefiting from geographical proximity, integrated transport routes, and access to Black Sea ports, which facilitate onward distribution to the EU and global markets. Like other cereals produced in Moldova, corn exports are predominantly in raw, unprocessed form, which limits the domestic value added captured within the agri-food chain and exposes producers to fluctuations in international commodity prices.

At the same time, corn plays a crucial role in the domestic agri-food system, in particular as a key component of animal feed. Although the collapse of the livestock sector during the transition period reduced domestic demand for animal feed, recent policy initiatives aim to revitalize livestock production and strengthen domestic feed supply chains. In this context, corn is expected to remain a strategic crop both for export and to support the recovery of the Moldovan livestock sector.

Overall, the position of the Republic of Moldova on the corn market can be characterized as that of a small but regionally significant producer and exporter, whose production potential is strongly influenced by climatic conditions and structural constraints in the agricultural sector. Strengthening drought resilience, improving storage and logistics infrastructure, and expanding value-added processing could strengthen the country's role in the regional corn economy.

2.2. Maize production in Moldova – recent developments

Maize is a vital staple crop used **both, in human consumption and livestock feed**, thus representing a keystone of the national agricultural sector of the Republic of Moldova. Only a **small portion of maize production - around 5-10% in Moldova - is allocated to direct human consumption**. Human consumption mainly includes maize flour and groats (for *mămăligă*, a traditional dish, similar to polenta). Most of the maize is used as animal feed, exported as grain, or industrially processed, reflecting its primary role as animal feed and commodity rather than as a staple food.



Being one of the most affected crops by the negative effects of climate change, specifically droughts from 2020, 2022 and 2024, maize yield has had significant fluctuations during 2016 – 2024, with a minimum value of 717.8 thousand tons in 2024 and the maximum of 2,792.7 thousand tons in 2021.

The environmental challenges such as increase in severity of drought especially in the Southern region of the country has a considerable effect on the total yield per country through reduced harvest and threatening of food security. Therefore, this variability in production emphasizes the high vulnerability of maize to climate shifts and changes, while the stress induced by drought has a great effect on the growth cycle, due to water scarcity and impact on soil fertility.

By types of ownership, in 2024, over 42% of the maize yield was obtained in agricultural enterprises, reflecting their higher access to modern technologies, better and efficient farmer practices; these are followed by almost 33% in rural households which apply labour-intensive methods at a small scale and 25% in peasant farms who sometimes operate with relatively limited resources. The distribution presents the dominance of agricultural enterprises which are more prone to invest in modern machinery and inputs. At the same time, the large share of maize in rural households points on their important role in ensuring food security, but also on some challenges they face like adaptation to climate change and lack of possibility in widening the productivity gap.

The prolonged and more often dry periods since 2020, as well as inadequate adaptation measures had a negative impact on production stabilization during the last 3 years.

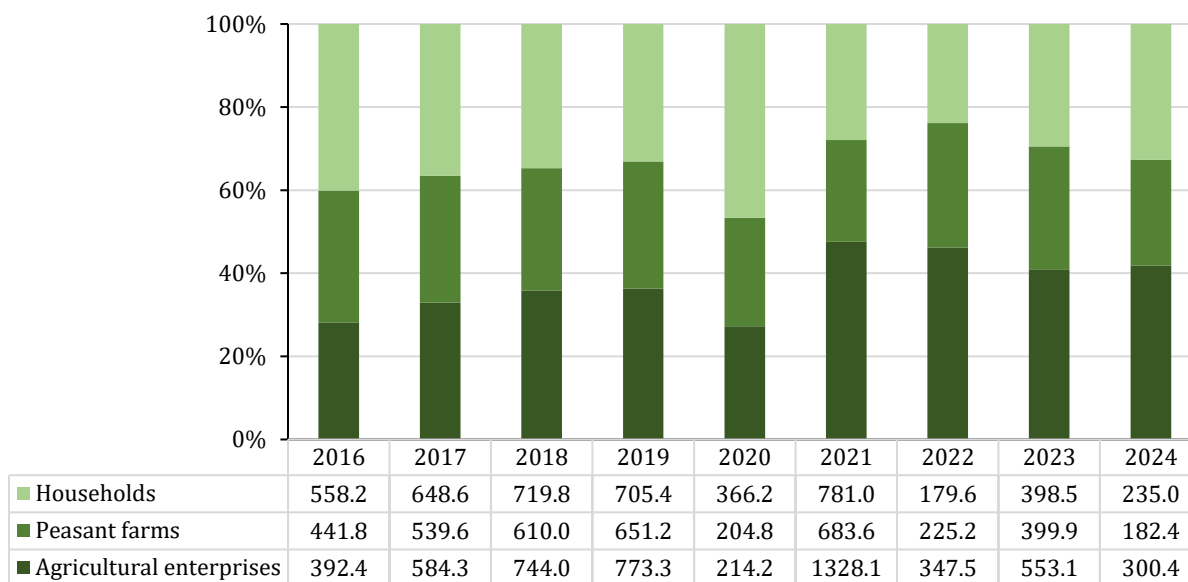


FIGURE 2-3 DISTRIBUTION OF TOTAL PRODUCTION AMONG DIFFERENT TYPES OF PRODUCERS. 2016 – 2024, THOUSAND TONS
Source: NBS database, 2025

In the regional aspect, agricultural enterprises and peasant farms from the North region hold the highest share of harvested maize – 48.5% in average in 2020 – 2024, being followed by Centre region with 28.8% and South region with 22.7%. the dominance of the North region is due to the more favourable climate conditions that mitigate, at some level, the negative effects of water scarcity. In contrast to this, the lower shares in Southpoint on the fact that the severe impact of drought has contributed to reduced productivity and has had a negative impact on the crop resilience.

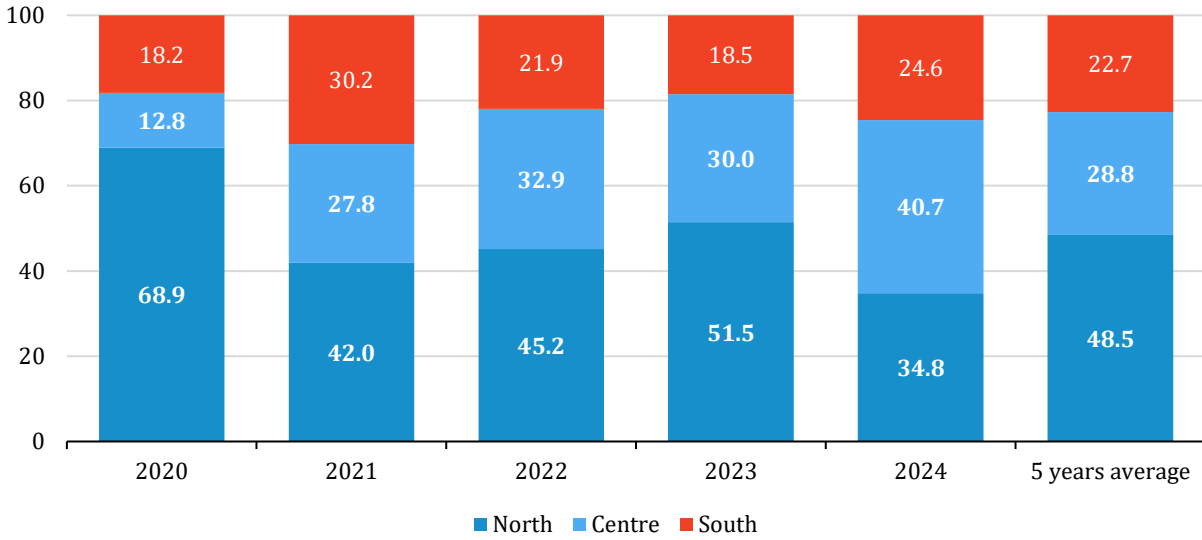


FIGURE 2-4. PRODUCTION SHARE OF MAIZE IN AGRICULTURAL ENTERPRISES AND PEASANT FARMS, 2016 – 2024, % OF TOTAL VALUE
Source: NBS database, 2025

In terms of efficiency measured in average yield per ha, agricultural enterprises have the highest values per one hectare of sown maize. Thus, during 2016 – 2024, in agricultural enterprises average yield per ha varied between 3.6 t in 2016 to 2.2 t in 2024, with a maximum level of 7.8 t in 2021 and the minimum of 1.6 t in 2020. The values in peasant farms recorded lower yields and are close to the values from households, with a slight increase, except for 2020. Thus, in peasant farms the average yield of maize per ha fluctuated between 2.8 t in 2016 to 1.7 t in 2014, with a minimum amount in 2020 of 1.5 t, while in households it varied between 2.9 t to 1.2 t in the same period. The overall picture presents the superior performance of agricultural enterprises caused by the more intensive agricultural practices, with a higher use of fertilizers, advanced seed varieties, mechanized or improved harvesting process and less losses due to modern agricultural harvest equipment. On the other side, the lower yields in peasant farms and households point on the limited access to modern inputs and a deep reliance on traditional methods of cultivation and harvesting. The obvious decline in yields across all types of ownership in 2020, 2022 and 2024 corresponds with drought years and suggests that even carrying out advanced practices in enterprises cannot fully stand in front of severe climate impacts.

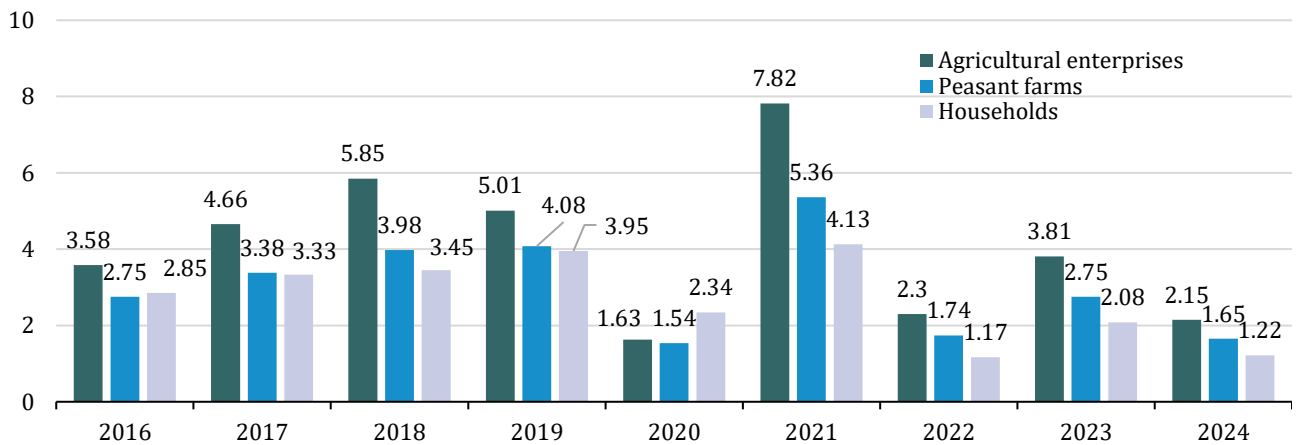


FIGURE 2-5. AVERAGE YIELD PER HECTARE FOR MAIZE, BY TYPES OF OWNERSHIP, TONS
Source: NBS database, 2025

When analysing the average yield of maize by regions of development, one can note that North region of the country has the most favourable conditions for growth of maize in agricultural enterprises and peasant farms. During 2020 – 2024, on average, the North region has registered 4.02 t/ha, while Centre – 3.39 t/ha and South – 2.88 t/ha. These figures emphasize the North's more advantageous agroclimatic zone, while the Centre's moderate yields suggest the existing of transitional conditions, and the South's lower outputs are primarily due to arid climates and frequent droughts. With the better-preserved ecosystems in North and while South region experiences deforestation and overgrazing, the drought effects are comparable across these regions. At the same time, the figures may point on the overexploitation of arable lands in the North, as the same time, the South region facing important desertification risks and reduced biodiversity.

2.3. Maize food balance

The food balance for maize shows that domestic utilization is generally lower than the total available supply in several years, while exports considerably exceed imports and a significant share of production is directed to animal feed. The self-sufficiency level reached an average value of 134.7% during the period 2019–2023, with a minimum of 61.1% in 2020 and a maximum of 216.8% in 2021.

Overall, this surplus reflects strong domestic production capacity in years with favourable climatic conditions, allowing producers to benefit from export opportunities. However, the sharp decline to 61.1% in 2020 highlights the sector’s vulnerability to climatic shocks, as reduced yields may increase reliance on imports. Weather variability therefore plays an important role in shaping supply and demand dynamics and may also influence international market prices for animal feed.

These fluctuations affect the trade balance: in years of surplus, they contribute to improved export performance, while in deficit years they may lead to higher domestic prices. Such increases can affect both consumers and livestock producers, potentially raising production costs in the meat and dairy sectors.

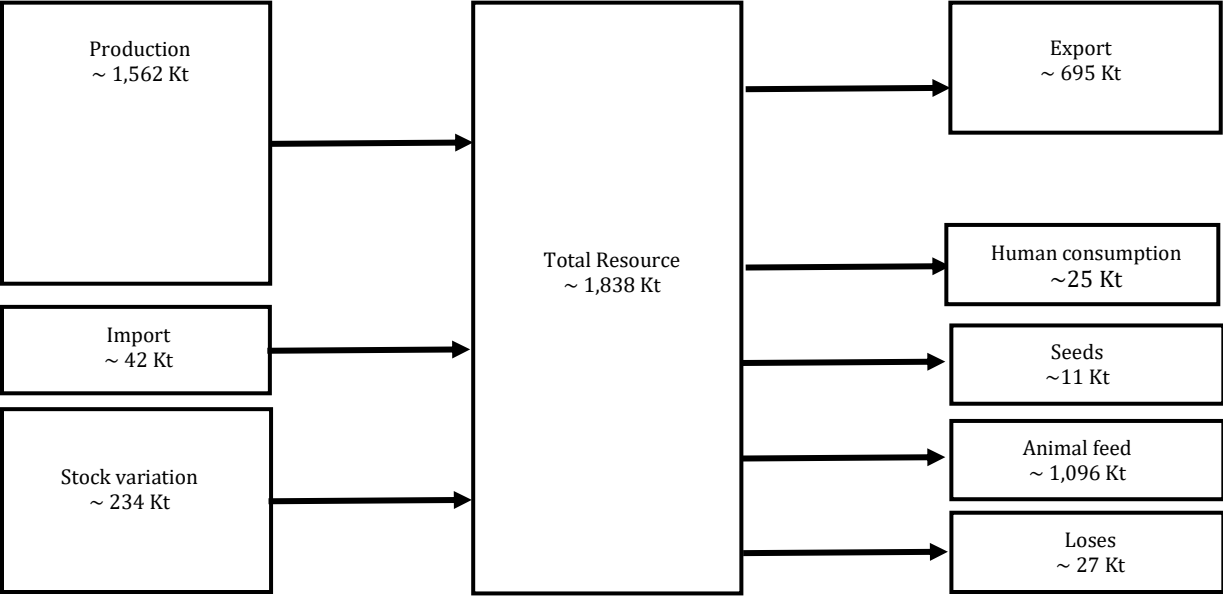


FIGURE 2-6 BALANCE OF FOOD RESOURCES AND THEIR USE, MAIZE, AVERAGE VALUES FOR 2019 – 2023, THOUSAND TONS
 Source: NBS database, 2025

2.4. Actors Considered in the Moldova Maize Value Chain

2.4.1. Farmers

The agricultural sector plays an important role in combating poverty and food insecurity in the Republic of Moldova. Micro and small-scale agricultural holdings represent 95% of all agricultural holdings and provide 71% of total agricultural production in the country. Due to insufficient technical equipment and lack of entrepreneurial education and agricultural skills, a large part of this land is leased to large agricultural producers, and those who retain the land engage in subsistence agricultural activities. Women, the elderly and those with a lower level of education report lower incomes and are the most economically vulnerable.

According to the General Agricultural Census (2011) and academic analyses:

- ✓ 99.6% of agricultural holdings are households without legal personality (households and peasant households),
- ✓ 0.4% are agricultural enterprises with legal personality.
- 95% of farms are considered smallholders (small farms, subsistence or semi-subsistence).

The structure is extremely fragmented:

- 71% of holdings have <1 ha, but use only ~10% of the agricultural area
- 0.3% of holdings (>100 ha) control ~63% of the utilized agricultural area

This duality explains the imbalance between the large number of small producers and their lower share in commercial production. Maize represents 27–33% of the total area of cereals cultivated annually.

A dominant crop in smallholder farms, especially for:

- self-consumption
- animal feed
- informal local sales

The average level of production remains below the genetic potential of available hybrids, mainly due to the low use of modern inputs, extensive cultivation technologies, limited access to capital and irrigation.

The role of household and peasant farms in the maize value chain is quite significant (Table 2-4). Smallholder farms (<10 ha) use almost half of the agricultural land, but portions are dispersed. Maize is the dominant crop in these farms, but production is **predominantly non-commercial or sold through short** channels (local markets). Yields are lower than in large farms. **The root cause is limited mechanization, low use of certified seeds, reliance on manual labour.**

In the Republic of Moldova, households and peasants numerically dominate the agricultural sector and contribute approximately 40% of maize production, but on small areas and with low yields. Large agricultural enterprises, although few, control most of the land and produce most of the commercial maize. This dual structure limits the efficiency of the maize value chain and requires differentiated policies for the integration of smallholders into the economy.

During the interviews, it was discovered that some peasant farms operate on thousands of hectares, while some agricultural enterprises can be relatively small. Thus, the Cabinet of Ministers of the Republic of Moldova approved the draft amending the conditions for the exercise of entrepreneurial activity by peasant households (AgroExpert 2023).

"The concept of the peasant household is based on the idea of developing family businesses in agriculture, based on the personal work of its members. To support them, a number of facilities have been granted through normative acts, in relation to other forms of entrepreneurial activity, such as the income tax rate, the accounting system, and social security contributions. Analysing the area of agricultural land declared by peasant households in the applications for subsidies, it was found that **around 8% of them own land with an area greater than 150 ha**, with households being registered with a land area exceeding 10,000 ha. Owning such land areas indirectly indicates that they have exceeded the scope of a business in which the work of family members is used and special protection from the state would not be justified".

Considering the shortcomings of the current situation, a survey was conducted among farmers to identify and accurately characterize the archetypes of farms. 165 producers from different production regions, who represented the classical farming entities (PF + AE), were questioned. Additionally, farmers practicing a no-tillage system (n=10) and organic producers (n=9) were interviewed. Information collected provided a possibility to characterise archetypes of producers.

We identify three base archetypes of classical producers, aligning with the official division into peasant farms (PF), agricultural enterprises (AE) and Smallholders (SHs). Following the survey results, it was established that on average, PFs are much smaller than AEs, and on average, they are characterised by lower yields. This base division is further subdivided by region where farms operate (south, centre, north). This, in total, creates 9 farm types. Additionally, we add a typical example of a farmer who practices conservational agriculture in the form of a no-tillage system. Lastly, we consider a typical organic producer.

All farm archetypes used in this report are shortly described below, and their summary statistics are provided in Table 2-5.

TABLE 2-5 DISTRIBUTION OF MAIZE PRODUCTION AMONG TYPICAL FARMS (2023I)

Archetypes			Total Maize production (K t) ¹	Total hectares - maize (K ha) ³	Yields (t/ha) ²	Farm maize area (ha) ⁵	Per farm production (t) ⁴	Number of Farms ⁴
Conventional	North	PF	203	52.1	3.9	65.7	256	792
		AE	231	49.4	4.7	70.8	331	697
		SHs	202	67.6	3.0	1.2	3.5	57,190
	Central	PF	140	46.7	3.0	112.7	338	414
		AE	130	36.1	3.6	77.5	279	466
		SHs	140	60.9	2.3	2.0	4.7	29,899
	South	PF	57	38.0	1.5	62.5	94	608
		AE	97	53.9	1.8	87.9	158	613
		SHs	57	49.6	1.2	1.1	1.3	43,911
Organic			13	4.8	2.7	320.0	864	15
No-Till			81.3	21.4	3.8	184.5	701	116
Total Average			1,351.3	480.3	2.8		2.8	134,721

Source: Own calculations based on the National Bureau of Statistics (NBS) of the Republic of Moldova, survey conducted.

Notes:¹ NBS of Moldova, regional statistics of production. ² Data are based on a survey conducted. ³ Derived from yields and production statistics. ⁴ Based on information derived from Payment Agency (AIPA) and information on green diesel support in 2023 and microdata provided by NBS. ⁵ Deducted from information from AIPA, surveys, and NBS.

Data from table 2.4 indicates that No-Till technology is the absolute performance leader in terms of productivity:

- Maximum yield is observed in the **North** (about 130% of national production). **Central** reflect the national average. **Southern** region faces yields which are about 50% less than national averages.
- No-till maize production: Although it occupies only ~5% of the total area (21.4K ha out of 480.3K ha), it contributes disproportionately to the total production, demonstrating superior soil resilience.
- The Organic system has relatively average yield, but lower costs and higher prices, suggesting that organic management is more efficient.

The analysis by region highlights a clear productivity gradient North > Center > South. National average indicates that Agro-Enterprises (AE) (large farms, average 420-500 ha) obtain the best yields from the conventional system. This confirms the direct correlation between access to technology/capital and productivity. Smallholders obtain the worst results (e.g. 1.2 t/ha in the South). This value below the profitability threshold indicates a chronic lack of inputs and water conservation technologies.

TABLE 2-6 COMPARATIVE ANALYSIS OF BUSINESS PERFORMANCE BY REGION

Region	Farm type	Comments
North	Smallholders (SHs)	small farms, low inputs, low productivity
	Peasant farms (PFs)	medium-sized family farms, medium technologies
	Agricultural enterprises (AEs)	large, fully mechanized farms
Centra	Smallholders (SHs)	lack of irrigation, high costs
	Peasant farms (PFs)	mixed farms, average results
	Agricultural enterprises (AEs)	moderate investments, partial infrastructure
South	Smallholders (SHs)	affected by severe drought
	Peasant farms (PFs)	low productivity, limited inputs
	Agricultural enterprises (AEs)	degraded soils, local irrigation

Source: Survey conducted.

No-Till is not just a conservation method, but the most productive strategy available for maize in the current climate. The huge number of small farms (21,200 SHs) with low yields (3.17 t/ha) drags down the national average, indicating the need for No-Till technology transfer to these segments and their consolidation. At the same time, the no-till technology request high capital investments which is not always reasonable for small holder farms. The organic production of 2.70 t/ha is remarkably stable, being almost equal to the yield of commercial farms (PF) in the Central region, which validates the economic viability of the eco-system.

The qualitative analysis of this table reveals a direct correlation between the scale of production, access to resources and climate resilience in Moldovan agriculture. The North is the only region where agricultural enterprises (AE) are described as “fully mechanized”. Productivity here is supported by technology, not just soil. The Centre faces a paradox of high costs and lack of infrastructure (irrigation), which caps results at an “average” level. The South is marked by soil degradation and severe drought. Production here depends on survival, not performance, being the only region where devastating climate impacts are explicitly mentioned.

Smallholders (SHs - Subsistence): Defined by “low inputs” and “low productivity”. In all regions, they represent the most fragile segment, being the first to be affected by drought and lack of capital.

Peasant Farms (PFs - Transition): Represent family farms that use average technologies. These are the “bridge” between subsistence and business, but their results are mixed/average.

Agricultural Enterprises (AEs - Industrial): They are the only entities capable of investment (mechanization, infrastructure). However, even they are limited in the South by soil quality, which suggests that technology cannot fully compensate for the degradation of natural resources without regenerative practices (such as No-Till).

The table suggests that to increase national profitability, Moldova needs to solve two structural problems:

1. Mechanization and consolidation of small producers (SHs) to exit the “low productivity” zone.
2. Soil rehabilitation in the South, where the classic mechanization of large enterprises (AEs) is no longer sufficient due to advanced degradation.

TABLE 2-7 QUANTITY OF MAIZE FOR OWN CONSUMPTION, GIFT, BONUS FOR EMPLOYEES (AS A SHARE OF PRODUCTION) .

Farm type	Total
Smallholders (SHs)	92%
Peasant farms (PFs)	3%
Agricultural enterprises (AEs)	4%
No-till farms	4%
Organic farms	19%

Source: survey conducted.

According to the survey data, a large amount of maize is used for own consumption, especially that obtained in smallholders farms.

Agricultural enterprises

Agricultural enterprises in the Republic of Moldova represent the commercial and larger-scale segment of the agrarian sector, typically characterized by greater capitalization, mechanization, and access to improved seeds, fertilizers, and, in some cases, supplementary irrigation. These entities have assumed increasing importance in national grain output following post-Soviet agrarian restructuring.

Across the nine-year observation window, sown area under maize for grain exhibited marked initial expansion followed by relative stabilization at elevated levels. From 2017 onward, sown area ranged between 126.8 and 192.0 thousand hectares, reaching its zenith in the pandemic-affected year 2020 (192.0 thousand ha) before moderating to 149–175 thousand hectares in 2021–2024.

Average yields per hectare displayed the pronounced inter-annual volatility characteristic of rain-fed cereal production in the Black Sea steppe zone. The series maximum occurred in 2021 (7.82 t/ha), while the minimum was registered in 2020 (1.63 t/ha), yielding an overall mean of 4.09 t/ha. These fluctuations are overwhelmingly attributable to meteorological conditions – particularly precipitation deficits and elevated temperatures during the critical silking and grain-filling phases – rather than to shifts in sown area.

Output attained its peak of 1 328.1 thousand tons in 2021 and the minimum of 214.2 thousand tons in 2020, for a nine-year average of 581.9 thousand tons. The dataset thus portrays a sub-sector that, while benefiting from structural advantages over smallholder peasant farms, remains highly sensitive to climatic risk. The exceptional 2021 campaign – combining near-peak area with record yield – generated more than six times the output of the drought-stricken 2020 season. The mild downward trend in production (approximately –11.7 thousand tons per year) and the contraction in sown area after 2020 suggest emerging pressures from input costs, market signals, and recurrent weather extremes.

TABLE 2-8. MAIZE PRODUCTION, AGRICULTURAL ENTERPRISES, MOLDOVA (2016 - 2024)

Agricultural enterprises		2016	2017	2018	2019	2020	2021	2022	2023	2024
Area	K hectares	111	126,8	128,7	156,4	192,0	174,1	174,9	149,2	150,8
Yield	t/ha	3,6	4,7	5,9	5,0	1,6	7,8	2,3	3,8	2,2
Production	K tons	392,4	584,3	744,0	773,3	214,2	1,328,1	347,5	553,1	300,4

Source: National Bureau of Statistics (2025)

Peasant farms

The Republic of Moldova remains a predominantly agrarian economy in which peasant farms (*gospodării țărănești*) play a central role in grain production, particularly maize. These smallholder units, typically operating on modest land parcels, represent a legacy of post-Soviet land reform and continue to dominate certain segments of crop output despite ongoing structural consolidation toward larger commercial enterprises. Over the nine-year observation period (2016 – 2024), sown area under maize in peasant farms averaged 154.4 thousand hectares, fluctuating within a relatively narrow band of 148–168 thousand hectares from 2016 to 2022 before declining markedly. The peak sown area occurred in 2020 (168.2 thousand ha), while the lowest value was recorded in 2024 (120.3 thousand ha), representing a contraction of approximately 19% relative to the immediately preceding year and marking the lowest level in the series. This recent reduction in planted area reflects a combination of agronomic, economic, and climatic considerations, including elevated input costs, uncertain market prospects for late crops, and strategic shifts toward alternative enterprises amid persistent

weather adversity. Yields ranged from a low of 1.5 tons per hectare in 2020 to a high of 5.4 tons per hectare in 2021, yielding a period average of 3.0 tons per hectare. Exceptional performance was observed during the 2018–2019 and especially 2021 seasons, whereas markedly depressed yields characterized the years of 2020, 2022, and 2024 (the latter registering 1.7 tons per hectare). Such fluctuations are widely attributable to precipitation deficits and heat stress during critical growth stages; phenomena increasingly linked to regional climate variability. Global harvest volumes closely mirrored yield movements rather than changes in sown area, underscoring the dominant influence of per-hectare productivity on total output. Production peaked at 683.6 thousand tons in 2021 and reached a minimum of 182.4 thousand tons in 2024 – the lowest recorded value in the series. The period average stood at 437.6 thousand tons, yet annual totals varied by more than 500 thousand tons between the best and worst years. The 2024 collapse, combining the smallest sown area with near-record low yields, contributed to a broader contraction in national crop production, with maize among the crops most severely affected.

These empirical findings highlight structural vulnerabilities inherent to peasant maize production in Moldova: dependence on seasonal rainfall, limited adoption of stress-tolerant varieties or supplementary irrigation, and exposure to input-price volatility.

TABLE 2-9. MAIZE PRODUCTION, PEASANT FARMERS, MOLDOVA (2016 - 2024)

Peasant farms		2016	2017	2018	2019	2020	2021	2022	2023	2024
Area	K hectares	160,9	159,9	154,0	160,3	168,2	155,9	161,8	148,3	120,3
Yield	t/ha	2,8	3,4	4,0	4,1	1,5	5,4	1,7	2,8	1,7
Production	K tons	441,8	539,6	610,0	651,2	204,8	683,6	225,2	399,9	182,4

Source: National Bureau of Statistics (2025)

Rural households

Rural households constitute the most numerous and traditionally oriented segment of Moldovan agriculture. These small-scale, family-operated units, typically cultivating modest plots for self-provisioning and limited market sales, continue to play a vital role in national maize output despite the structural shift toward larger commercial farms. Their production would range from 1 ha to about 2 ha of maize, while some production is also conducted in the back-yard plots, which could be even smaller (100 – 1,000; 3000 m²) with the aim to produce a bit of maize for backyard animals.

Across the nine-year period, sown area under maize for grain in rural households displayed some stability, fluctuating within a narrow range of 178.6–208.7 thousand hectares and averaging 192.1 thousand hectares. The highest value occurred in 2018 (208.7 thousand ha), while the lowest was recorded in 2019 (178.6 thousand ha). Unlike other categories of producers, rural households showed no clear contraction or expansion trend, reflecting the persistence of traditional land-use patterns and the limited responsiveness of small plots to market or policy signals.

Yields ranged from a minimum of 1.17 t/ha in 2022 to a maximum of 4.13 t/ha in 2021, with a period average of 2.72 t/ha. Elevated performance was observed in 2019 and 2021, whereas severe depressions characterised 2020, 2022, and especially 2024 (1.22 t/ha). These fluctuations are overwhelmingly driven by meteorological factors like precipitation deficits and heat stress during critical phenological stages.

Output reached its peak of 781 thousand tonnes in 2021 and fell to its lowest level of 179.6 thousand tonnes in 2022, yielding a nine-year average of 510.3 thousand tonnes. While rural households maintained a consistent contribution to national maize supply through stable planting, recurrent drought episodes – particularly in 2022

and 2024 – produced sharp contractions in output. These patterns underscore the vulnerability of smallholder systems lacking widespread access to irrigation, improved varieties, or risk-management instruments.

TABLE 2-10. MAIZE PRODUCTION, RURAL HOUSEHOLDS, MOLDOVA (2016 - 2024)

Rural households		2016	2017	2018	2019	2020	2021	2022	2023	2024
Area	K hectares	196.0	194.7	208.7	178.6	186.2	192.3	189.3	191.6	191.9
Yield	t/ha	2.9	3.3	3.5	4.0	2.3	4.1	1.2	2.1	1.2
Production	K tons	558.2	648.6	719.8	705.4	366.2	781.0	179.6	398.5	235.0

Source: National Bureau of Statistics (2025)

Organic Producers

Only 1.4% of the agricultural land in the Republic of Moldova is cultivated using organic farming practices. Organic maize production remains particularly low, covering only 5,500 hectares. While yields from organic maize are generally lower than conventional production, this is partially offset by reduced costs due to the elimination of expensive chemical treatments. However, given the unclear total production volume, organic maize cultivation merits further investigation.

One major barrier to the expansion of organic agriculture in Moldova exists already at the production level – the lack of certified organic seed material. Nevertheless, both national and European legislation permit the use of conventional seed, provided it meets specific criteria: it must be untreated with pesticides and must not originate from genetically modified crops.

Another constraint is limited consumer awareness regarding the value of organic products. Although interest in organic food is slowly growing among Moldovan consumers, price sensitivity remains high, and lower-cost products are generally preferred over higher-quality or certified organic goods.

No-Tillage Practices

Conservation agriculture, particularly no-tillage techniques, holds significant potential for Moldovan farmers who face recurring droughts and increasing soil degradation. It is estimated that no-tillage practices are applied on approximately 70,000 hectares nationwide. In line with national cropping patterns, maize accounts for around 30% of this area (21.4 K ha). No-tillage methods can lead to considerable reductions in diesel use and labour input, lowering overall production costs. These practices also improve soil moisture retention and enhance resistance to drought and erosion.

2.4.2. Landowners

Landowners are generally rural households or private individuals who do not personally carry out agricultural activities. Although they obtained their land through the land reform process, many decided not to pursue farming themselves. Instead, they lease their plots to active farmers, who compensate them through an annual rental payment.

Lease contracts, which clearly define the rental terms, are usually concluded for a five-year period and may provide for payment either in cash or in agricultural products. According to the survey results, most landowners prefer payment in kind. Under this system, the owner receives a predetermined quantity of agricultural goods, as specified in the contract. Table 2.10 illustrates an example of the compensation structure for a single land quota (the standard unit used in lease arrangements). It should be emphasized that the size of these quotas differs, since they were established based on the number of shares distributed during the land reform and the subsequent division of former collective farms (kolkhozes).

TABLE 2-11 EXAMPLES OF CONTRACTUAL AGREEMENTS FOR IN-KIND PAYMENTS FOR LAND LEASE

Land quota (Ha)	Annual rent agreement for in kind payment
1.54 ha	500 kg of wheat, 100 kg of sunflower, 500 kg of maize
1.10 ha	400 kg of wheat, 130 kg of sunflower, 250 kg of maize
2.00 ha	600 kg of wheat, 200 kg of sunflower, 300 kg of maize, 200 kg of barley
1.3 – 1,5 ha depending on quality	600 kg of wheat, 150 kg of sunflower, 50 kg of sugar, 100 kg of maize

Source: own survey conducted

At the time of collection, landowners receive the commodities as agreed in the lease contract. Larger landowners, who lease out greater areas of land, often choose to receive the market price equivalent of the agreed commodities². In contrast, owners of smaller plots typically receive the commodities themselves. These commodities are then used for household purposes: maize used as animal feed. **A small quantity of maize is milled into maize flour at small local mills** (service milling), and sunflower seeds are pressed into oil, with the remaining cake also fed to animals.

2.4.3. Input providers

Input providers represent an important group of actors in the maize value chain in the Republic of Moldova. In the context of value chain analysis, it is important to distinguish between direct actors, who own the product and decide on its commercialization, and indirect actors, who support the production process by supplying inputs or services.

In the maize value chain, **farmers and agricultural enterprises represent the direct actors**, as they own the maize production and determine the marketing channels through which the product is sold. **Input suppliers represent indirect actors**, providing essential inputs such as fertilizers, pesticides, and seeds, as well as technical advisory services necessary for crop production.

Due to the limited domestic production of agricultural inputs, Moldovan farmers rely heavily on imported products distributed by specialized companies. Input providers typically include fertilizer importers and distributors, seed suppliers, pesticide distributors, and agricultural input retailers operating at national and regional levels.

Mineral fertilizers are largely imported. As illustrated in Figure 2-7, both the volume and value of fertilizer imports have increased steadily over time. The total volume of imports increased from approximately 150 thousand tons to more than 267 thousand tons in 2018, while in 2023 imports amounted to around 250 thousand tons. The main suppliers include the Russian Federation, Bulgaria, Turkmenistan, Greece, Romania, Egypt, and Belarus.

A significant increase in the use of mineral fertilizers has been observed since 2010, when the consumption of nutrients such as nitrogen (N), phosphorus (P), and potassium (K) began to grow rapidly. This development is largely associated with the expansion of areas cultivated with maize and sunflower and the intensification of agricultural production systems. (Figure 2-8)

² Given by the contract, usually it is a mix of amount of wheat, sunflower and maize, with some additions like apples, sugar, barley, etc.

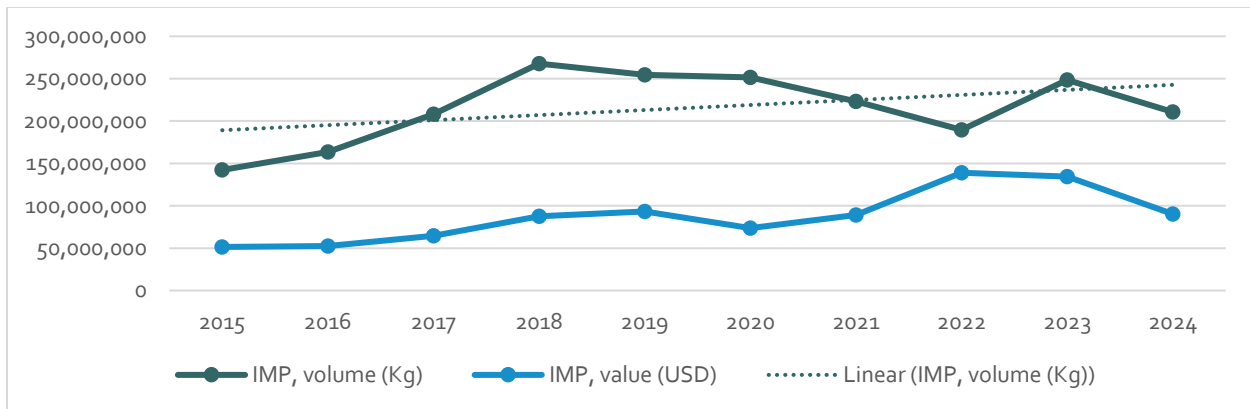


FIGURE 2-7: TRENDS OF FERTILISERS IMPORTS (HS 31), REPUBLIC OF MOLDOVA, VOLUME IN KG, VALUE IN USD, 2015 – 2024.
Source: UN Comtrade (2025)

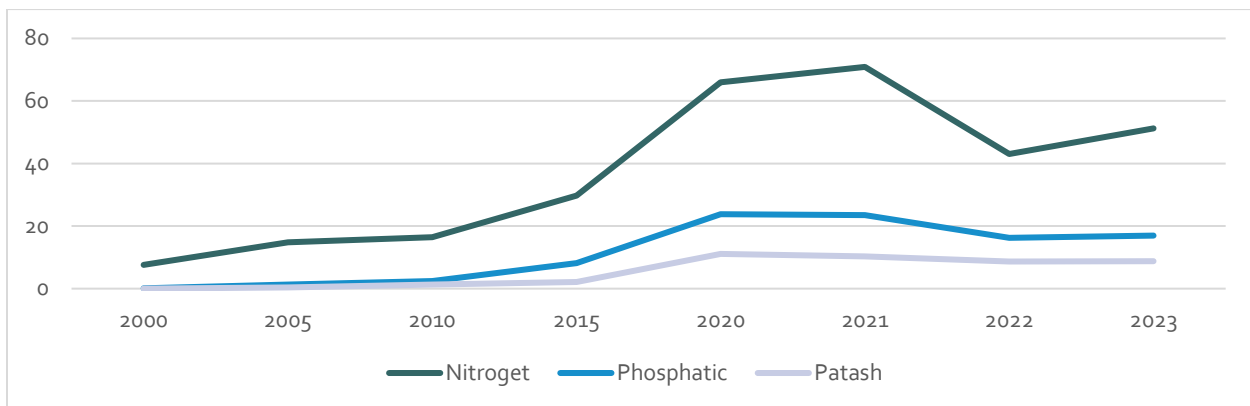


FIGURE 2-8: MINERAL FERTILISERS USED IN AGRICULTURAL ENTERPRISES AND IN FARMS WITH MORE THAN 50HA (THOUSAND TONNE OF ACTIVE SUBSTANCES).
Source: National Bureau of Statistics - Statistical Yearbook 2023 (National Bureau of Statistics of the Republic of Moldova, 2025c)

A similar trend can be observed in the case of pesticide use, which has increased gradually since 2010, with accelerated growth after 2020 (Figure 2-9). Like fertilizers, pesticides are almost entirely imported (Figure 2-10), which further highlights the growing importance of input suppliers within agricultural value chains in Moldova, including the maize sector.

Because there is limited domestic production of most agricultural inputs, the relationship between farmers and input suppliers plays a significant role. Based on interviews with input providers, it is estimated that approximately **95% of farmers obtain inputs through technical credit schemes**, allowing them to pay for inputs after harvest. This system reduces liquidity constraints for farmers and strengthens the economic relationship between producers and input suppliers.

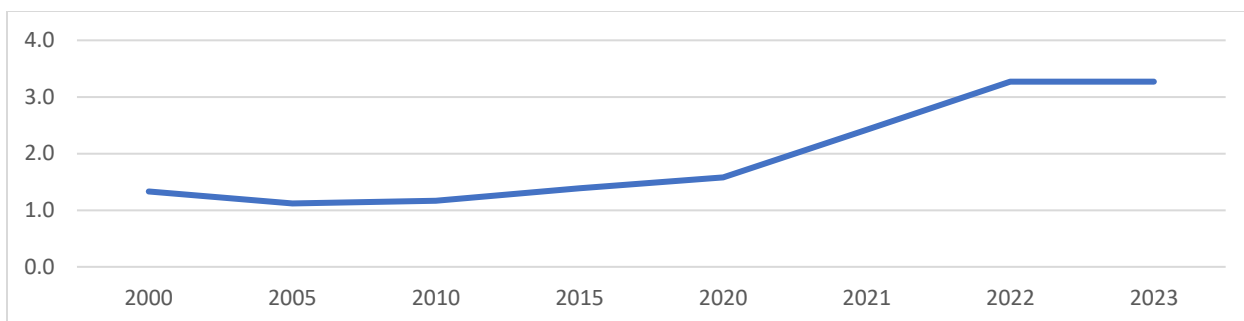


FIGURE 2-9 PESTICIDE USE IN MOLDOVA IN KG PER HA OF CROPLAND

Source: FAOstat (2025)

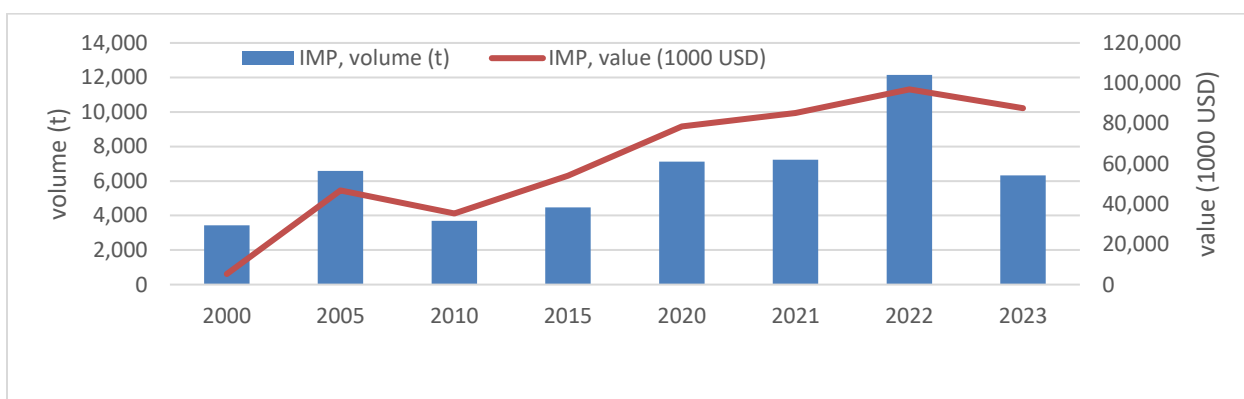


FIGURE 2-10 VOLUME AND VALUE OF PESTICIDE IMPORTS IN MOLDOVA

Source: FAOstat (2025)

The fertilizers used in maize cultivation include a wide range of products, from bulk nitrogen fertilizers such as ammonium nitrate and urea to complex NPK fertilizers and micronutrient products. Most fertilizers are applied using farmers' own machinery, indicating a relatively high level of mechanization among agricultural enterprises and larger peasant farms. Prices vary significantly depending on the type of fertilizer. Commodity fertilizers such as ammonium nitrate are typically priced between 9 and 14 MDL/kg, while specialized micronutrient fertilizers may exceed 512 MDL/kg. This difference reflects the distinction between standard bulk fertilizers and high-value specialty inputs used for improving crop performance. Most fertilizers used are nitrogen-based or balanced NPK formulations, highlighting the high nutrient demand of maize crops. Ammonium nitrate and urea (46% nitrogen) are among the most frequently used products, with application rates typically ranging from 80 to 120 kg/ha. Complex fertilizers such as diammonium phosphate and nitroamophos are also commonly applied.

Russia remains one of the most frequent countries of origin for fertilizers, followed by Uzbekistan, Romania, and several European Union countries. This distribution reflects both historical supply chains and geographical proximity. However, the strong reliance on imported inputs may create supply risks, particularly in the context of geopolitical instability. Table 2-11 presents information on fertilizers, type, quantity, price and country of import. The data were obtained from the survey conducted.

TABLE 2-12 MOSTLY MENTIONED FERTILISERS, THEIR DOSES AND PRICES SOLD TO FARMERS BY INPUT PROVIDERS.

Fertiliser name, type	Dose (kg/ha)	Price range MDL/kg (2022)	Price range MDL/kg (2023)	Country of origin
Ammonium nitrate	80 - 120	8.5 - 21	9 - 11	Russia / EU
Urea 46%	105	7 - 17.7	13 - 14	Russia / Uzbekistan / Romania
NPK	80 - 90	221	10.7 - 13	Moldova / Russia
Amofos (N:P 12:52)	75	13.5	14.5	Russia
Bombardier	1.8	80.1	84.5	Spain
Cellerate MoZn	0.5	495	512	Uzbekistan
Diamofosca 10.26.26	47.5	14.8	15.51	Russia
Harbest	11.68	48	50	Uzbekistan
Harvest Tech 20-20-20	7	48	49	Uzbekistan
Nitroamofos NPK	60	11 - 12	11 - 12	Ukraine
Nitroplus	3.25	47.5	49.23	Romania
Starter Mn Platinum	0.9	118	122	Uzbekistan
Diamofos 10-26-26	115	12	15	Russia
Dr Green Porumb/ Kukurydza	1	0	130	Europe

Source: Survey among farmers

Regarding seed use, the data reflects actual inputs used by Moldovan farmers and agricultural enterprises, highlighting a mix of local, regional, and international seed brands. Prices range widely from 17 MDL (Pioneer LE 25) to 200 MDL (SUM305), with most varieties clustered between 20–50 MDL, indicating significant cost variation driven by origin, brand, and technological package.

Most maize hybrids cultivated in the Republic of Moldova are grain hybrids primarily used for animal feed. However, depending on quality parameters and market demand, maize grain may also be processed for human consumption (e.g., cornmeal or other processed products). Only certain maize types, such as sweet corn or flint maize, are specifically bred for direct human consumption.

Overall, the Moldovan-origin seeds dominate the list. These are priced competitively, mostly between 17 and 27 MDL/Kg, and are applied using own technology (except P-461 and Pioneer, which use service). This reflects strong reliance on the Porumbeni Institute and local breeding programs, which prioritize adaptation to Moldova's climate – particularly drought-prone conditions in the south. Recommended doses for local hybrids range from 20 to 35 kg/ha, with Kavalier requiring the highest at 35 kg/ha. At the same time, European and U.S. brands command higher prices and reflect access to advanced genetics. French (Alexandra, LG P9889 2023hu), American (Corteva P 9889, P 9610), Romanian (SUM305, KVS Oltenio), and other European (GW 90003, Paparazzi) varieties are priced from 98.89 MDL (Alexandra) to 200 MDL (SUM305) – up to 10 times more than local options. Despite high costs, these are used with own technology, suggesting farmers have the machinery and expertise to maximize their potential.

The quality of seeds is also clearly reflected in import prices. On the local market, domestically produced seeds are sold for approximately 17 – 27 MDL/kg, while export prices range between 40 and 50 MDL/kg. In contrast, import prices are significantly higher, averaging around 90–100 MDL/kg (see HS code 100510, UN Comtrade).

Only two varieties – P-461 and Pioneer (both Moldovan) – are applied via service technology, meaning farmers hire external contractors for seeding, likely due to lack of precision planters or capital for equipment. All others use own technology, indicating that most maize-growing enterprises and larger peasant farms in Moldova have invested in their own seeding machinery. This split highlights a technology adoption gradient: smallholders may rely on services, while medium-to-large farms internalize operations to control quality and timing, especially critical under variable rainfall.

TABLE 2-13. MOSTLY MENTIONED SEED TYPES, THEIR DOSES AND PRICES SOLD TO FARMERS BY INPUT PROVIDERS.

Maize type	Dose (kg, per ha / seeds per ha)	Price 2023 (MDL per Kg)	Technology (Own/service)	Country of origin
Porumbeni 461	20	27	Own	Moldova
Pioneer LE 25	21	17	Own	Moldova
Porumbeni 458	22	25	Own	Moldova
Pioneer 9889	26	30	Own	Hungary
Adevey	22	23	Own	Italy
LG30389	21	23	Own	Moldova
P-461	25	25,5	Service	Moldova
Pioneer	22	23,3	Service	Moldova
Alexandra	20	98,89	Own	France
LG P9889 2023hu	15	46	Own	France
BC323	15	21	Own	Croatia
Kavalier	35	129	Own	Moldova
SUM305	20	200	Own	Romania
Corteva P 9889	20	125,28	Own	USA
Corteva P 9610	20	120,9	Own	USA
KVS Oltenio	25	117,8	Own	Romania
GW 90003	25	170	Own	Europe
Paparazzi	20	180	Own	Europe

Source: Survey among farmers



In the Republic of Moldova, corn hybrids created by the Public Institution "National Center for Seed Research and Production" (e.g. Porumbeni 427, 461, 310), known for their resistance to drought and drought, are mainly grown. Intensive hybrids from international companies (LG Seeds, DKC) are also popular. Hybrids adapted for grain and silage are used, with various ripening periods, able to withstand water stress.

The Institute for Testing and Registration of Varieties in Bucharest (ISTIS) has introduced three corn hybrids from the Institute of Plant Breeding "Porumbeni" into the State Register of Romania: Porumbeni 461 (FAO 460), Porumbeni 427 (FAO450) and Porumbeni 310. Thanks to this research, the Republic of Moldova will also be able to promote and market the seeds in the European Union. (Table 2-12)

The seed rate for maize hybrids is approximately 15-30 kg/ha, adapted according to the desired density and MMB (1000-grain weight). The manufacturer recommends a seeding density

adjusted to the crop conditions (non-irrigated/irrigated) to maximize the production potential of this hybrid (12-13 t/ha) (Table 2-13).

TABLE 2-14. THE STRUCTURE OF INPUTS PER 1 HECTARE OF MAIZE

Inputs	MIN	MAX	Share in fin accounts
Fuels	400	3,000	~15%
Seeds	300	4,500	~12%
Fertilizers	0	4,000	~11%
Foliar protection and fertilization	500	1,500	~10%
Unforeseen expenses (5-10%)	496		

Source: Survey among farmers

The cost structure of maize production indicates a moderate-intensity technology level. Fuels is important costs item ranging to about 15% in costs. Seeds represent approximately 12% of total input costs, which corresponds to the use of certified hybrid seeds and reflects a balance between genetic performance and production cost.

Fertilizers represent around 11% of total costs, making them the most important input category. This is typical for maize production, a crop with high nutrient requirements.

Plant protection products and foliar fertilizers account for approximately 10% of input costs, indicating the application of standard phytosanitary treatments.

Overall, the analysed data suggest that maize production technology in Moldova is generally based on an economically balanced input structure. The cost distribution indicates an average but efficient technological level that allows farmers to obtain stable yields under normal agro-climatic conditions.

The analysed inputs represent approximately 48% of the total estimated production costs per hectare. The remaining costs are associated with mechanized operations, other costs and services, labour, and machinery depreciation. Unforeseen expenses typically fall within the recommended range of 5–10%, representing a prudent financial buffer to cover price fluctuations, additional treatments, or minor operational losses.

2.4.4. Traders

The Republic of Moldova has maintained a consistent position as a net exporter of maize (corn) throughout the decade 2015–2024. Thus, export values exhibited strong overall growth accompanied by pronounced volatility. From a base of 43.9 million USD in 2015, exports rose steadily to 125.2 million USD in 2019. A temporary contraction occurred in 2020 (79.5 million USD), followed by recovery and an exceptional surge in 2022, when exports reached a record 339.8 million USD – more than double the previous peak. Subsequent years saw a sharp correction: 144.1 million USD in 2023 and 66.6 million USD in 2024, the lowest level since 2017. The ten-year average export value stood at approximately 118.0 million USD.

Import volumes remained comparatively modest, averaging 20.3 million USD annually. Imports grew gradually from 8.0 million USD in 2015 to a peak of 45.4 million USD in 2022, before declining to 19.0 million USD in 2024. The relatively low import dependence reflects Moldova’s domestic production capacity, with imports primarily serving as supplementary supply during poor harvest years or for specific quality/seed requirements.

The trade balance remained strongly positive in every year, confirming Moldova’s structural role as a net maize exporter. The surplus averaged 97.7 million USD annually, reaching its maximum of 294.4 million USD in 2022 and falling to 47.6 million USD in 2024. The balance closely mirrored export fluctuations, underscoring that export performance, rather than import levels, drives the overall trade outcome.

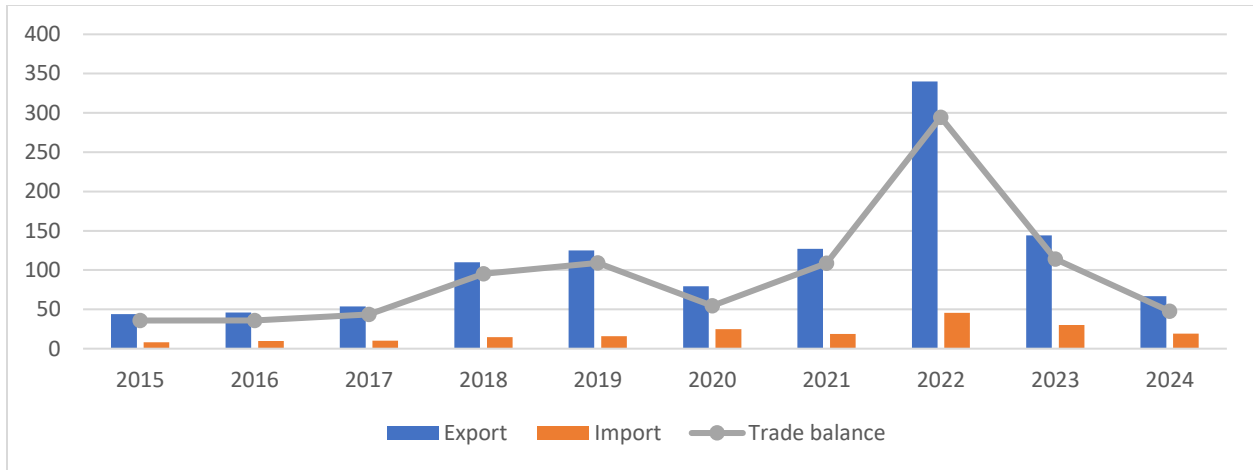


FIGURE 2-11. FOREIGN TRADE WITH MAIZE (HS 1005), 2015 - 2024, MIL. USD
Source: UN Comtrade database

Import prices of maize (figure 2-12) in the Republic of Moldova were consistently higher than export prices over the period 2015–2024, indicating a persistent price gap. Import prices exhibited significant volatility, with notable peaks in 2017 and 2019 (around 0.52 USD/kg) and reaching the highest level in 2024 at approximately 0.59 USD/kg. In contrast, export prices remained relatively stable, fluctuating within a narrower range of 0.15–0.28 USD/kg, with a modest peak in 2022. The gap between import and export prices widened particularly in years of import price spikes, reflecting asymmetric market dynamics. Both import and export prices declined in 2020–2021 before recovering in subsequent years. Overall, the data suggest that while export prices follow a relatively steady trend, import prices are more sensitive to external market conditions, leading to increasing price disparities in recent years.

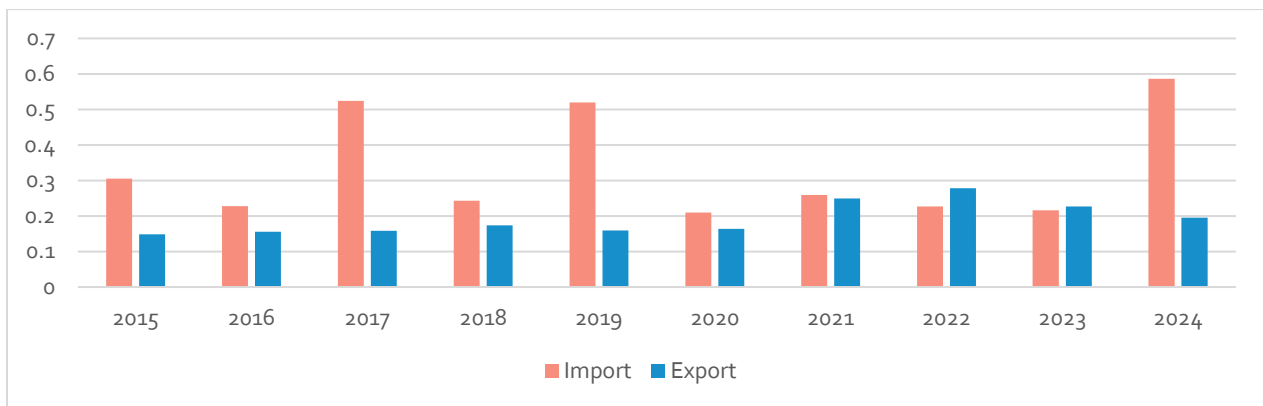


FIGURE 2-12. AVERAGE IMPORT AND EXPORT PRICE OF MAIZE (HS 100590), REPUBLIC OF MOLDOVA, USD/KG
Source: UN Comtrade database

2.4.5. Maize milling

The maize milling industry in terms of foreign trade registers continuously increasing imports and fluctuating exports. Import prices averaged for approximately 0.40 USD/kg in 2024 (458.2 thousand USD for 1142 thousand kg), while export prices, although minimal in volume reached 1 USD/kg, because of the small-scale trade. The trends from 2016–2024 suggest gradual increases for mostly imports, driven by the demand for fortified and gluten-free flours. The limited domestic milling capacity keeps export volumes on the low side, stabilizing prices on the one hand, but not elevating them. This dynamic is benefit mostly for urban consumers due to affordable

staples but puts a pressure on rural households due to higher costs for processing. Enhancing local processing could add somewhere between 20–50% value to raw exports, improving the overall trade balance.

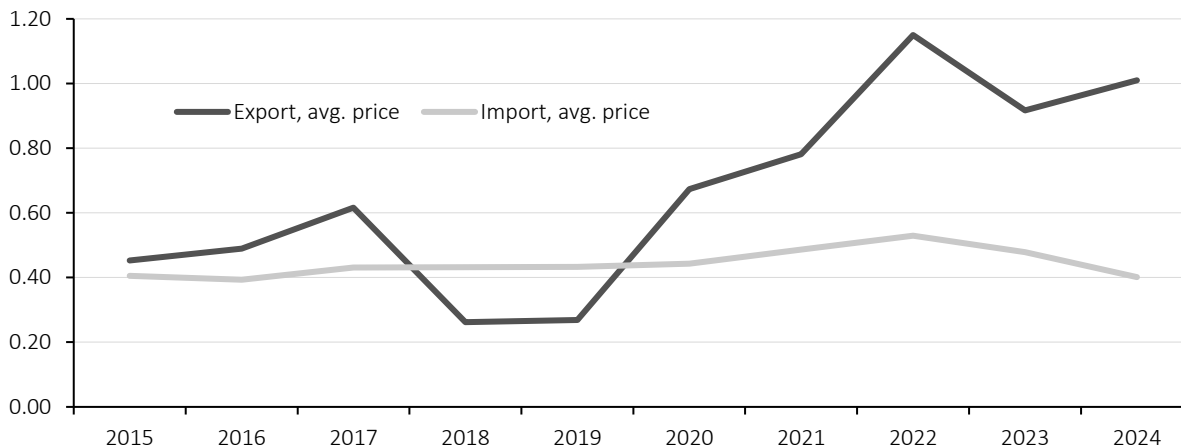


FIGURE 2-13. AVERAGE IMPORT AND EXPORT PRICE OF MAIZE FLOUR (HS 110220), REPUBLIC OF MOLDOVA, USD/KG. Source: UN Comtrade database

Republic of Moldova has a minor role in trade with maize flour, with an obvious domination of imports and almost negligible exports. The key import partners in 2023 included Ukraine, Romania, Italy and Turkey, this trend persisting also in 2024. As for exports, in 2023 Moldova exported in Ukraine, Germany and France, while in 2024 Romania was added among these partners. In general terms, the proximity to Black Sea suppliers such as Ukraine and Romania lower logistics costs for imports, while the limited export capacity is caused by the small-scale milling industry present in households or peasant farms. At the same time, the heavy import reliance ensures supply for food industries and consumption of the population, but, at the same time, exposes Moldova to regional price shocks.

TABLE 2-15. IMPORT AND EXPORT DESTINATIONS FOR MOLDOVA MAIZE FLOUR (HS 110220), 2023 – 2024

Export	Quantity (tonnes)		Average price (USD/kg)		Import	Quantity (tonnes)		Average price (USD/kg)	
	2023	2024	2023	2024		2023	2024	2023	2024
Ukraine	0,58	4,50	0,66	1,01	Ukraine	449,7	802,7	0,35	0,29
Romania	0,00	0,43	0,00	1,04	Romania	241,3	322,2	0,62	0,58
France	0,01	0,04	1,50	0,68	Italy	12,6	17,7	2,27	2,29
Germany	0,81	0,00	1,09	0,00	Turkey	0,0	0,0	2,33	0,00
World	1,4	4,97	0,92	1,01	World	703,7	1 142,6	0,48	0,40

Source: UN Comtrade database



FIGURE 2-14 FROM THE LEFT: LOCAL MAIZE FLOUR, AGRICULTURAL MARKET IN CHISINAU, IMPORTED MAIZE FLOUR, MOLDOVA 2025.

Ethanol production

One of the largest branches of the food industry in the Republic of Moldova, which uses cereals as raw materials, including maize, is the alcohol industry. Several modern and efficient factories have been built in the Republic of Moldova, which produce high-quality luxury-class ethyl alcohol. If we analyse the data from the last 3 years, we can see that the export from 2021 to 2023 amounted to over 121 million liters of ethyl alcohol and over 60 thousand tons of DDGS, which is equivalent to almost 111 million euros. **Because the sector is rather complex and not much information is available, the sector was not included in the VC modelling.**

TABLE 2-16 ETHANOL EXPORT, MOLDOVA, 2022-2025

		jul. 21- jun. 22	jul. 22- jun. 23	jul. 23- jun. 24	jul. 24- jun. 25	Season average
Ethanol	Quantity, liters	47,079	35,487	36,893	36,924	40,000
	Avg.price, lei/kg	15,32	18,42	12,36	14,08	15,05
	Amount, thous. lei	721,126	653,546	456,101	520,039	602,000
DDGS	Quantity, liters	24,821	16,024	20,990	22,688	21,000
	Avg.price, lei/kg	4,89	4,89	3,74	4,16	4,42
	Amount, thous. lei	121,444	78,330	78,574	94,277	92,820
Total	Total, thous. lei	842,570	731,876	534,675	614,316	694,820

Source: Iurie Rija

Virtually all large production units in this branch in the Republic of Moldova are designed to make the most of available resources - these are high-tech production platforms, energy-efficient systems with a closed production cycle, in which waste forms new types of products.

In particular, some producers have adopted the method of drying residues resulting from the production of alcohol in the manufacture of DDGS (Dried Distillers Grains with Solubles) - a product of deep grain processing, rich in minerals, proteins and vitamin complexes, effectively used as a food supplement in animal husbandry.

Other producers have chosen a different path - biogas production, in which the process of transforming the wort takes place through anaerobic fermentation. The released methane is collected in gasometers, cleaned and used for the enterprise's own needs as an energy source. These solutions have the effect of increasing competitiveness on international markets, and given the large capacities of production units, it should be noted that approximately 99% of all ethyl alcohol produced in the Republic of Moldova is exported to countries in Europe and Asia.

At the state level, there is also a positive impact - the country exports products with significant added value. For example, the production of exported ethanol requires a quantity of 327 thousand tons of grain, which, recalculated in export prices for that period, would be worth to the national economy - 75.5 million euros.

2.5. Flow chart

The flowchart illustrates the main movements of the commodity, from production (on the left side) to utilization and export (on the right side). Production is divided among smallholders, peasant farms, agricultural enterprises, no-till production systems, and organic production. Total national production of maize in 2023 is estimated at approximately 1.3 million tonnes. This production is distributed among landowners, milling (both industrial and local service-based), the feed sector, and exports.

The chart also presents key indicators such as volumes, prices, and yields. In addition, it highlights the supply of seed materials, which are sourced both locally (about 60%) and through imports (about 40%).

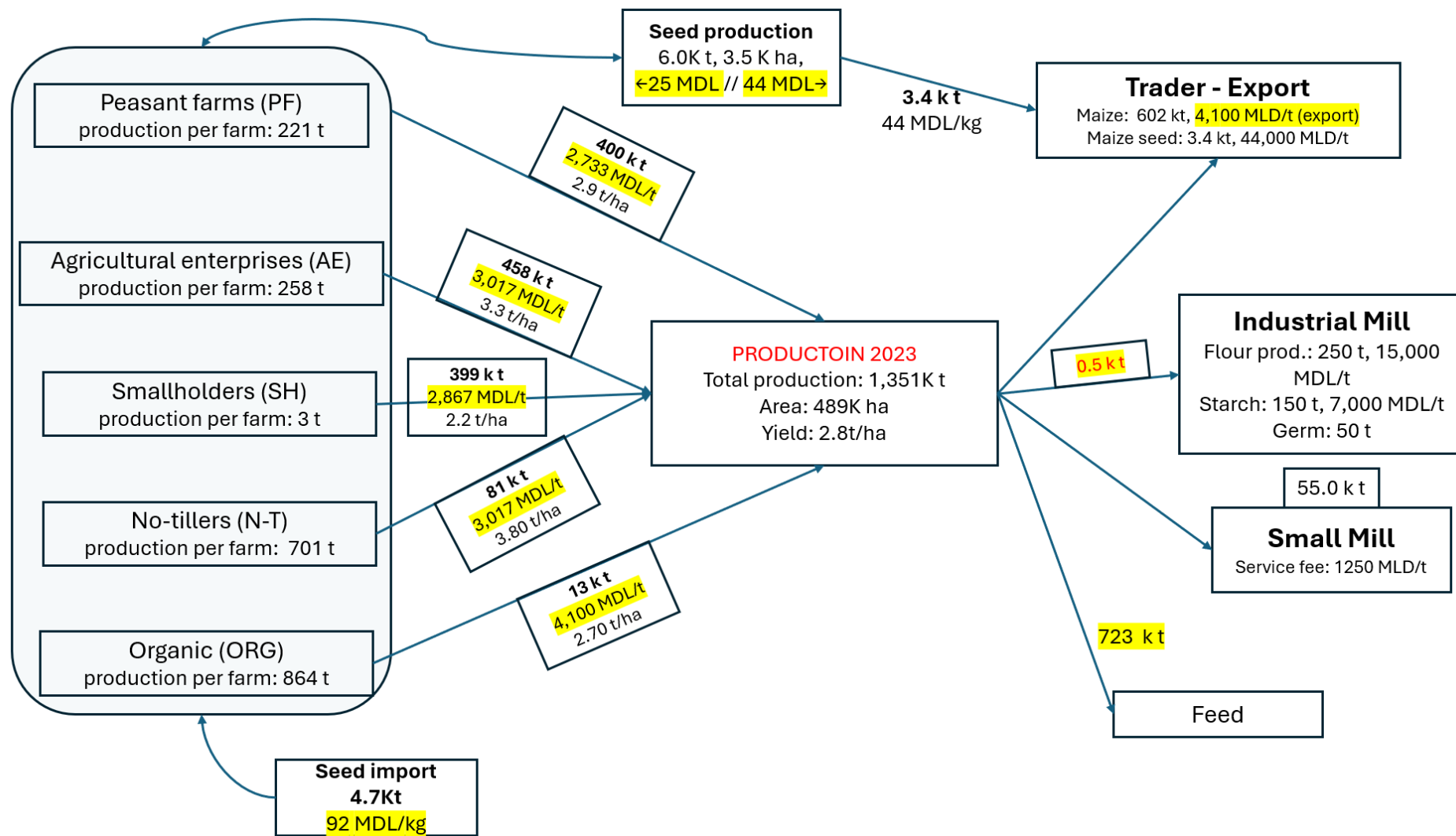


FIGURE 2-15 MAIZE FLOW CHART OF MOLDOVA, 2023

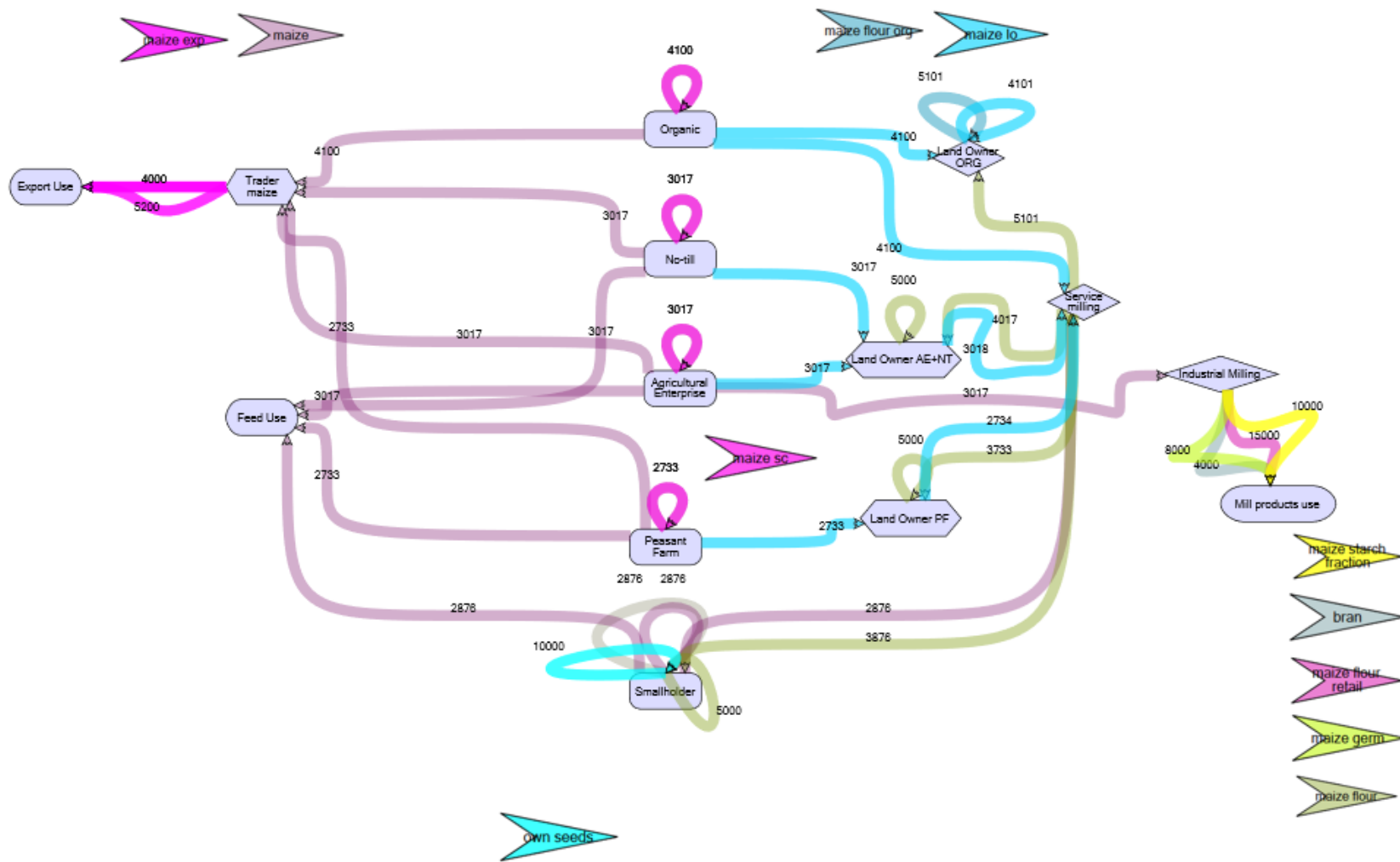


Figure 2-15. Detailed maize flow chart of Moldova (with indicated prices MDL/tonne), 2023

2.6. Governance

2.6.1. Institutional landscape along the chain

- **Ministry of Agriculture and Food Industry (MAFI)** – policy design and implementation for agriculture, food industry and rural development; oversight of research, education, irrigation and sustainable soil management.
- **Agency for Intervention and Payments in Agriculture (AIPA)** – national paying agency that administers Moldova’s National Fund for Agriculture and Rural Development (FNDAMR/NARDF) and implements donor-financed measures; leads project-level monitoring and evaluation (M&E).
- **National Food Safety Agency (ANSA)** – food safety, veterinary, plant health, seed control, feed and consumer protection **across the whole chain**.
- **State Hydrometeorological Service (SHS)** – drought/early-warning services and agrometeorology; Special Service of Hydrometeorology and Active Influence on Atmospheric Phenomena protects crops against hail.
- **Agency for Land Relations and Cadastre; Apele Moldovei** – land administration/soil protection and hydro-improvement/irrigation programs.
- **State Commission for Variety Testing; State Inspectorate “Intehagro”** – seed/variety approval and machinery/operator certification.
- **Local Action Groups (LAGs)** – community-led LEADER structures increasingly financed from the national fund to implement local development strategies affecting rural services and logistics.
- **Development partners** – EU, World Bank, IFAD, FAO, USAID and others support policy implementation, institutional capacity and investments.
- **Research institutions:** Public Institution "National Center for Seed Research and Production"; Technical University of Moldova (UTM); Institute of Genetics, Physiology and Plant Protection (IGFPP, SUM)
- **Banks:** Joint-Stock Commercial Bank "EXIMBANK"; MAIB; Commercial Bank "Moldindconbank" JS; etc.

Access to finance is a crucial factor shaping the development of Moldovan agriculture, yet the frequency and ease with which farmers borrow remain uneven across farm sizes and subsectors. Larger and more formalized producers, particularly those engaged in cereal cultivation, have relatively wide access to bank financing. One of the country’s largest agricultural banks reports that agriculture accounts for more than one-third of its total loan portfolio, with thousands of outstanding loans directed to crop producers. Within this group, cereal growers alone account for many agricultural loans, representing close to two-thirds of the value of agricultural lending. In recent years, data for cereal-producer loans indicate a contraction in both the number of loans and the average loan size. The number of loans decreased steadily from 2022 to 2024, while the average loan amount fell from approximately 0.57 million lei in 2022 to 0.53 million lei in 2024. This means that not only are fewer loans being issued to cereal producers, but individual loans are also becoming smaller in value. From the most recent data available for 2025, this downward trend appears to be continuing. This decline is partially driven by deteriorating financial condition of farms, which has reduced their capacity to service debt and limited their ability to qualify for new financing. Seasonal borrowing remains important, as banks continue to align repayment schedules and grace periods with harvest cycles. Access to finance, particularly bank loans, presents considerable challenges for small farmers. In addition, external resources channelled through international development programmes play an important role in supplementing domestic bank funds, ensuring longer maturities and somewhat lower interest rates for agricultural investment loans.

Overall, agriculture accounts for a modest share of total lending in the financial system, typically no more than 7 to 8 percent of all outstanding loans in recent years. However, within the sector itself, the prevalence of credit is relatively high among medium and large farms, with many enterprises taking on several loans per year. Smaller producers, including family farms and backyard operations, participate far less in the credit market. Limited collateral, weak formal accounting, and reliance on cash-based transactions continue to restrict their access, leaving them more dependent on remittances and self-financing.

An important role in bridging this gap is played by non-bank credit institutions, which have expanded rapidly in rural areas. Institutions such as microfinance companies provide loans to more farmers every year, including those who may not qualify for traditional bank credit. These organizations often have simpler procedures, faster approvals, and more flexible collateral requirements, which make them attractive for small and medium-sized farms needing quick access to seasonal financing. Savings and credit associations also contribute to this ecosystem, pooling local resources to meet the working capital needs of their members. While the scale of lending by non-bank institutions remains smaller than that of banks, their outreach has grown steadily, making them an increasingly important source of credit for rural households and agricultural producers.

International initiatives play an equally vital role. Credit lines supported by the International Fund for Agricultural Development, the World Bank's Rural Investment and Services Project, and joint schemes with European and German development banks continue to channel dedicated resources to agriculture. These facilities often combine loans with grant elements, technical assistance, and more favourable repayment terms, targeting especially small and medium-sized producers. Recent operations under the Capacity Enhancement for Rural Transformation Project have extended credit and grants to youth and women farmers, with average agro-production loans close to EUR 90,000. In addition, some banks have developed tailored agricultural products, such as seasonal loans with grace periods of up to eight months or credit lines of up to 2.5 million lei without collateral, to better match the financing cycle of crop production. Together, these programmes supplement domestic bank funds, provide longer maturities, and lower effective interest rates, helping sustain investment in the sector even during periods of tighter financial conditions. Despite their rare involvement in the maize value chain, women farmers can access financial resources and training provided by farmer associations. These associations, supported by international organizations, implement projects designed to enhance rural farmers' access to finance and machinery.

The frequency of borrowing is also shaped by the macroeconomic environment. During 2024, interest rates on new loans declined significantly, stimulating an increase in credit volumes, with new disbursements across the economy exceeding 5 billion lei in a single month. By early 2025, however, the central bank raised policy rates, which began to increase borrowing costs again. To ease these fluctuations, national programmes have subsidized interest payments and provided partial guarantees, reducing effective rates for investment loans and encouraging banks and non-bank lenders alike to expand lending to farmers.

National Agricultural Policy

The national agricultural policy of the Republic of Moldova is coordinated by the Ministry of Agriculture and Food Industry (MAIA) and implemented through the Agricultural Intervention and Payments Agency (AIPA). The current strategic framework is defined by a set of documents and programs that aim to modernize the agricultural sector, sustainable development of the rural environment and alignment with European Union standards. The National Strategy for Agricultural and Rural Development (NSARD) 2023–2030 represents the main pillar of agricultural policy. It aims to modernize agriculture, reduce poverty in rural areas and increase economic and environmental sustainability. The strategy promotes the transition to a resilient, competitive and ecological agriculture, in line with the principles of the European Green Deal. An essential implementation tool is the National Program for Subsidies to Agriculture and Rural Environment, managed by AIPA. Through this program, farmers benefit from financial support for investments in machinery, irrigation systems, post-harvest infrastructure and conversion to organic farming. The National Food Safety Strategy 2023–2030 aims to harmonize phytosanitary and veterinary standards with EU regulations, strengthening the competitiveness of agri-food exports and the safety of domestic consumers. Current policy instruments include: subsidies (grants and direct payments per area or head of animal), post-investment and advance support for agricultural start-ups, as well as financing the purchase of agricultural machinery, anti-freeze and anti-hail systems, small irrigation, rural infrastructure and farm modernization. Recent national policies reflect a clear orientation towards the values and objectives of the European Union: sustainability, rural development, environmental protection and adaptation to climate change. The reforms announced for 2025 are based on the model of the Common Agricultural Policy (CAP), aiming for greater predictability, transparency and fairness in the allocation of financial support. At the same time, sectoral

consultations, adaptation of secondary legislation and technical cooperation projects with European partners demonstrate Moldova's commitment to full institutional alignment with EU standards. The extension service under the ministry is relatively newly established and at this stage it has minimal influence of the development of maize value chain.

Legal and regulatory instruments shaping maize production

A subsidy framework under Law 71/2023 (with further changes) is implemented via Government Decisions for: investment subsidies (GD 491/2023), direct payments (GD 492/2023), advanced payments (GD 465/2023), complementary subsidies (GD 464/2023), LEADER (GD 277/2022), and land-improvement subsidies (GD 985/2020). Eligible applicants include farmers (micro- to large), LAGs, research/education bodies and local authorities, subject to transparency and fiscal compliance conditions. For the maize chain specifically, relevant investment windows include:

- SP_2.8 – Plant sector processing/marketing infrastructure: financing for cereal conditioning, drying, storage, and packaging; up to 50% of eligible costs (≤ 7.0 million MDL per beneficiary).
- SP_2.10 – Tillage technologies: 25–35% for tractors/combines (higher for young/"GT" farmers), 50% for soil-conservation equipment and crop-protection drones (set ceilings).
- SP_2.2 – Irrigation systems & equipment and SP_2.3 – Water storage basins: 50% for farmers and 75% for Water Users' Associations (AUAI), with annual ceilings; renewable-energy components are eligible.

Targeted top-ups increase authorization amounts for young/women farmers and returned migrants (+10%); for domestic machinery (+20%); and for Producer Groups (GP)/Entrepreneurs' Cooperatives (CI) (+25%). NFSA regulates feed/food safety, plant health and seeds. Moldova is progressively approximating EU acquis, including sanitary-phytosanitary (SPS) measures and organics. Recent steps include the Organic Production Law 237/2023 (partially harmonized with EU Regulation 2018/848) and GD 253/2024, transposing key EU acts on organic rules and inputs. NSARD calls for an Integrated Agricultural Information System, a national agromarketing centre, farmer cooperation, and hubs/clusters – measures that directly address price discovery, logistics and bargaining power for cereals.

Governance priorities for 2025–2030

1. Professionalize aggregation and storage for maize. Use SP_2.8 to co-finance dryers, cleaners, silos, and quality-testing at the cooperative/cluster level; apply top-ups for Producer Groups/Cooperatives (+25%) and for young/women farmers (+10%).
2. Scale water security in maize zones. Prioritize SP_2.2/2.3 for sprinkler/drip systems and farm/community reservoirs; favour AUAI (75%) where feasible to spread operation and maintenance costs.
3. Accelerate land consolidation pilots around grain clusters. Pair consolidation with shared machinery, conservation tillage (SP_2.10) and precision tech (drones) to stabilize yields and cut costs.
4. Institutionalize price transparency. Stand up the Integrated Agricultural Information System and the National Agromarketing Centre to publish weekly farm-gate/wholesale/retail cereal prices and logistics indices; link to NFSA quality grades.
5. Tighten risk governance. Update drought-loss protocols for smallholder inclusion, expand early-warning from SHS into operational advisory, and pre-define relief triggers to avoid ad-hoc decision making.
6. Keep closing the SPS gap. Resource NFSA and labs to EU-compliant cereal testing; consolidate the 2023–2024 organics/legal advances into practice (inspection, certification, lab methods).
7. Embed bottom-up planning. Use LEADER to co-finance local grain logistics (feeder roads, weighing points, drying nodes) identified in LAG strategies.
8. Measure what matters. Track NSARD result indicators most relevant to maize (irrigated share; soil-conservation area; storage capacity; quality-certified producers) in MAFI/AIPA's public dashboards.

The role of local leaders

National strategies like NSARD 2030 set ambitious goals, but their impact hinges on feedback loops from local leaders, associations, and cooperatives. Policies on irrigation, storage, and subsidies need to be communicated through these local intermediaries who translate bureaucratic language into actionable decisions for farmers. This is especially evident in Moldova, where local leaders emerged from land consolidation reforms in the 1990s,

having important roles in rural communities. These entrepreneurs consolidated fragmented agricultural land into larger plots, usually by renting or purchasing land from rural residents. These leaders have become the main economic drivers in rural areas, providing much of the investment in modern machinery, storage, and production practices. They are also key beneficiaries of government subsidies, due to their larger farm structures and higher formalization levels. From a governance perspective, these leaders are not only farmers but de facto coordinators of the local agricultural economy. They aggregate land, mobilize capital, and connect local production with markets. However, this also concentrates economic power and public support in their hands. These leaders frequently contribute to community development beyond their primary roles, actively participating in efforts such as reforestation and infrastructure improvements, either by providing funding or through lobbying municipal and central governments.

2.7. SWOT ANALYSIS

TABLE 2-17. SWOT ANALYSIS FOR MAIZE, MOLDOVA, 2023

Strengths	Weaknesses
<ol style="list-style-type: none"> 1. Maize is a well-established strategic crop in Moldova 2. Strong domestic self-sufficiency and export surplus 3. Presence of mechanised medium and large agricultural enterprises 4. Secure land tenure and stable lease arrangements 5. Community embeddedness and contribution to rural food security 6. Growing adoption of conservation agriculture (especially no-till) 	<ol style="list-style-type: none"> 1. Extreme dependence on rainfall and near-absence of irrigation infrastructure 2. Fragmented land structure and large number of small farms 3. Low productivity compared with EU benchmarks 4. Ageing agricultural workforce and weak generational renewal 5. Limited market transparency, weak producer cooperation, and weak bargaining power of small producers 6. Dependence on input suppliers and limited access to finance and risk-management tools
Opportunities	Threats
<ol style="list-style-type: none"> 1. EU accession process and access to modernization funds. 2. Expansion of climate-smart, digital, and precision agriculture. 3. Expansion of irrigation and water-management investments. 4. Strengthening producer organizations, cooperatives, and collective action. 5. Investment in rural human capital, vocational training, and generational renewal. 6. Growing demand for sustainable, traceable, certified, and organic agricultural products in EU markets. 	<ol style="list-style-type: none"> 1. Increasing frequency and severity of droughts and climate extremes 2. Land degradation, soil erosion, and declining soil fertility 3. Global price volatility and unstable commodity markets 4. Geopolitical disruptions affecting trade, logistics, and input supply chains 5. Continued rural depopulation, migration, and labour shortages 6. Dependence on imported fertilizers, seeds, and other agricultural inputs

TABLE 2-18. SURVEY RESULTS FOR MAIZE, MOLDOVA, 2023

Rank	Problem	Frequency	% of Respondents (n=33)
1	Drought / Climate Change	18	54.5%
2	High input costs (fuel, fertilizers, seeds)	12	36.4%
3	Low maize prices at harvest	8	24.2%
4	Poor seed quality / lack of adapted varieties	7	21.2%
5	Lack of irrigation infrastructure	6	18.2%

A comprehensive inventory of constraints reveals 22 distinct problem categories. The most prevalent concern, cited by 18 of the 33 respondents (54.5 %), centres on climatic stressors, with the term “drought” appearing explicitly in 13 entries and “climate change” in eight. Respondents articulate drought not merely as a meteorological anomaly but as a systemic threat capable of “compromising the entire harvest” or inducing “persistent” multi-year impacts. Secondary climatic manifestations include late-spring frosts, excessive rainfall, and storm events, each noted in two responses.

Economic pressures constitute the second-most salient domain. High input costs – encompassing diesel fuel, fertilizers, plant-protection products, and seed – are flagged by 12 respondents (36.4 %). Fuel price volatility is singled out in three separate statements, with one producer calculating that diesel now exceeds the harvest-time value of maize.

Low prices at sale emerge as a parallel grievance, mentioned explicitly in eight answers.

Infrastructure deficits are articulated in relation to water management. Nine respondents point to the absence of functional irrigation systems, while four call for the construction of water-storage basins. Soil-related limitations – low fertility, compaction, and moisture deficit – are raised in three entries, often in conjunction with calls for conservation tillage. Seed quality and varietal adaptation surface in seven responses; producers decry the scarcity of certified, drought-tolerant hybrids calibrated to southern Moldova’s pedo-climatic profile.

Detailed typology of proposed interventions

The solution space is equally diverse, yielding 19 discrete intervention types. Hydraulic infrastructure dominates: eight respondents advocate immediate investment in irrigation networks, and five propose reservoirs or accumulation basins. One producer couple reservoir construction with a national afforestation programme and the establishment of shelterbelts, thereby linking short-term water security to long-term micro-climatic regulation.

Financial instruments are the second-most recommended lever. Six respondents request per-hectare subsidies, three explicitly target diesel cost relief, and three others seek low-interest credit lines. Pre-harvest contracting emerges as a market-based risk-mitigation strategy in five cells; producers envisage binding agreements that lock in remunerative prices prior to harvest, thus insulating them from post-harvest price collapses.

Agronomic innovation features prominently. Five respondents urge the introduction of certified, drought-resistant hybrids, while four advocate for minimum or zero tillage combined with mulching to conserve soil moisture. Crop rotation is prescribed in three entries as a means of restoring soil structure and interrupting pest cycles. Two respondents emphasize the need for agrochemical soil testing to guide “rational fertilization,” signalling a shift from blanket applications toward precision nutrient management.

Institutional and policy reforms round out the portfolio. Cooperative formation is suggested twice as a mechanism to reduce intermediary margins, while state-mediated price floors are demanded in four responses. A niche but instructive subset of organic producers calls for official registration of EU-approved bio-inputs, media

campaigns to stimulate consumer demand for organic maize, and dedicated subsidy streams to offset elevated production costs.

Inter-linkages, contradictions, and scale effects

Cross-tabulation of problems and solutions reveals tight coupling between diagnosis and remedy. Every mention of drought is accompanied by at least one water-related solution, confirming internal coherence. Conversely, economic complaints rarely map onto technological fixes; high input costs are almost universally paired with calls for subsidies or price supports rather than productivity-enhancing innovations, suggesting a perception that structural market failures outweigh agronomic constraints.

A subtle tension surfaces between state absence and state overreach. Producers criticize governmental inaction in input markets and price formation yet simultaneously demand regulatory intervention to curb intermediary power and enforce minimum prices. This duality reflects a preference for an enabling rather than dirigiste state – one that corrects market failures without supplanting private initiative.

3. WHAT IS THE CONTRIBUTION OF THE VALUE CHAIN TO ECONOMIC GROWTH?

The economic analyses rely on the VCA4D methodological brief, which clearly outlines the objectives of the economic analyses and defines the main framing questions.

For the economic part, the data used comes from various resources.

- Moldovan statistical office (National Bureau of Statistics of the Republic of Moldova, NBS) and its information on national accounts, production quantities, average prices, and total maize production.
- Microdata provided by producers of maize from the statistical survey, which is conducted annually by NBS, among all farmers with the area of land greater than 10 hectares.
- The financial accounts of companies, which are made available through the platform of NBS at the Public Repository of Financial Statements
- Discussion with stakeholders, producers, and processing companies, made during 3 personal visits to Moldova.
- Survey conducted among farmers, which collected 165+81 surveys from 3 regions, aiming to target small farms (smallholder, backyard farms), pheasant farms (10ha and more), and agricultural enterprises (large farms). Among those, we collected 10+8 surveys of organic producers and no-till farmers.

The accounts for the maize farms are constructed based on the surveys conducted. Information from surveys, as well as from market consultations, has been used.

The costs, if applicable to the whole farm, have been recalculated based on the cultivation area of the main commodity.

The basic financial account was determined for one-hectare maize production at the farm level. For the processing industry, the accounts are created for one ton of input maize.

Financial accounts for other actors are based on secondary data, interviews, available financial reports, and I-O tables.

Depreciation is typically not reported separately in a company's financial statements, as it is embedded within the overall cost structure. Therefore, estimates were derived from Input-Output tables, applying average sectoral amortization rates. For agriculture, depreciation was estimated at 7% of the sector's value added, while for food milling, a rate of 5% was applied.

Land rent estimates were derived from survey responses on the share of leased land compensated in kind and in cash. Based on the quantities of products received by landowners, the real value of in-kind payments was calculated, providing an estimate of the per-hectare cost of land tenure.

3.1. Profitability & Sustainability of actors

The value chain concept is a systemic approach that has evolved over time, drawing inspiration from different disciplines. The scientific discussion of the vertical integration of production and distribution processes began in the 1960s. These concepts vary mainly in their focus on specific products or target markets, in the activity highlighted, and in the way they have been applied. However, the different concepts of the value chain tend to identify opportunities and constraints against productivity growth. A common definition presents the value chain as a mechanism that allows producers, processors, and traders - separated by time and space - to gradually add value to products and services as they move from one link in the chain to another, all the way to the final consumer (domestic or global). In a value chain, the main actors in the different segments become connected and, to some extent, coordinated.

The maize value chain involves several key actors and stages. Initially, agricultural input suppliers provide farmers with the necessary inputs for cultivation, such as **fertilizers, seeds, fuel and plant protection materials**. Farmers cultivate maize, using their primary resources: land, labour and capital. The harvested maize is then distributed to various actors within the sector, such as landowners, traders, industrial mills and feed producers. A certain amount of maize production is stored for on-farm consumption, mainly as animal feed. It should be noted that a large amount of maize is grown by households.

The value chain can be divided into **five main actors**, each with different levels of profitability and sustainability:

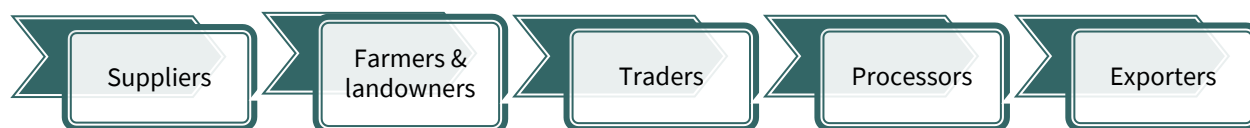


FIGURE 3-1 ACTORS OF MAIZE VALUE CHAIN, MOLDOVA

3.1.1. Agricultural input suppliers (providers)

In the Republic of Moldova, extension services are at an early stage. It is worth mentioning that, now, within the Technical University of Moldova, the process of initiating and developing extension services is taking place, through a project financed by the World Bank. This will strengthen cooperation between academia and practitioners, which is currently poorly developed. In the Republic of Moldova, farmers' advisory services on the products used are usually provided by agricultural input suppliers. They provide recommendations on the choice of varieties and hybrids of cereals and oilseeds, including corn and sunflower, as well as on crop technologies, fertilization doses and pest control strategies. However, these recommendations are often influenced by the commercial objectives of the suppliers and do not always reflect the long-term economic interests of farmers. Their influence is particularly visible in the regional distribution of seeds, fertilizers and plant protection products, especially for dominant crops such as wheat, maize and sunflower.

In the value chain, the role of input suppliers goes beyond simply supplying inputs. In some contractual arrangements, they also act as commercial intermediaries or direct traders. Typically, farmers are obliged to deliver their produce – often maize or sunflower seeds – at a pre-agreed price and within a pre-agreed deadline at the end of the farming season. These deliveries are used to repay so-called “technical credits” resulting from the early provision of certified seeds, fertilizers and plant protection products. According to discussions with farmers, delays in delivery are often sanctioned by penalties in the form of price reductions per tonne. In most cases, the output collected by input suppliers, especially maize and sunflower, is destined for export to international markets. Interviews indicate that input suppliers have considerable bargaining power. Farmers' options are limited, as a small number of companies control significant market shares for hybrid seeds, fertilizers and plant protection products. Farmers' precarious financial situation, exacerbated by poor agricultural years – particularly for drought-sensitive crops such as maize and sunflower – further reduces their ability to negotiate favourable contractual terms. Low yields and insufficient income can lead, in some cases, to the loss of agricultural land, which is transferred to input suppliers, some of whom become large landowners at the national level.

Fertilizers are an essential input and a major cost for all farmers, especially those growing maize and sunflower, crops with high nutrient requirements. Maize has high nutrient requirements, massively consuming essential elements to form a large biomass: approximately 2.5 kg N, 2 kg $(P_{2}O_{5})$ and 3 kg $(K_{2}O)$ are required for 100 kg of grains. Nitrogen (N) supports leaf growth, phosphorus (P) develops roots and fruiting, and potassium (K) ensures drought resistance.

3.1.2. Agricultural producers (farmers)

The economic importance of corn is shown by its great productive potential, the exceptional diversity of all products that can be obtained from the cultivation of this crop. According to the size of the sown areas and the volume of total production, corn ranks first among cereal crops. In the structure of the sown areas of cereals and legumes-grains, according to statistical data, corn constituted more than 50% of the total sown areas in the republic. The development of corn cultivation in the Republic of Moldova had a rapid pace, especially the technological level and selection, which contributed to the increase in the areas and volume of production. Farmers are the main actors in the corn production value chain in the Republic of Moldova. In the economic analysis process, all prices are linked to the reference year considered (2023).

Diesel prices were rounded to the nearest whole Moldovan leu per one Liter. **Seed** input prices varied across the farmers surveyed; therefore, only the price range is presented below. A similar situation applied to **fertilizers**. For analytical purposes, the exact values used were calculated as weighted averages of all survey responses, giving lower weights to small farmers who typically faced higher prices. **Electricity** prices were obtained from the NBS, showing that retail tariffs for households and small entities are higher than those for larger users. Since peasant farms (PF) generally operate as household farms, the higher retail tariff was applied. Electricity consumption was assumed for general agricultural operations, such as workshops, storage, drying and internal handling. Insurance is mandatory mainly for machinery used on public roads (tractors and combine harvesters). Since only a few farmers provided data on insurance, a uniform flat rate was applied to all farms. Organic certification, which is mandatory for organic producers, includes both initial and annual fees. Based on survey data, initial certification costs were estimated at approximately 58 lei/ha, while annual certification costs were on average 46 lei/ha. It should be noted that organic maize production in Moldova as well as the cultivation of maize using no-till technology is very insignificant. For this reason, analyses were not performed for this area, due to lack of data.

Labour costs are presented as ranges, with the values in brackets indicating those used in the calculations. For family labour, which is common on smaller farms, opportunity cost was applied - farmers were assigned a remuneration equivalent to what they could earn in an alternative job. For each officially employed worker, the employer is required to pay an additional percentage of income as a contribution to the social and health system. According to data from the NBS (2025), companies' labour costs are higher than the wages paid, as they also include social and health contributions.

TABLE 3-1 CONSIDERED PRICING FOR THE ECONOMIC ANALYSES, MOLDOVA, REF. YEAR 2023.

	Price (MDL)	Unit
Diesel	20	per litre
Seed inputs	20-25	per Kg
Fertilisers	10 - 18.5	per Kg
Plant protection	500 - 1,200	per Ha
Electricity (NBS, Enterprises / Individual users)	2.80 / 3.40	per kWh
Insurance as a flat rate	89	per Ha
Organic certification, which can reach several hundred euros per entity, is recalculated per hectare. (Initial / Annual certification)	58 / 46	per Ha
Labour		
- Technical staff (administration, accounting, management)	10,000-15,000 (12,500)	per month
- Mechanizers	11,000-15,000 (13,000)	per month
- Others (cleaning, cooking, others unqualified)	5,500 - 7,000 (6,300)	per month
Value of the land rent provided in kind or in cash	1,630 -2,700 ³	MDL / ha

Source: NBS (2025), surveys, and other relevant sources.

³ This value excludes the in-kind value of maize, only include in-kind value of other commodities provided to landowners. The maize is included in VC and material flows, hence presented price here is lower from what we received from the market.

Farm-level production is clear: the farm produces part of the corn, part for its own consumption and part for commercial use. Corn seed production in Moldova is a strategic sector, focused on high-performance hybrids and industrial processing. Companies such as the Seed Processing Factory in Răuțel and the National Center for Research and Production of Seeds play a key role. The sector includes testing parental forms, using modern herbicide technologies and processing to ensure high quality. Corn seeds are also imported (about 40% of local need). Subsidies are also considered in the financial account. Although subsidy programs are varied, it is necessary to mention that we asked farmers how much they received in the form of subsidies in the last five years and divided this amount between the hectares cultivated. This includes all the public money they received from the national paying agency, AIPA. The supports considered include investment support, support for the purchase of diesel and support for areas affected by natural disasters, among others.

The economic analysis of maize production cost (Table 3-2) in the Republic of Moldova for 2023 highlights a complex picture, characterized by significant regional differences and notable variations between peasant farms (PF), agricultural enterprise (AE), smallholders, organic producers and no-tillers. The assessment of value-added total costs and net profit per hectare reveals that economic performance is decisively influenced by the cost structure, the degree of capitalization and the efficiency of the use of production factors. First, the value added per hectare of maize is an essential indicator for understanding the real contribution of agricultural activity to income formation.

The production data reveals stark contrasts in yields, revenue streams, and market engagement across the five agricultural models. No-till farming achieves the highest physical yield at 3.80, translating to the highest total production value (11,465) alongside the highest subsidy support (880). In contrast, organic farming yields lower volumes (2.70) but compensates through a significant market premium, achieving a price of 4,100 MLD compared to the standard 2,733 to 3,017 range seen in other commercial categories. Smallholders operate on a fundamentally different paradigm; despite having the lowest yield (2.20) and receiving zero subsidies, their total production value (6,478 MLD) is mainly used for self-consumption, and small part of their yield delivered to the market.

The dominant component of costs is represented by consumables, especially fertilizers, protection chemicals, fuel, followed by labour costs and land rent. Standard commercial operations like Peasant farms and Agricultural Enterprises face heavy total costs (10,733 and 10,804, respectively), severely impacted by land rent (1,603 to 2,126) and high labour costs, which peak at 3,008 for Peasant farms. Alternative systems show radical shifts in expense distribution: No-till drastically reduces fuel costs to just 720 (less than half of the 1,440 spent by Agricultural Enterprises) but requires a doubled investment in plant protection (1,200). Conversely, organic farming eliminates plant protection costs (0) but incurs the sector's highest fuel expenses (1,940), highest rent (2,725), and unique certification fees (100), driving its total costs to 10,915. Smallholders bypass most of these financial burdens entirely, recording zero rent and minimal depreciation (95), resulting in the lowest total costs of just 5,863.

TABLE 3-2 PRODUCTION COSTS OF MAIZE AMONG FARMERS IN MOLDOVA, PER HA VALUES, 2023

Production	Smallholders	Peasant farms	Agri Enterprises	No-till	Organic
Yield (t/ha)	2.20	2.90	3.30	3.80	2.70
Maize delivered (MDL/ha)	523	7,688	9,558	11,006	8,967
- Yield delivered (t/ha)	0.18	2.81	3.17	3.34	1.81
- Price (MDL/t)	2,876	2,733	3,017	3,017	4,100
Self-consumption (MLD/ha)	5,955	238	398	459	2,103
Subsidies (5y average) (MLD/ha)	0	819	630	880	714
Total production	6,478	7,926	9,956	11,465	11,070
Consumables (MDL/ha)					
Fuel (VAT 20%)	1,325	1,660	1,440	720	1,940
Seeds (VAT 8%)	625	1,452	1,386	1,386	780
Fertilisers (VAT 20%)	1,200	1,250	1,315	1,000	700
Plant protection (VAT 20%)	650	600	550	1,200	0
Services (MDL/ha)					
Electricity (VAT 20%)	28	56	14	146	146
Insurance (VAT 20%)	89	89	89	89	89
Repair (VAT 20%)	200	399	330	339	733
Field service	1000	0	0	126	70
Certification	0	0	0	0	100
Financial charges (MDL/ha)					
Interest paid (1.25% of sales)	81	83	110	126	93
Land (MDL/ha)					
Rent	0	1,603	2,126	2,126	2,725
Land Tax	120	157	170	154	231
Labour (MDL/ha)					
skilled and unskilled labour	450	3,008	2,737	2,335	2,737
Labour indirect contributions (19% from 34% of costs - 64% of undeclared labour)	0	194	177	151	177
Depreciation	95	181	361	483	495
Total costs	5,863	10,733	10,804	10,255	10,915
Benefit from production	615	-2,807	-848	1,083	155
Tax (12%)	0	0	0	20	0
Net income	615	-2,807	-848	1,063	155
Net margin	9%	-35%	-9%	9%	1%

Source: Own calculations

Peasant farms and agricultural enterprises operate at significant losses, recording net margins of -35% and -9%, respectively, with net income deficits of -2,807 MDL and -848 MDL. These results should be interpreted with caution, as survey respondents did not always distinguish between hired workers and family members involved in farm operations. This limitation is particularly relevant for peasant farms, where much of the labour is provided by household members whose remuneration is derived from farm income rather than formal wages.

This may help explain the negative results, as in some cases farmers may not fully account for all relevant costs in practice. For example, depreciation may be overlooked, labour may not be properly valued, or yields may be underestimated (as suggested by some agencies), leading to a perception of profitability despite weaker economic performance. At the same time, Agricultural Enterprises may benefit from scale effects that were not fully captured in the survey. Some enterprises engage in additional activities such as processing or animal husbandry, which can significantly alter value added (VA) and profitability. In such cases, selling primary production alone may appear unprofitable, but further processing or integration into downstream activities can generate additional value. Similarly, some peasant farms and agricultural enterprises export their commodities directly, capturing part of the trader margin, which may represent a critical factor in shifting from losses to profitability. Overall, farmers behave rationally and are unlikely to consistently operate at a loss. However,

agricultural production is inherently variable, and strong income years are often offset by weaker seasons, which can significantly influence the observed economic results.

Moldovan farmers face a major challenge with VAT, as they pay more VAT on inputs than they collect on sales. Most agricultural inputs, such as imported fuel, consumables, and equipment, are taxed at the standard rate of 20%, while products sold by farmers are often taxed at a significantly lower rate. Local sales of key agricultural goods, such as bread, dairy products, and other products, are taxed at just 8%, and exports are taxed at 0%. If the output VAT is higher than the input VAT, the farmer simply pays the difference to the state budget. However, when the input VAT exceeds the output VAT, which is often the case in Moldovan agriculture due to lower tax rates and export sales, **the farmer ends up with an excess credit**. This negative balance can be carried forward, used to offset other tax liabilities, or, under certain conditions, claimed as a VAT refund. The VAT payment balance for maize hectares in Moldova in 2023 (Table 3-3) clearly illustrates this trend, showing that farmers are frequently facing a negative VAT balance. A significant driver of this negative balance is that a large portion of production is transferred to landowners as rent in kind. Because VAT is neither charged nor eligible for refund on this unsold production, it shrinks the effective monetary income base and severely impacts farmers' liquidity.

To improve this situation and support a sector battered by climate instability and rising input costs, the Government of the Republic of Moldova amended the Tax Code, effective January 1, 2026. Under the new provisions, farmers can deduct the amount of land tax paid for the years 2023–2025 from their reimbursable VAT⁴. According to the Ministry of Finance, this measure aims to improve farmers' liquidity and their capacity to finance operations. The calculation basis for July 2023–June 2026 has been expanded to include the 2025 land tax, establishing a **more advantageous reimbursement ceiling** that accounts for previously accepted VAT amounts. Ultimately, while the gross value added for maize is modest, the VAT refund mechanism plays a crucial role in maintaining positive cash flow. VAT has become not just a fiscal instrument, but a determining factor in the financial sustainability of Moldovan crop farming.

TABLE 3-3 BALANCE OF VAT PAYMENT FROM ONE STANDARD MAIZE HECTARE, MOLDOVA, 2023.

	SHs	PF	AE	No-till	Organic
Maize sold	523	7,133	8,761	10,089	7,417
Inbound VAT	39	528	648	747	549
IGS (Including VAT)	4,117	5,506	5,124	4,880	4,388
Outbound VAT	629	784	727	686	660
VAT balance	591	257	78	-60	111
Ha (thousand)	178.0	136.7	139.4	21.4	4.8
VAT balance	105,140,009	35,083,792	10,926,018	-1,294,258	534,906
Total VAT balance for Maize	150,390,466 MLD				

Source: Own calculations

Note: Negative values indicate the amount the farmer must pay, while positive values indicate the farmer is eligible for a VAT refund.

The analysis of the VAT balance for a hectare of maize in the Republic of Moldova in 2023 (Table 3-3) highlights the significant impact of the taxation mechanism on farmers' cash flow. The total VAT refund owed to farmers across the sector is estimated to be close to about 150 million MDL.

3.1.3. Maize food processing

Maize processing is poorly developed in Moldova. Maize is mostly used as animal feed or export. People use maize flour in the form of traditional food such as *mămăliga*. In some villages there is a small mill, which provides such services. Most of the mills observed are quite old, most of them from the Soviet period.

⁴ The legislation seems to be a positive solution to the problem. However, many farmers operate at a net tax loss from maize production, meaning they owe no income tax and therefore cannot benefit from these tax deductions



The Bobulești Mill, Florești district

Based on our investigation, some mills operate on a cash basis and may not accurately report their income and revenues. Therefore, VAT is not a significant issue when operating partly in the shadow economy. From an economic perspective, small mills mainly serve landowners by processing the corn they receive into flour or groats. A small mill is usually operated by the owner and approximately two workers, who work throughout the year. Payments are made in cash, or the transaction can include a portion of the production (where an agreed-upon share of the final product is retained by the miller).

TABLE 3-4 THE ACCOUNT FOR THE SERVICE RURAL MAIZE MILLING, MOLDOVA, 2023.

Production (annual capacity 3600t)	Unit price	Volume	Total
Service fee	1,000	1	1000
Consumables	Unit price	Volume	Total
Maize	2,700	1	2700
Bags	3	38.00	114
Spare Parts	100	1	100
Services			
Electricity (KWh)	3.4	45.00	153.0
Labour	wage	# of people	Total (MDL/t)
Technical (Owner, opportunity costs)	130,000	1.0	43
Others (8000 per worker)	100,000	2.0	67
Labour indirect contributions (21% from 36% of costs - 64% of undeclared labour)			29
Depreciation	Depreciated, Old technology		
Total costs			506
Income			494
Tax			59
NET MARGIN			44%

In addition to these small mills, in 2002 a couple established a business based on maize cultivation and processing by acquiring a mill. With the support of subsidies, they modernized the facility and process maize grown on approximately 50 hectares. They offer a range of quality products, including flour, oil, and corn bran, marketed under the brand name "Iurcaneanca." The maize flour produced by the enterprise has gained a strong reputation.

In 2011, “Iurcaneanca” was awarded a gold medal at the prestigious national competition “Trademark of the Year 2011.” Subsequently, with the support of international organizations, the business invested in more advanced processing technologies, including an upgraded packaging line and pet feed production (primarily for dogs). No further examples of industrial-scale milling with products widely available in retail were identified.

As illustrated in Table 3-4, the 2023 financial account for rural maize milling services in the Republic of Moldova reflects a highly profitable processing segment within the local agrifood value chain, yielding a notable 44% net profit margin. This strong profitability is heavily underpinned by the utilization, fully depreciated technology, which eliminates asset amortization costs from the 506 MDL/t operational expenditure base. While primary cost drivers are concentrated in electricity (153 MDL/t) and aggregate labour (139 MDL/t), the data reveals a critical structural vulnerability from an institutional and regulatory perspective: approximately 64% of the enterprise’s labour force operates within the informal economy.

TABLE 3-5 THE ACCOUNT FOR THE INDUSTRIAL MAIZE MILLING, MOLDOVA, 2023.

Production	Unit price	Volume	per 1 tonnes
Maize flour (45%), (t)	15,000	0.48	7,200
Maize starch fraction (30%), (t)	10,000	0.30	3,000
Maize germ (10%), (t)	8,000	0.10	800
Bran (10%), (t)	4,000	0.10	400
Impurities + moisture loss (3%)	0	0.04	0
Production			11,400
Consumables			
maize (1 tonne input)	3,017	1	3017
Packaging	800	1	800
Others	500	1	500
Services			
Electricity (30 kWh)	3.4	40	136
Transportation	1000	1	1000
Other Services	300	1	300
Financial charges	50	1	50
Depreciation (5% of VA)	5,647	5%	282
Labour			
Administrative	440	1	440
Operation	600	1	600
Social insurance	1040	19%	197.6
Profit before tax			4,077
Income tax (11.5%)	4,077	11.50%	469
Profit after tax			3608
Margin rate			31.65%
VA			5,647

As shown in Table 3-4, industrial maize milling in Moldova can be profitable business, achieving a 31.65% net profit margin (equal to 3,608 MDL per ton after tax). Unlike small rural mills that only charge a basic service fee, industrial processors buy raw maize (3,017 MDL/t) and separate it into multiple valuable products like flour, starch, germ, and bran⁵, boosting the total output value to 11,400 MDL/t. The cost structure reflects a fully formal business model, with its largest expenses dedicated to transportation (1,000 MDL/t) and commercial packaging (800 MDL/t). Furthermore, unlike the informal rural sector, this industrial segment complies with legal regulations by fully accounting for equipment depreciation and paying formal labour costs, including the mandatory 19% social insurance contribution. Ultimately, by creating 5,647 MDL/t in gross value added, industrial milling demonstrates how modern processing infrastructure can successfully upgrade Moldova's raw agricultural goods

⁵ Maize oil is a highly specialized product that is produced in Moldova only on a very limited scale (approximately 1,000 litres per year) and was therefore not included in the analysis..

into higher-value commercial products. **However, further processing growth remains heavily constrained by demand, leaving little feasibility for scaling annual processing volumes beyond approximately 500 tonnes annually⁶.**

3.1.4 Traders

Traders and transport companies play a crucial role in the Moldovan maize trade. Farmers, who usually sell their grain directly from the field, depend on trade intermediaries who channel the goods to international markets. Among the most frequently mentioned destinations are Romania and the Port of Constanța, from where purchase prices for maize can be obtained. These price data are published by the EU market monitor. While international statistics provide information on average export prices from Moldova, the EU market service provides monthly quotes for the Port of Constanța. Economic analyses clearly show that Moldovan maize does not reach the Constanța (FOB) price level in Romania. The difference varies between 7.5 and 6.3 % in the 2023 quarters. Part of this discrepancy can be attributed to transport costs, border-port logistics cost, trader margin, financing and handling cost.

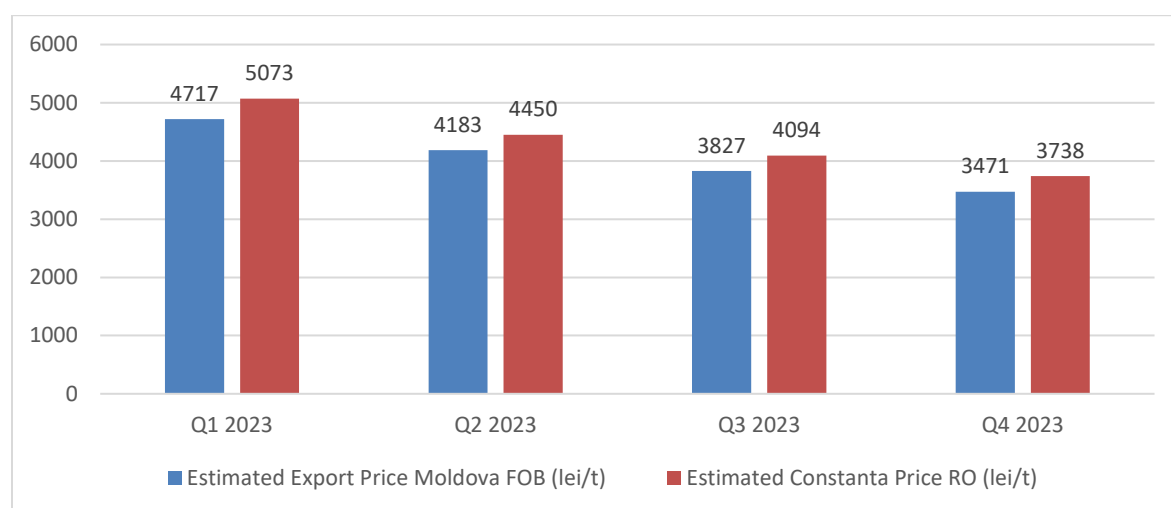


FIGURE 3-2 EXPORT PRICE VS. CONSTANTA PRICE (RO), 2023.

TABLE 3-6 FINANCIAL ACCOUNT FOR THE MAIZE TRADERS (MDL/TONNE), MOLDOVA, 2023

Production	Unit price	Volume	Total
maize / export (220 USD)	4,000	1	4,000
Consumables	Unit price	Volume	Total
Maize (t)	2,733	1	2,733
Storage costs	170	1	170
Transportation (MDL/tonne)	0.7	250	175
Energy consumption	2.8	25	70
Labour costs	300	1	300
Social insurance	57	1	57
Interest paid	70	1	70
Depreciation (5% of sales)	4,000	0.05	200
Profit Before Tax	298		225
Tax (12%)			27
Net Profit			198
Net margin			4.95%

⁶ During the survey of local retail outlets, the team identified only one Moldovan producer of maize-milling products. Most other maize-based products available on the domestic market originated from Ukraine and Romania.

As outlined in Table 3-6, the cost structure for trading companies exporting maize reflects tight operational margins. In addition to the primary expense of purchasing maize from farmers (2,733 MDL/t). However, it needs to be stated, that trades are able to distinguish purchase price by location. **The more distant farmer is from the port (meaning port of Giurgiulesti, MD or Constanța, RO), the lower the purchasing price, which compensate the costs of transportation.**

Traders incur significant secondary overheads, including storage (170 MDL/t), transportation (175 MDL/t), energy (70 MDL/t), and depreciation (200 MDL/t, 5% of sales). Financial and labour obligations further compress returns, with interest payments of 70 MDL/t (representing 1.75% of sales) and aggregate labour costs, including social insurance, amounting to 357 MDL/t (roughly 9% of sales). While these cumulative transaction-related costs heavily absorb the 4,000 MDL/t export revenue base, the achieved margin remains just sufficient to cover all expenses, yielding a modest pre-tax profit of 225 MDL/t and a final net profit of 198 MDL/t.

3.2. Total effects within the national economy

Table 3-7 presents the consolidated account of the maize value chain in Moldova. It includes the main actors and reports their production, total support received, intermediate consumption, wages, taxes, interest payments, and depreciation.

TABLE 3-7 TOTAL CONSOLIDATED ACCOUNT FOR MOLDOVA MAIZE (THOUSANDS OF MDL), MOLDOVA, 2023

Actor	Production	Subsidy	IGS	Wages	Taxes	Interest on loan	Land Fee	Deprec.	NOP	VA
Smallholder F.	2,412,536	0	2,038,959	108,818	126,655	19,043	0	21,764	97,296	373,576
Peasant Farm	2,186,400	185,773	1,852,648	415,614	151,498	11,448	221,103	31,310	-311,449	333,752
AE	2,901,751	186,416	2,092,880	379,424	149,023	15,267	295,063	52,462	104,050	808,871
No-till	488,754	34,672	348,402	49,628	21,126	2,601	45,317	11,169	45,182	140,352
Organic	106,600	6,080	74,910	13,165	5,144	631	13,120	2,504	3,207	31,690
Industrial Milling	6,570	561	3,489	599	386	29	0	163	2,466	3,082
Land Owner AE+NT	164,469	0	159,847	0	0	0	-141,147	0	145,770	4,623
Land Owner ORG	8,388	0	8,386	0	0	0	-7,462	0	7,464	2
Land Owner PF	90,482	0	86,924	0	0	0	-76,524	0	80,082	3,558
Service milling	91,575	0	76,528	2,598	2,345	0	0	0	10,103	15,046
Trader maize	2,540,942	44,070	2,082,221	190,797	43,009	44,284	0	127,047	97,654	458,721
VALUE CHAIN	4,845,945	457,572	2,672,674	1,160,644	499,184	93,302	349,471	246,419	281,824	2,173,272

Figure 3-3 illustrates the breakdown of intermediate goods and services (IGS) consumed along the value chain. While farm-level data provide a detailed overview of the inputs used, the composition of items becomes more diverse and less clearly defined further downstream. However, agrotechnical inputs remain dominant, particularly fertilisers and pesticides (36%), fuels (22%), and seeds (18%). Transportation and repair account together for about 8% of total IGS. Once most of the smallholders rely on service harvesting, the services provided by other farmers (harvester owners) account for 7%.

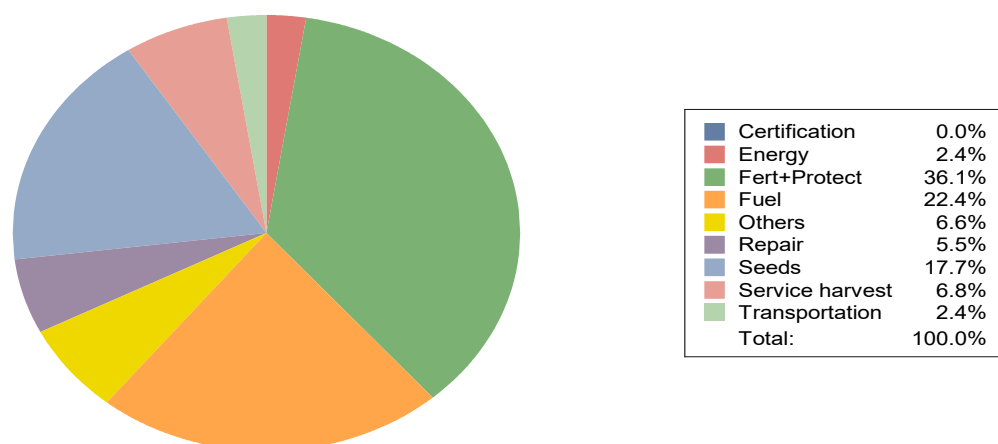


FIGURE 3-3 INTERMEDIATE CONSUMPTION (IGS) BREAKDOWN, 2023, %, MOLDOVA MAIZE VC

Table 3-8 presents the consolidated account of the maize value chain in Moldova in 2023. The chain generated a total production value of MDL 4.85 billion and an estimated direct value added of MDL 2.17 billion. Labour remuneration represented the largest share of distributed direct value added (53%), followed by land fee (16%), net operating profit (14%), depreciation (11%), interest payments (4%), and taxes net of subsidies (2%). These results highlight the significant contribution of the maize value chain to income generation, employment, and capital remuneration within the Moldovan economy.

TABLE 3-8 CONSOLIDATED ACCOUNT OF THE MAIZE VALUE CHAIN, 2023, MOLDOVA (THOUSAND MDL)

Category	Value
Production (Final Value of Output)	4,845,945
Intermediate Consumption	1,111,947
Direct Value Added	2,173,272
Distribution of Net Value Added	
Labour (Wages)	53%
Taxes less Subsidies	2%
Interest on Loans	4%
Land fee	16%
Net Operating Profit	14%
Depreciation	11%

Source: Based on Table 3-7.

When examining the cost structure presented in Table 3.9, total costs amount to more than 4.6 billion Moldovan lei. The largest shares are attributed to farm wages and agrotechnical inputs. Within the value chain, depreciation accounts for approximately 5% of total costs, mainly because landowners have relatively limited fixed assets to depreciate.

Some cost items are negligible in the overall analysis, as they do not significantly affect the order of magnitude of total costs. These include, for example, certification costs for organic producers, income tax, and electricity charges.

TABLE 3-9 COST STRUCTURE OF MAIZE VALUE CHAIN, 2023, MOLDOVA

Category	Group/Item	Value (K MDL)	Percentage
1.Consumable	Fertilisation and Protection	964,420	21%
	Fuel	598,599	13%
	Others	5,804	0%
	Seeds	473,543	10%
2.Service	Certification	481	0%
	Energy	63,014	1%
	Others	170,516	4%
	Repair	147,863	3%
	Service harvest	181,364	4%
	Transportation	64,556	1%
3.Wages	Farm wages	966,649	21%
	Mill wages	3,198	0%
	Trade wages	190,797	4%
4.Taxes	Income tax	1,760	0%
	Land tax	71,408	2%
	Social and Health	98,242	2%
5.Financial Charges	Interests	93,331	2%
6.Property Income	Land rent	349,471	7%
7.Depreciation	Depreciation	241,631	5%
Total		4,686,644	100%

Source: information based on survey, secondary data processed in the AFA software

Although individual wages in agriculture in the Republic of Moldova are generally lower than the average wage in the economy, the **share of wage costs of 21% of the total cost of the maize value chain does not reflect the high level of labour remuneration, but rather the importance of the labour factor in the production process and the economic size of the analysed agricultural activities.**

The high share of wages results from:

- the large number of workers involved in the production, handling and marketing of maize;
- the seasonal nature of some agricultural works, which require additional employment of labour;
- the inclusion of social contributions and other labour-related costs in the total cost of the labour factor;
- the relatively low value of other cost categories in the analysed year, which leads to an increase in the relative share of wages.

At the same time, the results highlight that the largest share of wage costs is generated at the level of primary agricultural production (21%), while processing has an insignificant contribution (below 1%), and trade represents approximately 4% of total costs. This structure confirms that the **maize value chain** in the Republic of Moldova **is predominantly oriented towards the production and marketing of raw materials, with a low level of internal processing and value-added creation in the downstream stages.**

Therefore, the high share of wages should not be interpreted as an indicator of high incomes of agricultural workers, but as an expression of the important contribution of the labour force to the functioning of the value chain. **In reality, agricultural wages remain relatively low**, which suggests that a significant part of the value generated by the chain is distributed to other categories of actors and factors of production (inputs, landowners, traders), and not to agricultural workers.

This situation highlights a structural challenge in the sector: labour productivity and remuneration levels remain low, despite the significant contribution of labour to the total costs of the value chain. Consequently, increasing technological efficiency and developing processing activities could contribute to generating higher added value and improving the incomes of workers in the sector.

Looking at Figure 3-4, it can be observed that approximately 44% of the final production value is generated as value added (VA) within the value chain. The remaining share consists of intermediate goods and services (IGS), highlighting the importance of input costs in overall production. The distribution of value added indicates that a significant portion is captured at the primary production level, while downstream activities contribute comparatively less.

At the same time, the figure suggests that maize processing into secondary and higher value-added products in Moldova remains relatively limited. The structure of value distribution points to a value chain that is still largely focused on primary production, with only modest development of processing activities such as milling and further transformation.

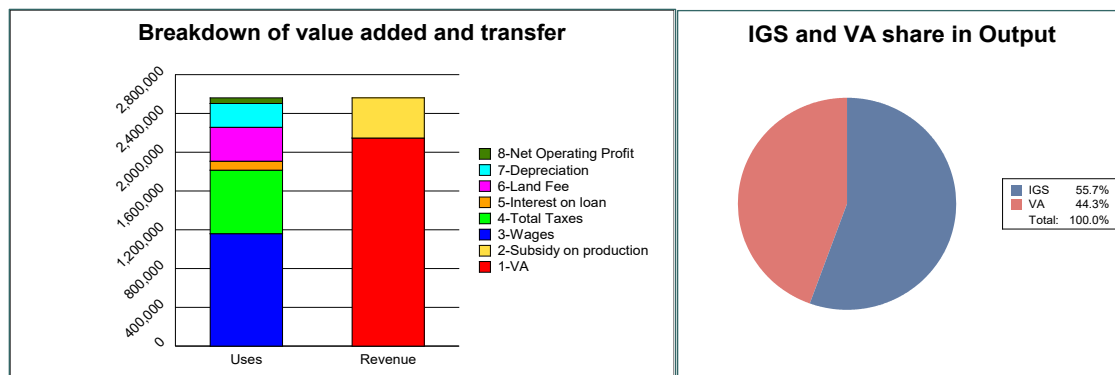


FIGURE 3-4 VALUE ADDED (VA) DISTRIBUTION OF THE VC (DIRECT), 2023, MOLDOVA MAIZE

Table 3-10 presents the distribution of value added (VA) in the maize value chain, distinguishing between direct and indirect effects. Total value added is estimated at approximately 3.7 billion Moldovan lei, of which around 2.1 billion is generated directly within the value chain and 1.6 billion indirectly through related economic activities. Wages represent the largest component of value added, followed by net operating profit and depreciation, highlighting the importance of labour and capital in the sector. Indirect effects are particularly significant for net operating profit and depreciation, reflecting strong linkages with upstream and supporting sectors. Taxes and subsidies play a more limited role in the overall structure.

The role of direct imports (i.e. imports undertaken directly by farmers or large agricultural holdings) is relatively limited, as most producers source inputs through domestic distributors and importers. The Moldovan agriculture is also characterised (and that is clearly visible) by high rent towards landowners. While the large enterprises could rent over 95% of the land, the smaller the farm is, the more land is owned by farming subjects. The Table 3-8 explains that land fees are close to 390 million MDL.

TABLE 3-10 VALUE ADDED (VA) DISTRIBUTION OF THE VC (DIRECT AND INDIRECT EFFECTS), 2023, MOLDOVA MAIZE

	Direct effects	Indirect effects	Total effects
Imports	0	622,109	622,109
IC not disaggregated		10,952	10,952
Value added			
Wages	1,160,644	570,525	1,731,168
Taxes	654,017		
Subsidy	601,952		
Tax (+) Sub (-)	41,612	100,789	142,401
Interest on loan	93,302	66,290	159,592
Land Fee	349,471	37,753	387,224
Depreciation	246,419	171,389	417,808
Net Operating Profit	281,824	613,684	895,508
VA not disaggregated		297	297
VA Total	2,173,217	1,560,727	3,733,998

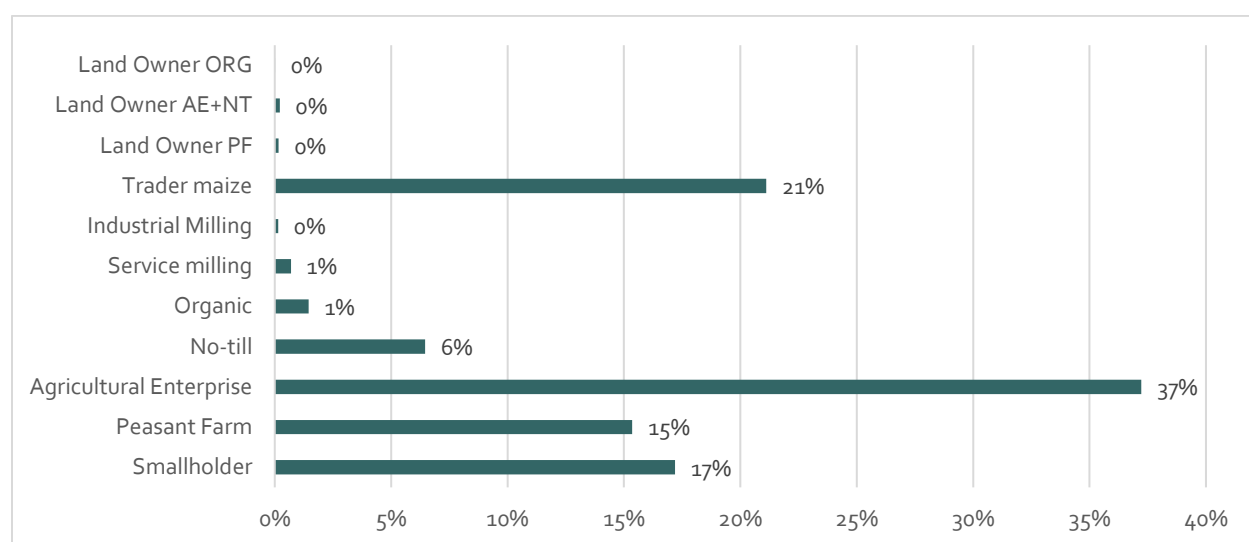


FIGURE 3-5 VALUE ADDED CONTRIBUTION BY INDIVIDUAL TYPE OF ACTOR, 2023

Given that agricultural enterprises (AEs) achieve the highest yields and cultivate the largest share of land, it is expected that they also generate the highest total value added (VA). Also, once the trader must manage large quantities of commodity volumes, also their contribution to total VA is understandable.

An interesting perspective is presented in the figure below, which illustrates value added (VA) relative to production. A higher VA-to-production ratio indicates that more value is generated per unit of input. The analysis shows that industrial milling – processing maize into flour and other products – achieves the highest VA relative to production (47%).

Peasant and smallholder farms exhibit similar performance levels, with conventional production generating approximately 15% VA. In contrast, conservation agriculture and larger agricultural enterprises achieve higher values, ranging between 28% and 30%.

Several factors explain these differences. Agricultural enterprises benefit from economies of scale, allowing them to attain higher yields with a given set of inputs. Meanwhile, conservation agriculture practices – such as no-till and organic production – typically operate with lower input use (e.g., reduced diesel and fertilizer consumption), which lowers costs and increases the potential for higher value added.

However, a higher VA relative to production does not automatically imply greater profitability and economic success. This indicator alone can be misleading, as substantial investments and associated depreciation costs may reduce overall financial performance. Similarly, high levels of debt or excessive labour costs can offset gains in value added, potentially resulting in financial losses.

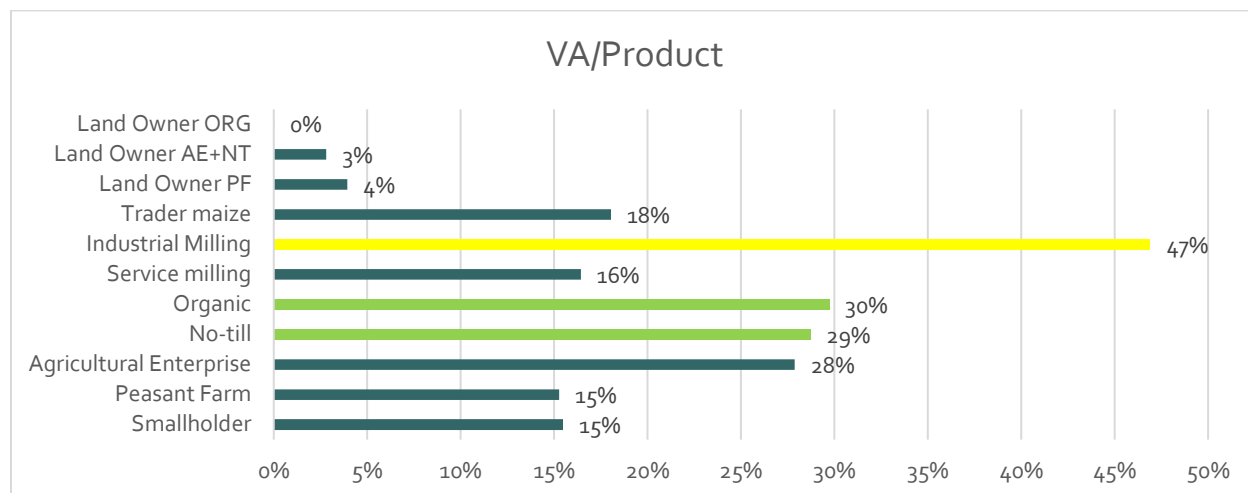


FIGURE 3-6 VALUE ADDED OVER PRODUCTION, MOLDOVA MAIZE, 2023

It is also important to assess the contribution of maize production to the gross agricultural output. Figure 3-6 illustrates the distribution of value added among actors along the value chain. In 2023, maize production generated **over 3.7 billion MDL** in value added at the national level (direct and indirect effects).

3.3. Competitiveness and viability within the international economy

The top export partners of Moldovan maize in 2023 were Romania, Cyprus, Italy, Lebanon, Belarus and Turkey, all of them accounting for 92.42%. On the import side, Moldova imported maize mainly from Ukraine, Romania, Hungary, France, and Serbia (accounting in total 96.36% of the total imports).

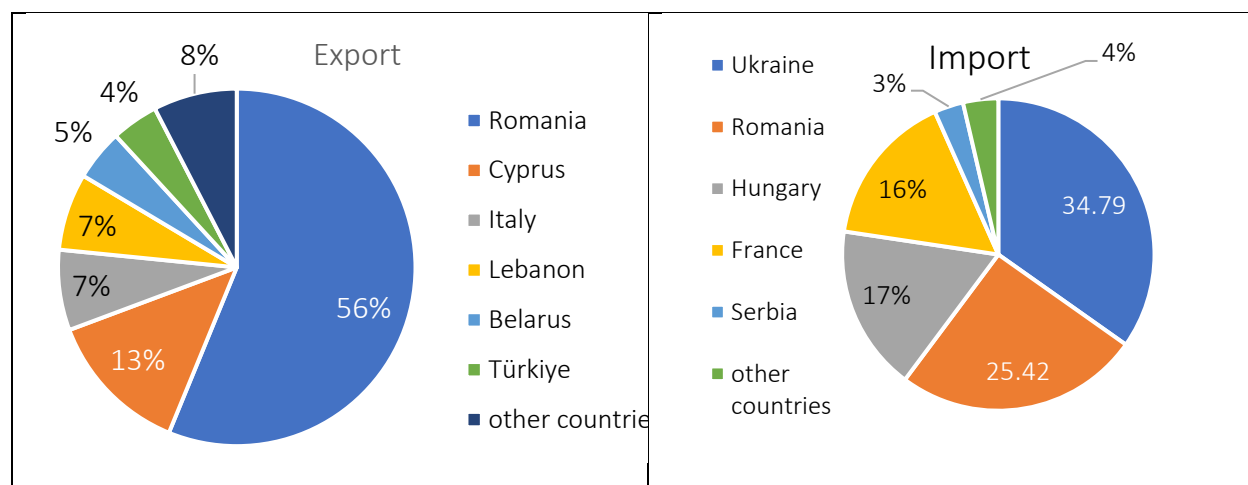


FIGURE 3-7 TOP IMPORT AND EXPORT COUNTRIES FOR MAIZE, HS 1005, 2023, %

Source: UN Comtrade database

The trade export concentration of maize from the Republic of Moldova exhibits substantial dynamics and increasing geographic concentration over the period 2018–2024, as evidenced by the percentage distribution of export destinations.

Throughout the observed timeframe, the structure of Moldova’s maize exports underwent a marked shift from a relatively diversified pattern toward a high degree of dependence on a small number of destination markets. In 2018, the five leading partners (Italy 28.7%, Turkey 13.2%, Greece 11.6%, Switzerland 11.5%, Belarus 7.1%) collectively accounted for approximately 72% of total export value, with Italy serving as the single most important destination. The remaining 28% was distributed among Cyprus, Romania, Lebanon, and a broad group of “other countries” (13.4%).

A progressive concentration becomes clearly visible from 2021 onward. By 2022, Romania emerged as the dominant partner, absorbing 39.3% of Moldova’s maize exports – a more than six-fold increase compared with its 2018–2020 share of 5–6%. Turkey maintained a strong position (28.7%), resulting in the two countries jointly accounting for nearly 68% of exports that year. The previously important markets of Switzerland, Italy, and Greece experienced pronounced declines.⁷

The trend toward extreme concentration peaked in 2023, when Romania alone directed 56.2% of Moldova’s maize export flows, followed distantly by Cyprus (13.1%), Italy (7.3%), and Lebanon (7.0%). The combined share of the top three destinations reached approximately 76.6%, while the residual category “other countries” fell to a historic low of 5.1%. This level of market concentration indicates a pronounced export dependency on a single neighbouring country.

In 2024, partial geographical re-diversification occurred. Romania’s share decreased substantially to 28.7%, while several secondary markets regained importance: Belarus (12.1%), Lebanon (12.3%), Turkey and Switzerland (both 10.8%), and Greece (6.4%). Despite this adjustment, the top four destinations still captured roughly 64% of export volume, confirming the persistence of a moderately concentrated structure compared with the 2018–2020 period.

Overall, the data reveal a transition from moderate diversification toward a highly concentrated export profile in 2022–2023, followed by only partial deconcentrating in 2024. Such dependence on one or two principal partners exposes Moldova’s maize export sector to significant counterparty risk, price transmission effects, and potential disruptions in bilateral trade relations or transit infrastructure.

TABLE 3-11. TRADE EXPORT CONCENTRATION OF THE MAIZE (HS 1005), 2018 – 2024, %

	2018	2019	2020	2021	2022	2023	2024
Romania	6,8	5,9	5,1	12,6	39,3	56,2	28,7
Turkey	13,2	19,7	24,1	28,1	28,7	4,2	10,8
Switzerland	11,5	22,4	22,1	16,7	7,3	0,1	10,8
Italy	28,7	17,7	9,2	8,2	5,8	7,3	8,1
Cyprus	5,6	4,1	11,0	8,7	4,7	13,1	6,5
Greece	11,6	5,9	8,9	9,7	1,8	2,4	6,4
Belarus	7,1	6,4	7,8	4,0	2,3	4,6	12,1
Lebanon	2,3	4,2	3,1	2,0	3,6	7,0	12,3
Other countries	13,4	13,7	8,6	10,1	6,5	5,1	4,3

Source: UN Comtrade database

An analysis of the policy and macroeconomic environment for the Moldovan maize VC reveals significant challenges to the sector’s competitiveness.

⁷ Litvin, A., Turcan, R., Stratila, A., Turcan, I. Agricultural trade: Impacts on market stability and integration with developing countries, Reference Module in Food Science, Elsevier, 2025, ISBN 9780081005965, <https://doi.org/10.1016/B978-0-443-15976-3.00140-9>. (<https://www.sciencedirect.com/science/article/pii/B9780443159763001409>)

The international competitiveness of Moldovan maize is defined by the **Domestic Resource Cost (DRC) indicator, calculated at 0.14, is below the 1.0 threshold for efficiency.** This figure suggests Moldovan maize operates under competitive advantage.

Nevertheless, Moldova is on the track to Dutch disease, maybe not via the export of valuable commodities, but mainly due to inflow of remittances. The inflow of foreign currency make pressure on MDL exchange rate. Stratan et al (2024) indicates overvaluation of the Moldovan Leu, stating *'These developments have significantly eroded Moldova's cost competitiveness compared to other countries in the region and its economic partners in the Eurozone'*. Overvaluation acts as a direct tax on all exporting sectors, as producers receive less in domestic currency for their goods than they would under a market-aligned rate.

3.5 Answer to the Framing Question 1

The tables below summarise the main findings from the economic and financial analysis of the Moldovan maize VC. The results indicate that the VC is not fully economically profitable particularly at the level of primary producers and exporters. However, profitability improves with processing. **The conservation agriculture (no-till and organic farming) proves to be resilient even in the times of lower prices** and this showcase shall be further promoted and communicated towards farmers.

The information provided could suggest that the maize VC is not economically sustainable or viable, given that both farmers and traders may operate at a loss. However, such an interpretation would oversimplify the results. Farmers and traders do not operate in an isolated "maize-only" environment. Agricultural production follows crop rotation, and traders typically handle multiple commodities rather than a single product. Moreover, weather conditions affect global production and lead to price fluctuations, meaning that some years are profitable while others are not. Managing risk through production and trade diversification across several commodities is therefore a key strategy for maintaining the long-term viability and sustainability of farms and trading companies.

Also, good practices we have seen indicates how successful processing industry may transform the sector. Successful processors usually demanding quality deliveries, it leads to innovations among farmers (focus on quality varieties, proper management etc.) which further may be reflected in higher prices. Overall, the greater the efficiency of the processing industry (milling and bakeries), the more beneficial the maize VC becomes for the Moldovan economy. Hence, the industrial innovations and food processing industry success on international markets is seen as key element to improve the Moldovan maize production economic viability.

TABLE 3-12 HOW PROFITABLE AND SUSTAINABLE ARE THE VC ACTIVITIES FOR THE ENTITIES INVOLVED? MAIZE - MOLDOVA, 2023

Framing Question 1: What is the contribution of the VC to economic growth?		INDICATORS	RESULTS
CQ1.1	How profitable and sustainable are the VC activities for the entities involved?	Operating Accounts of every type of actor	Chapter 3.1
		Net operating profit by type of actor	SHs: 615 MDL/ha PF: -2,125 MDL/ha AE: -539 MDL/ha No-till: 1,529 MDL/ha Organic: 639 MDL/t Industrial mill: 3,608 MDL/ha Trader: 198 MDL/t
		Return on turnover (operating profit/production)	SHs: 9% PF: -24% AE: -5% No-till: 12% Organic: 5% Service mill: 44% Industrial mill: 31.6% Trader: 5%
		Benchmarks for farmers' net income (minimum wage, livelihood needs, job opportunities...)	Minimum wage: - 4,000 MDL Average gross wage in Agriculture: - 7,952 MDL Average gross wage in Economy: - 12,209 MDL

Framing Question 1: What is the contribution of the VC to economic growth?		INDICATORS	RESULTS
CQ1.2	What is the contribution of the VC to the GDP?	Value of final VC production	4,845,945 K MDL
		Total VA and components	3,708,216 K MDL
		Total VA in percentage of the GDP	1.2%
		Rate of integration into the Economy (total VA/VC production)	76.5%
CQ1.3	What is the contribution of the VC to the agriculture sector GDP?	VC agricultural actors' Value Added in percentage of the agriculture sector GDP	8%
CQ1.4	What is the contribution of the VC to the public finances?	Public Funds Balance	340,883 K MDL
CQ1.5	What is the contribution of the VC to the balance of trade?	VC exports	2,617,800 K MDL
		VC total imports	622,108 K MDL
		Balance of trade of the VC	1,995,691 K MDL
CQ1.6	Is the VC viable in the international economy?	Nominal Protection Coefficient (NPC)	1.01
		Domestic Resource Cost Ratio (DRC)	0.14

4. IS THIS ECONOMIC GROWTH INCLUSIVE?

This section examines whether economic growth within Moldova's maize value chain is socially inclusive. In line with the VCA4D methodological framework, social inclusiveness refers to the extent to which the benefits of economic growth – such as income, employment, access to resources, and social protection – are equitably distributed among different categories of actors, including smallholders (SHs), peasant farms (PFs), large agricultural enterprises (AEs), and their employees.

In the Moldovan context, assessing inclusiveness is particularly relevant given the structural polarisation of the agricultural sector. A small number of large, capital-intensive enterprises coexist with a majority of small and semi-subsistence farms, generating marked disparities in productivity, income, and access to resources. Informal employment remains widespread, seasonal and casual work is predominant, and many rural households rely on migration and remittances to sustain livelihoods. Moreover, persistent gender inequalities and limited social protection mechanisms further constrain equitable participation in and benefits from value chain growth.

This analysis therefore asks: **To what extent is economic growth in the maize value chain inclusive?** More specifically, it explores how value added and income are distributed among actors, how governance systems shape access to opportunities, and how employment and working conditions reflect or mitigate existing social inequalities.

Chain structure and actor categories

The maize value chain in Moldova reflects the broader polarisation of the country's agricultural landscape, with three conventional categories of producers coexisting. This typology is used for analytical clarity and does not necessarily correspond to strict legal or statistical classifications. For this reason, the term smallholders (SH) is applied as a functional category for all farms of ≤ 10 ha, regardless of their legal status.

Upstream, the supply of seeds, fertilizers, pesticides, and mechanization services is highly concentrated among a few large input distributors, often linked to multinational firms. Downstream, maize chain are dominated by a limited number of industrial processors (feed mills and oilseed crushers) and exporters who capture a substantial share of final profits. While small producers (SHs) often lack the means to organize collectively, several positive experiences among PFs and AEs show that cooperative models can significantly enhance efficiency, market access, and bargaining power (Ignat et al. 2017; Hejkrlik & Chaloupková 2021). Examples include *Agrostoc*, a national-level cooperative that supplies inputs and facilitates grain marketing, and a large cooperative from Criuleni district, which manages joint storage and collective sales of maize. These initiatives illustrate that cooperation and aggregation can strengthen producers' competitiveness and resilience, especially in the face of volatile prices and climate risks (Field Notes, March 2025; FGs & Interviews, June 2025; Ignat et al. 2017; Savga & Savga 2024).

4.1. Distribution of Income and Value Added among Value-Chain Actors

Figure 4–1 presents the distribution of net operating profits (NOP) across actors in the maize value chain. The waterfall chart illustrates how profits accumulate along successive stages, revealing marked differences between actor categories. While some producer groups—notably peasant farms—record negative returns, profits increase downstream, with traders and landowners capturing the largest gains. Overall, the figure highlights the unequal distribution of profits and the concentration of value capture beyond primary production.

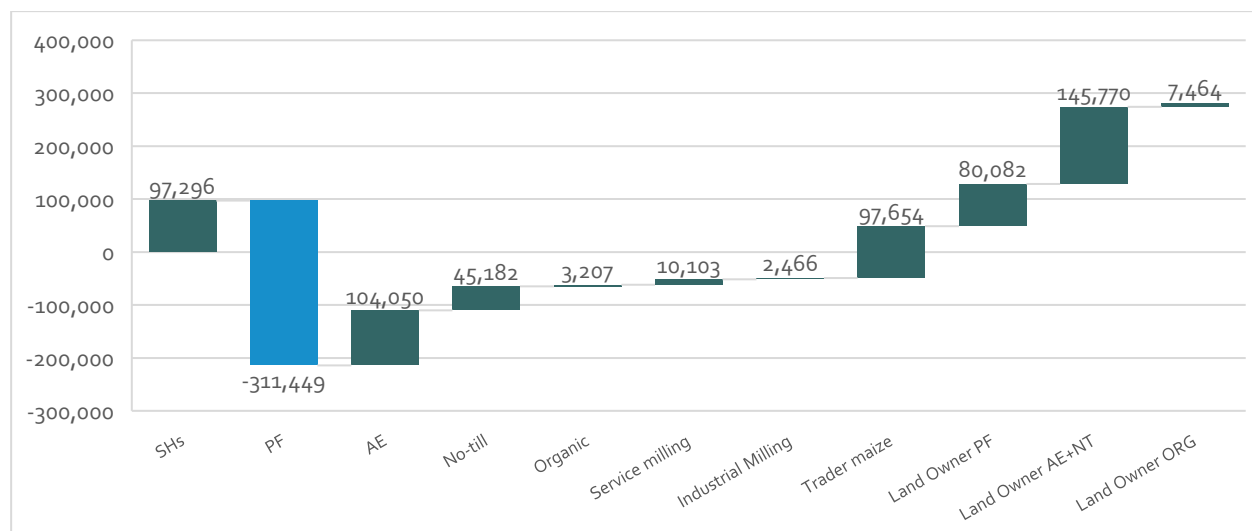


FIGURE 4-1. NET OPERATING PROFIT DISTRIBUTION BY ACTORS, MAIZE, MOLDOVA, THOUSANDS MDL, 2023

While some stages, such as PF, show significant negative impacts, most actors contribute positively to the overall result. Value is gradually built through production, processing, and trading activities, with the largest increases observed at the level of traders and landowners. Overall, the figure highlights the uneven distribution of Net Operating Profits and the concentration of gains in the later stages of the value chain.

Table 4-1 shows that farms generate about 78% of value added and 83% of wages, but capture little net operating profit. By contrast, traders and especially landowners account for most profits, highlighting the asymmetry between where value and labour are created and where income is ultimately captured.

TABLE 4-1: DISTRIBUTION OF WAGES AND CREATION OF LABOUR (IN AWU), MOLDOVA, THOUSAND MLD, 2023

Thousand MLD	Value added	%	Wages	%	Tax	%	NOP	%
Farms	1,688,241	78%	966,649	83%	453,445	70%	-61,714	-22%
Traders	458,721	21%	190,797	16%	186,969	29%	97,654	35%
Mills	18,128	1%	3,198	0%	3,151	0%	12,569	4%
Landowners	8,182	0%	0	0%	0	0%	233,316	83%
Total	2,173,272	100%	1,160,644	100%	643,565	100%	281,825	100%

TABLE 4-2: DISTRIBUTION OF WAGES AND CREATION OF LABOUR (IN FTE), MOLDOVA, 2023SA

	Temporary	Permanent Unskilled	Permanent Skilled	Male	Female	Total
Farming	3,036	2,377	1,869	4,695	2,587	7,282
Milling	0	402	420	548	274	822
Trading	0	1,146	441	1,247	341	1,588
Total	3,036	2,784	2,291	5,248	2,863	8,110

Table 4-1 shows that most wage payments and employment in the maize VC are concentrated upstream at the farm level (over 966 million MDL), while downstream actors such as traders (190 million MDL) and mills generate comparatively little labour due to higher capital intensity and limited labour demand. Larger agricultural enterprises, especially in the Centre and South, account for the highest wage volumes and concentrate skilled permanent positions, whereas peasant and household farms rely more on temporary and unskilled work. Gender segmentation is evident: men dominate skilled and mechanised roles, driving higher aggregate male wages, while women are over-represented in lower-paid, auxiliary tasks. In addition, the small number of Full Time Equivalent (FTE) generated downstream underscores the narrow distribution of labour benefits beyond the farm gate. Overall, the table illustrates structural inequalities – by enterprise size, job type, and gender – that restrict broad-based income inclusivity across wheat, maize, and sunflower value chains in Moldova.

Benchmark evidence from Kotyza et al. (2025) for wheat showed a Gini coefficient of 0.44 for farms larger than 10 ha. Updated BNS data for maize indicate an even stronger concentration (Gini = 0.58)

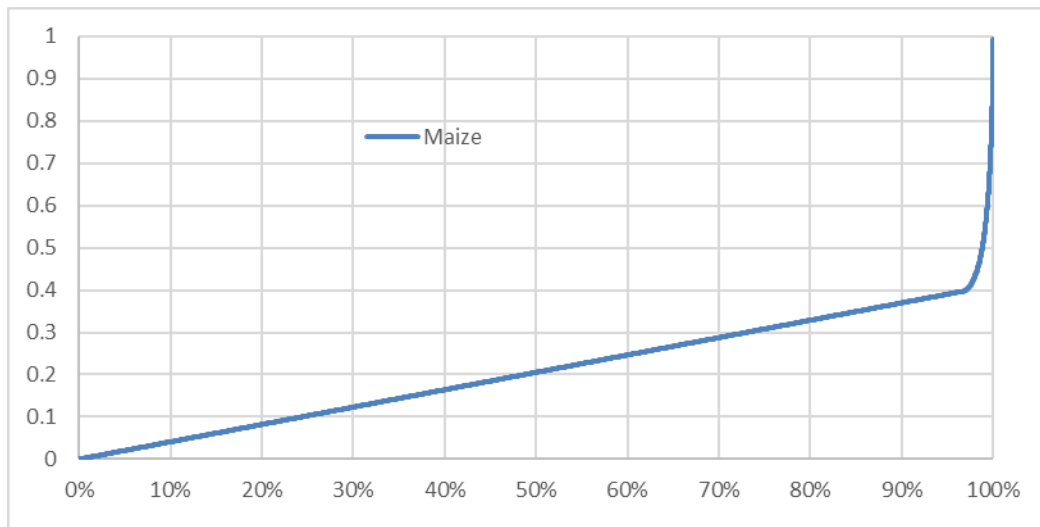


FIGURE 4-2. MOLDOVA LAND DISTRIBUTION, GINI COEFFICIENT, 2023 BNS MICRODATA

The corresponding Lorenz curve illustrates a pronounced dual structure within the sector, clearly divided into two distinct segments with differing economic behaviours. The section preceding the curve's inflection point represents most individual growers who cultivate very small individual plots, collectively making up a minority of the total area (about 97% of entities farm on roughly 40% of the maize acreage). These small-scale producers engage primarily in subsistence farming, growing maize for their own consumption with possible participation in the local markets. Conversely, the segment beyond the inflection point comprises a narrow group of larger entities, specifically peasant farms and agricultural enterprises, that manage the dominant share of the total land. This latter sector is fully market-oriented and is responsible for most of the crop's commercial output.

Field and policy evidence point to consistent differences in income and production capacity between agricultural enterprises (AEs) and peasant farms (PFs). In 2022, input costs rose sharply: diesel increased from around 16.4 MDL/l in 2021 to 25.9 MDL/l (+57%), before easing to ~22 MDL/l in 2023 and ~20.9 MDL/l in 2024 (PECO.md; ANRE). Fertilizer prices grew even faster – by roughly 4–5 times during winter 2021–2022 – then gradually moderated through 2023–2024 as markets stabilised (Mold-Street 2022; Agroexpert 2022; FAO 2022a). After the 2022 spike, fertilizer prices declined yet stayed high enough to restrict use among small and mid-sized farms, many relying on cheaper, less efficient products (Crivoi 2024). The 2025 Fertilizer Law aims to align Moldova with EU standards by simplifying recognition of EU-certified products, defining clear rules for domestic ones, and improving labelling and quality control – measures expected to broaden supply and gradually enhance access to affordable, quality inputs (Parliament of the RM, 2025).

Alongside war-related trade disruptions, drought, and tight credit conditions that eased only after 2024 rate cuts, these shocks affected both costs and producer prices: in 2024, prices rose by +9.1% for maize (BNM 2025; MAIA 2024). Stabilising input costs benefited farms unevenly – larger enterprises could absorb shocks through liquidity, storage, and delayed sales, while smaller producers remained more exposed to market and credit risks (BNM 2025). The easing of 2023–2024 improved labour stability but brought little structural change in value distribution.

Yield data confirm similar patterns. Productivity differences between AEs, PFs, and small household farms (<10 ha) remain visible and have been accentuated by weather shocks. During the 2022 drought, maize yields declined across all groups – from 78 q/ha to 23 q/ha in AEs and from 71 q/ha to 21 q/ha in PFs – while smaller farms registered ~15 q/ha. A partial recovery followed in 2023 yet yields dropped again in 2024 to around 20–21 q/ha for AEs/PFs and 14–15 q/ha for household farms. Regional trends reflect these patterns: the North achieves the

highest yields, the Central region shows intermediate levels, while the South and U.T.A. Găgăuzia remain more affected by drought exposure (BNS 2025c; BNS 2025d; BNS 2025e).

Access to storage facilities plays a key role in shaping farmers' market behaviour and profitability. The adjusted survey data reveal a stark structural divide. Smallholders (SHs) have virtually no storage capacity (an average of less than 20 kg), leaving them with no choice but to sell their maize immediately after harvest to obtain cash income. Peasant farms (PFs) are only slightly better positioned: their average storage capacity – around 250 kg – is still very limited, allowing only short-term buffering and little flexibility in timing sales. By contrast, agricultural enterprises (AEs) possess significantly larger storage capacities (on average about 2 tonnes), which provides them with far greater autonomy to decide when to sell and to benefit from more favourable market prices (Survey 2025 – see Table 4-3).

TABLE 4-3: SALES TIMING AND SUBSIDIES BY FARM CATEGORY – MAIZE VALUE CHAIN

Farm category	Avg. maize sold immediately after harvest (avg. %)	Avg. total subsidies received, 2019-2023 (avg. MDL)
PF – Peasant Farms	22.0%	671,152 MDL
AE – Agricultural Enterprises	27.0%	3,318,508 MDL
SH – Smallholders / Household farms	36.9%	138,045 MDL

Source: VCA4D field survey conducted in August–September 2025 (n = 48). **Note:** Values rounded for clarity. Subsidies include investment support and drought-related payments.

These differences are reflected in farmers' sales timing, although the survey findings for this particular set of questions should be interpreted with some caution, as several responses suggest variation in how the items were understood or reported. After adjusting for outlier entries, the pattern becomes clearer: smallholders (SHs), who have practically no storage capacity, sell the largest share of their maize immediately after harvest (around 37 percent). Peasant farms (PFs) follow a similar logic, with about 22 percent of their crop sold directly, reflecting their very limited capacity to delay sales. Agricultural enterprises (AEs), with comparatively larger storage options (around 2 tonnes), sell a smaller share immediately (about 27 percent), allowing at least part of their production to be marketed later in the season at more favourable prices. Overall, storage capacity and liquidity constraints significantly shape market behaviour, influencing both the timing of sales and the distribution of income along the maize value chain (Survey 2025 – see Table 4-2).

Larger agricultural enterprises (AEs) cushion input-price shocks through on-farm storage, delayed sales, stronger liquidity, and access to higher-ceiling investment subsidies. While AIPA's reports do not disaggregate subsidy flows by farm size, its 2024 schemes clearly favour capital-intensive actors (AIPA 2025). Survey data indicate that agricultural enterprises (AEs) receive by far the largest share of public support: their average subsidies for 2019–2023 amount to about 3.3 million MDL per enterprise. Peasant farms (PFs) receive a more moderate level of support (around 670,000 MDL on average), while smallholders (SHs) receive comparatively little (about 140,000 MDL). In proportional terms, AEs capture roughly 80% of total subsidy flows reported in the sample, PFs about 16%, and SHs around 3% (Survey 2025, Table 4-3).

Available evidence points to a clear asymmetry between where value and wages are created and where profits are captured. Farms generate most value added and employment, whereas traders and landowners capture the largest share of net operating profits. Within production, AEs benefit from superior storage, liquidity, and access to subsidies, while PFs and especially SHs face tighter constraints that translate into earlier sales, lower and more volatile yields, and greater exposure to climate and price shocks. Regional disparities and the shocks of 2022–2024 reinforced these inequalities without fundamentally altering the underlying pattern of value capture.

4.2. Labour Share and Structural Barriers to Inclusivity

Most wage payments and employment in the maize value chain are concentrated at the farm stage, while the overall labour share in value added remains relatively low ($\approx 10\text{--}20\%$ by proxy). This reflects high capital intensity, persistent informality, and the prevalence of unpaid family labour among smallholders (SHs) and peasant farms (PFs), which remain undervalued in national accounts.

Agriculture is among Moldova's lowest-paying sectors, with an average monthly gross earning of 7,952 MDL (≈ 404.8 EUR), compared to the national average of 12,209 MDL (≈ 621.6 EUR) (BNS 2024a). Permanent workers in agricultural enterprises (AEs) – such as mechanizers, agronomists, and technicians – typically earn around 10,000–22,000 MDL (500–1,100 EUR) per month in peak season under formal contracts. However, in some cases workers receive little or no pay during the winter (off-season), indicating uneven income distribution across the year and significant variability between farms. Peasant farms and family households tend to offer the least stable earnings throughout the production cycle (Field Notes, March 2025; FGs & Interviews, June 2025). Seasonal and casual workers, especially in smaller farms, are often paid informally in cash (≈ 50 MDL/hour), frequently without social insurance contributions. Wage delays and “no yield, no pay” arrangements were reported during drought years (2022–2023) (FGs & Interviews, June 2025; Interview farm leader Sept. 2025).

Informality disproportionately affects women, who are overrepresented in short-term and auxiliary roles (sorting, cleaning, bagging). Men dominate mechanised and better-paid tasks (≈ 700 MDL/day), while women often receive $\approx 350\text{--}450$ MDL/day for temporary, non-mechanised work. National data indicate that women constitute about 42% of the agricultural workforce but only one-third of salaried employees, underscoring persistent gaps in access to formal contracts, training, and advancement. The gender pay gap in agriculture remains at about 15–17%, similar to the national average (BNS 2024a; ILO 2024b). Survey data confirm a gendered distribution of labour: in maize production, women represent about 36% of employees in small farms (SHs), 23% in peasant farms (PFs), and 20% in agricultural enterprises (AEs) (Survey 2025).

Asset ownership disparities further constrain women's productivity and resilience: they hold less than 12% of agricultural machinery overall and only about 8% of irrigation equipment. In post-harvest activities, women are concentrated in low-paid, low-mobility positions, while some secure more stable jobs in administration and accounting – often one of the few pathways into enterprise decision-making structures (FAO 2022b). Access to training and professionalisation remains uneven. Women account for only 15–20% of students in secondary-level agricultural specialisations and for fewer than one-third of farm holders who attend agricultural training (BNS 2024d; FAO 2022b). Unequal access to vocational training also contributes to women's under-representation in technical positions in intensive agriculture.

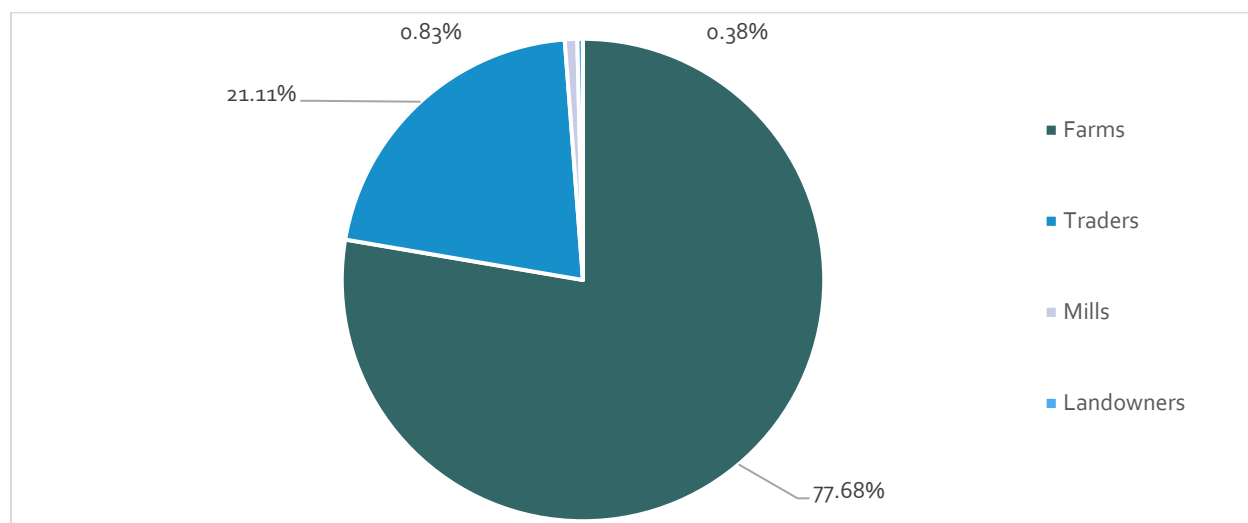


FIGURE 4-3. DIRECT VA DISTRIBUTIONS, MAIZE, MOLDOVA, 2023

The workforce in the maize chain is ageing, with many workers continuing beyond retirement age, often in informal or seasonal roles. Older women (50+) are over-represented in manual post-harvest tasks (cleaning, packaging, sorting), usually without contracts or social insurance (Field Notes, March 2025; FAO 2022b). Social protection coverage remains largely confined to permanent employees in agricultural enterprises (AEs), while peasant farms (PFs) and smallholders (SHs) rely on income diversification, remittances, or informal reciprocity networks.

Despite comparatively competitive wages for mechanizers and technical staff, maize production remains unattractive to youth. Young people aged 15–24 account for only about 21% of the agricultural labour force, and young workers account for just 2% of total agricultural employment, compared with 5% for those aged 65+ (BNS 2024a; 2024c). Focus groups reveal perceptions of hard physical work, limited career prospects, and low pay, with young women especially underrepresented in mechanised roles due to training gaps and gendered expectations (FAO 2022b; FGs & Interviews, June 2025).

Survey data confirm this pattern: among 48 interviewed farm leaders, most reported having no employees under 29. Youth represent around 7.9% of employees in larger AEs, 2% in PFs, and around 2.8% in SHs, reinforcing the generational imbalance across farm types. The age structure has significant implications for access to and the attractiveness of agricultural work: limited youth participation reduces the uptake of new technologies, constrains labour availability during peak seasons, and increases the sector's reliance on informal, older workers – weakening the resilience of the maize chain.

Economic growth in the maize value chain remains only partially inclusive. Although farms generate most employment and wage income, informality, gender segmentation, unequal access to training and productive assets, and the ageing workforce constrain equitable participation. Low youth involvement further limits innovation and labour availability, increasing reliance on seasonal and informal workers. Nevertheless, smallholders and peasant farms remain important for rural livelihoods and local food security, while improved training, advisory services, and cooperative initiatives offer opportunities for more inclusive growth.

TABLE 4-4: SUMMARY TABLE OF INDICATORS FOR FRAMING QUESTION 2

Framing Question 2: Is this economic growth inclusive? (To be completed with Social Analysis results)		INDICATORS	RESULTS
CQ2.1	How is income distributed across actors of the VC?	Disaggregated Value Added	Maize production generated over 1 billion MDL of value added in 2023 (Section 3.2). Value added is concentrated in the Centre region and in agricultural enterprises (AEs), which dominate export-oriented production. Smallholders (SHs) and peasant farms (PFs) contribute significantly to output (≈40% combined), but with lower yields and weaker commercialization.
		Total farm income	Farm-level profitability varies strongly by region and farm type (Table 3-2, 3-4). In 2023, maize was profitable mainly in Centre and South; structural losses appear under less favourable yield/price combinations. Income concentration reflects land inequality: 0.3% of farms control ~63% of utilized agricultural land , while 71% operate <1 ha (Section 2.4.1).
		Total wages and salaries	Maize-specific cost structure (Table 3-7) shows wages account for 9.6% of total VC costs , while depreciation represents ~50%, indicating a capital-intensive model. Absolute wage totals for maize are not disaggregated; the wage share estimate is maize-based.
		Total income accruing to marginalized and vulnerable groups	Smallholders (≈95% of holdings) operate fragmented plots with yields often below 3 t/ha. Lease payments (≈8% of VC costs) redistribute income to landowners, often elderly rural households, partly in kind (Section 2.4.2). Women, seasonal workers, and youth remain concentrated in lower-productivity segments.
CQ2.2	What is the impact of the governance systems on income distribution?	Income distribution among actors	Subsidy schemes (investment, irrigation, storage, machinery) are formally open to all farm types (Law 71/2023; GD 491/2023 etc.), but effective access favours capitalized farms capable of co-financing investments. Top-ups exist for young/women farmers (+10%) and cooperatives (+25%), yet structural land and capital concentration persist.
		Share of farm gate price in the final price (%)	Maize export prices remain below Constanța benchmarks by 6–7.5% (Section 3.1.4), reflecting logistics and trader margins. Trader profit margin is estimated at ~11% before tax (Table 3-6). Moldovan exports are highly concentrated (Romania 56% in 2023; Table 3-8), increasing vulnerability to external price shocks. Precise farm-gate-to-final-price ratios for maize are not available; distribution patterns are consistent with Kotyza et al. (2026) wheat benchmark (proxy).
CQ2.3	How is employment distributed across the VC?	Number of jobs (family, self- and formal employment) at different VC stages (permanent/temporary, skilled/unskilled...)	Approximately 83% of total employment (FTE) is generated at the farm level (Kotyza et al. 2026; cereal benchmark proxy). Downstream activities contribute relatively little to employment because of their capital-intensive character. Labour accounts for only 9.6% of total production costs. Jobs Created (FTE): 8,110
		Employment of women	Survey 2025 (maize farms) indicates women represent 36% of labour in SHs, 23% in PFs, and 20% in AEs . AWU-based female shares for maize are not available; cereal benchmark estimates (Kotyza et al. 2026 – proxy) suggest female labour input may approach ~40% of total AWU across the VC. Women remain concentrated in temporary and lower-paid roles.

5. IS THE VALUE CHAIN SOCIALLY SUSTAINABLE?

The social analysis of the maize value chain in Moldova follows the VCA4D Social Profile model, which assesses social sustainability across six broad domains of enquiry: working conditions, rights and access to land and water, gender equality, food and nutrition security, social capital, and living conditions. Each of these domains is further divided into 22 sub-domains and 63 guiding questions that evaluate both positive contributions and potential risks. These are scored and analysed through the Social Profile tool, which also generates a radar (spider) diagram to visualize the aggregate outcomes across the six dimensions.

This framework enables a systematic and evidence-based assessment of whether the maize value chain in Moldova are socially sustainable. The analysis goes beyond income and production indicators to examine the distribution of opportunities and risks, with particular attention to vulnerable groups, including women, youth, seasonal workers, and smallholders. In line with the VCA4D methodology, it addresses two overarching questions: whether the economic growth generated by the maize value chain is inclusive, and whether these chains are socially sustainable.

To answer these questions, the research team applied a mixed-methods design that combined a review of national and international literature and legal frameworks, key informant interviews with policymakers, farmer organizations, trade unions and agribusiness representatives, as well as focus groups and semi-structured interviews with farm workers, mechanisers, women farmers, and auxiliary laborers. These qualitative findings were complemented by survey and statistical data relevant to employment, wages, gender, education, and living standards.

The analysis presented in this chapter is organized into three main parts. First, it provides findings and analysis for each of the six domains, structured around the Social Profile framework. Second, it offers a summary and visual representation of the overall Social Profile for the maize value chain, highlighting the main issues, risks, and challenges. Finally, it draws conclusions and formulates recommendations addressing the two framing questions, with policy-relevant insights for EU Delegations, national authorities, and stakeholders.

By applying this methodology, the chapter provides an integrated assessment of the social dynamics within the maize value chain in Moldova, identifying both their contributions to inclusive development and the risks that need to be addressed to ensure long-term social sustainability.

5.1. Working conditions

Respect for Labour Rights

Moldova has ratified all eight fundamental ILO Conventions and is also a party to the ICESCR and ICCPR, as well as ILO Convention No. 190 on Violence and Harassment, ratified in March 2024 (ILO NORMLEX 2024). The legal framework is broadly aligned with international standards, guaranteeing freedom of association, non-discrimination, protection against forced and child labour, and the right to fair and safe working conditions. In practice, however, enforcement remains uneven, constrained by post-Soviet legacies, weak institutional capacity, and persistent socio-economic inequalities (Eurofound 2023; UN Moldova 2023).

Moldovan law provides for trade union rights, and agriculture is covered by sectoral collective agreements, yet in maize farming—especially larger and mechanized enterprises—unionization is rare. Agroindsind, the main agricultural union, estimates about 40,000 people employed in the sector, including seasonal workers, but acknowledges that workers in most mechanized cereal enterprises are not unionised (Field Notes, March 2025). Wage setting therefore tends to be individualised, with collective approaches limited to informal initiatives (Eurofound 2023; FG mechanisers, Centre, June 2025). Union leaders underline the limits of their leverage: benefits such as vouchers for sanatorium stays or children's treatment persist, but remain modest and fall short

of effective protection, especially compared to the Soviet-era system, when trade unions distributed welfare benefits such as access to sanatoria. Employers frequently avoid engaging in social dialogue with trade unions, while subsidies tend to favour large agro-holdings while bypassing small and medium producers (Field Notes, March 2025). Workers in focus groups likewise reported they did not expect management to negotiate with trade unions, which they tacitly considered a Soviet-era legacy—an institution closely tied to the state, with little influence today (FG employees, Centre, June 2025; FG canteen workers, South, June 2025). Still, the National Trade Union Confederation (CNSM), which brings together several unions including Agroindsind, periodically discusses action plans and frameworks for collective bargaining and collective agreements between employees and employers' representatives. Between 2004 and 2024, it concluded 21 collective agreements; however, Agroindsind's role in this process appears to have been rather passive (Sclifos 2025; Agroindsind 2022).

The Labour Code requires written contracts, but informality remains pervasive in agriculture, accounting for about two-thirds of total employment in 2023 (RM Labour Code 2003/2019; ILO 2024a; BNS 2024a). A dual system is visible in the field: permanent mechanisers at larger farms usually work under written contracts with health insurance and monthly wages ranging from 10,000 to 20,000 MDL (Field Notes, March 2025; Interview mechaniser, South, June 2025; interview farm leader, September 2025). Seasonal and casual workers, however, are often paid daily in cash. One medium-sized enterprise in the Centre reported paying skilled mechanisers 140 MDL/hour in 2025, about double the minimum wage, while seasonal fruit harvesters were paid by kilogram (Field Notes, March 2025). Focus groups confirmed recurrent wage delays, particularly in drought years: "No production means no wages—or at least delays" (FG mechanisers, Centre, June 2025). Such economic vulnerability increases dependency and reduces bargaining power for rural households.

Risks of Forced and Child Labour

Forced labour is legally prohibited, and no systemic cases have been identified in maize farming (RM Labour Code 2003 (2019); ILO 2021a; US DOL 2024; Field Notes, March 2025; FGs & Interviews, June 2025). Nonetheless, risks of exploitation persist. In one focus group, mechanisers noted that their wages depended on the harvest yield and weather conditions: "the cost per hectare was 12–14,000 lei, but we harvested only 800 kg. If there's no yield, we get no pay" (FG mechanisers, Centre, June 2025). Older mechanisers also continue working well beyond retirement age, often out of necessity. As one 77-year-old mechaniser at a large farm explained: "I have nothing to do at home; I'll keep working as long as I can" (FG employees, Centre, June 2025).

The minimum legal working age is 16, and hazardous work is prohibited under 18. National and international data indicate that about 97% of working children in Moldova are employed in agriculture, usually on family farms (IPEC, NBS & Dayioğlu 2010; US DOL 2024). The Labour Inspectorate has identified isolated cases of adolescents aged 15–16 engaged in day labour during harvests, particularly in orchards and smallholder cereal production (Field Notes, March 2025). By contrast, medium and large mechanized farms generally do not employ minors in cereal field operations, especially in mechanized tasks, although youth and women are more frequently engaged in auxiliary roles such as canteen, cleaning, or seasonal harvesting.

Official statistics show that school enrolment reach 100% in primary and secondary education (BNS 2025). However, many children involved in agricultural work—including maize production within family farming—continue to combine schooling with seasonal labour (IPEC, NBS & Dayioğlu 2010; US DOL 2024). Fieldwork in March and June 2025 suggests that teenagers may assist families during harvests or school vacations. While school attendance is high, combining studies with agricultural work exposes children to fatigue and raises the risk of absenteeism or early dropout (ECRI 2024; Field Notes, March 2025; FGs & Interviews, June 2025).

Moldovan Labour Code explicitly prohibits minors from engaging in hazardous work such as pesticide application, handling heavy loads, or operating dangerous machinery (RM Labour Code 2003/2019). In practice, however, these protections are only partially effective, as most child labour occurs informally on family farms or through seasonal day labour. Medium and large mechanized farms producing cereals generally do not employ minors in

field operations, though young people may occasionally be involved in auxiliary tasks such as maintenance, sorting, transport, or support services. Enforcement capacity remains weak: in 2022, only 18 violations of child labour were officially recorded nationwide, a figure that almost certainly underestimates the true scale of the problem. Despite formal prohibitions, children engaged in informal agricultural labour remain insufficiently protected (US DOL 2024).

Job Safety

Moldova's maize value chain is regulated by a relatively strong legal framework on occupational safety and health (OSH), but implementation remains uneven. The Labour Code and Law No. 186/2008 require employers to provide safe working conditions, rest periods, training, and personal protective equipment (PPE). Government Decision No. 353/2010 specifies minimum OSH provisions in employment contracts, with oversight entrusted to the State Labour Inspectorate.

Although OSH provisions are clearly set out in law, enforcement capacity is weak. The Labour Inspectorate employs only 55 inspectors nationwide and faces restrictions on unannounced visits (Field Notes, March 2025; ILO 2021b; ILO 2024a). Farm representatives acknowledged that PPE is sometimes provided but not consistently used. Workers reported reluctance to wear masks, citing discomfort and heat. Mechanisers reported limiting exposure during spraying by staying inside tractor cabins, while admitting that protective gear is often avoided: "We used to [wear masks], but in the heat it's hard to keep them on" (FG mechanisers, medium farm, Centre, June 2025). Gloves are widely used, but respirators and masks are often abandoned—especially during chemical mixing, when risks are greatest. Workers also recalled the absence of post-exposure protections, noting that "during the kolkhoz, especially when spraying chemicals, they gave us milk—but that's all gone now" (Interview, mechaniser, South, June 2025), referring to a Soviet-era practice whereby workers exposed to hazardous substances were given milk as a form of compensation or presumed detoxification, though it offered little real protection. In some larger enterprises, however, labour protection specialists are formally contracted and annual training sessions are held. Employees noted improvements in precision spraying, packaging controls, and environmental safety measures, though they expressed scepticism about consistent enforcement (Field Notes, March 2025; FG employees, Centre, June 2025).

Fieldwork also confirmed that fatigue and long working hours may compromise safety during peak harvests. Mechanisers in medium-sized farm described working six or seven days a week for up to 12 hours a day, while auxiliary staff such as canteen workers also reported extended shifts (FG mechanisers, Centre, June 2025; FG canteen workers, South, June 2025). Such labour intensity undermines compliance with rest and overtime rules and heightens accident risks.

When asked about incidents, focus group participants gave ambivalent answers: some denied hearing of poisoning or serious injuries, while others responded ironically that "a little poison makes you more resilient" (FG, animal farm employees, South, June 2025). Despite such remarks, accidents do occur. Official statistics report low rates—fewer than 1 per 1,000 employees, with fatalities under 10%—but these figures likely reflect significant underreporting due to widespread informality and limited enforcement (BNS 2024a; ILO 2024a). The Labour Inspectorate, critically understaffed and with restricted inspection powers, lacks the capacity to monitor high-risk sectors effectively (Field Notes, March 2025).

Labour inspectors noted that protection is strongest in larger, formal enterprises, where OSH committees are active, training is systematic, and modern equipment reduces exposure. By contrast, seasonal harvest crews and smallholder farms remain vulnerable, often outside effective inspection reach. Daily labour contracts exclude medical insurance, leaving workers to purchase coverage individually; in practice, many remain without adequate medical protection (Prohnițchi & Lupușor 2021). A recent amendment to the law aims to further formalize day labour by introducing the "e-Zilieri" digital registry and extending social protection coverage through the recording of working hours and employment history (Busuioc 2026).

Overall, job safety in maize farming is moderate but uneven. The legal framework is clear and well established, yet enforcement gaps persist, especially in informal and seasonal labour, chemical handling, and during long harvest shifts. Economic pressures, particularly in drought years, further encourage corner-cutting on safety. Targeted enforcement during peak seasons, broader availability of heat-adapted protective gear, and simplified schemes to formalize day labour would represent meaningful steps toward safer working conditions.

Salaries and Job Attractiveness

Wages in agriculture remain among the lowest compared to other sectors of Moldova's economy (Eurofound 2023; BNS 2024a). Yet in maize production, certain categories of employees—particularly mechanisers, agronomists, and administrative staff—can earn salaries comparable to, or even higher than, the national average wage, which stood at 13,170 MDL/month gross in 2024 (approx. 687 EUR) (BNS 2024).

Fieldwork confirms that mechanisers and permanent staff may receive substantially higher earnings during peak seasons, sometimes up to 20,000 MDL/month (≈1043 EUR), especially when hourly pay and performance-related bonuses are included (Field Notes, March 2025; FGs & Interviews, June 2025). However, these peaks are seasonal: during winter or low-activity periods, wages drop significantly, and some employees report income gaps or delays. Seasonal and casual workers, who are typically paid informally, often receive much lower remuneration (≈50 MDL/hour in the central region), with vulnerability to wage delays or cuts in poor harvest years (FGs & Interviews, June 2025).

A head of a large cooperative farm in the central region (2,100 ha) confirmed these patterns. In his enterprise, administrative staff earn around 20,000 MDL/month net, mechanisers about 14,000 MDL/month net, while seasonal workers are paid 50 MDL/hour. He also noted that salaries have increased steadily by 10–15 percent annually in recent years, with reserves set aside to cover wages during the winter months. The main factors influencing wage levels are productivity, market prices, and access to qualified workers. Gender-based differences were not observed in his farm, though women remain underrepresented in technical positions (Interview farm leader, Centre, September 2025).

Despite relatively competitive wages for mechanisers and technical staff, agricultural work in maize remains unattractive for many young people. National statistics show low youth participation in agriculture, with only about 21 percent of the 15–24 labour force engaged in the sector (BNS 2024a). Focus groups highlight widespread perceptions among youth that farm work is physically demanding, poorly paid, and offers limited career progression (FGs & Interviews, June 2025). Young women are especially underrepresented in mechanized or technical jobs, reflecting persistent training gaps and gendered expectations (FAO 2022b; FGs & Interviews, June 2025).

Moreover, the age structure of the rural population engaged in agriculture reveals a pronounced trend toward ageing, a pattern confirmed both in statistical data and during field visits and interviews with employees of maize enterprises. Young people (15–24 years) account for only about 2% of total agricultural employment, compared to 4% of the rural working population as a whole. At the other end of the spectrum, agricultural workers aged 65 and above make up 5% of the workforce—two and a half times more than youth—highlighting both the ageing profile of the sector and the persistence of older workers beyond retirement age (BNS 2024c).

Our survey data on maize enterprises broadly confirm the national tendency of low youth participation in agriculture and, in some respects, show an even more accentuated pattern. Among the 48 farmer-leaders interviewed, most reported having no employees under the age of 29 (see Table 5–1). Where young workers are present, their share remains very limited. Agricultural enterprises (AEs, from 390 ha upward) employ proportionally more youth (around 7.9 percent) than peasant farms (PFs, up to 390 ha), where the share is around 2 percent, while in smallholders (SHs, up to 10 ha) it stands at about 2.8 percent. This highlights the ageing workforce in maize production and reinforces the generational gap already observed in national statistics.

Migration also undermines job attractiveness. Many young people prefer opportunities abroad or in the urban service sector, perceiving agricultural employment as unstable and exhausting, with few long-term benefits. Older mechanisers themselves acknowledge the generational gap, noting that brigades are ageing, with most workers now over 50. As one 36-year-old mechaniser remarked: “Young people today aren’t into tractors like we are” (FG mechanisers, Centre, June 2025).

5.2. Land and water rights

Adherence to VGGT and Other International Standards

Moldovan agribusiness companies active in the maize value chain rarely make explicit public declarations of adherence to the Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forests (VGGT). VGGT promotes secure tenure rights, transparency, participation, equity (including gender equality), rule of law, sustainability, and effective grievance mechanisms. Nonetheless, both government institutions and private actors operate in ways that broadly reflect the spirit of the VGGT. FAO’s 2015 national workshop and country analysis helped map Moldova’s tenure framework and provided recommendations for improvement, contributing to institutional awareness and gradual policy alignment (FAO 2015). Since then, sectoral reforms and company practices have tended to converge with international good governance principles, even if not framed under the VGGT label. Firms generally emphasize compliance with recognized product and market standards such as GLOBALG.A.P. or GRASP,⁸ and government strategies prioritize sustainable land and water management in line with the European Union’s agricultural acquis (GLOBALG.A.P. 2023a; GLOBALG.A.P. 2023b; Moldpres 2024; Field Notes, March 2025). In this way, both state policy and agribusiness practices contribute to responsible tenure governance consistent with the VGGT, albeit without direct reference to the framework.

Policy directions reinforce aspects of tenure governance that are broadly consistent with the VGGT. The National Strategy for Agriculture and Rural Development 2023–2030 sets objectives for sustainable soil and water management and irrigation development (GRM 2023a). In practice, access to land in maize production continues to rely heavily on leasing from numerous smallholders. Consolidation occurs incrementally through leasing, frequently mediated by local leaders who are often connected to farm entrepreneurs (Calancea and Horjan 2006; Field Notes, March 2025; FGs & Interviews, June 2025). Plot owners often prefer to rent out their parcels rather than sell, providing steady cash income or security while retaining long-term rights (FGs & Interviews, June 2025). However, these practices are not framed as explicit VGGT compliance, and public disclosure of such alignment is rare.

Regarding due diligence for large-scale land acquisitions, the “Guide to Due Diligence of Agribusiness Projects that Affect Land and Property Rights,” developed by the Technical Committee on Land Tenure and Development for the AFD group, provides a recognized international framework (Guide to Due Diligence 2014). It sets standards on contracting, consultation, grievance redress, and protection of legitimate tenure rights. However, there is no public evidence that Moldovan agribusinesses systematically apply this framework. Moldova’s agrarian development has been shaped less by headline land acquisitions and more by gradual lease-based consolidation, limiting the visibility of formalized due-diligence processes (ACSA & FAO 2015; Field Notes, March 2025). Where donor or development finance institutions such as EBRD or AFD are involved, application of the Guide is plausible by policy requirement, but project-level disclosures for Moldova remain limited.

Transparency, Participation and Consultation

⁸ An internationally recognised farm assurance standard that sets requirements for Good Agricultural Practices (GAP) across farm production, GLOBALG.A.P. and its add-on GRASP cover are primarily aimed at ensuring that agricultural products entering retail markets are safe, sustainable, and responsibly produced (GLOBALG.A.P. 2023a; GLOBALG.A.P. 2023b).

A distinctive feature of Moldova's agricultural structure is the widespread system by which large farms cultivate land through the aggregation of numerous small parcels leased from non-farming households. This pattern reflects the post-socialist restitution of land into fragmented individual ownership, combined with limited capacity or incentives for smallholders to farm independently. As a result, agricultural enterprises operate through extensive lease networks, often coordinated by local intermediaries (locally called "leaders") who manage contracts for dozens of landowners. While not unique to Moldova, this system is pervasive and structurally central to its maize value chain, enabling economies of scale without formal land consolidation. As a valuable asset for households, land becomes—through these leasing arrangements—a source of social and economic subsistence. At the same time, this system embeds production in dense local social relations, where contractual arrangements coexist with trust-based practices, while asymmetries of information and bargaining power tend to favour larger operators.

In Moldova's maize value chain, information disclosure to local stakeholders is primarily informal and mediated. Still, most non-farming households lease their land to larger farms through local "leaders", who act as intermediaries between households and agricultural enterprises, under written contracts that specify cash or in-kind rents. Owners value the predictability of these arrangements: *"Whether it rains or not, that's what we're given... Even in a bad year, they still give us what's owed"* (FG, animal farm employees, South, June 2025). That said, proactive, community-wide briefings before projects are launched are uncommon, and day-to-day information often travels through farm leaders or managers rather than via open meetings (FGs & Interviews, June 2025; Discussion plot owners, Căușeni, August 2025). Where leaders are trusted, this mediation creates stability, but it also concentrates gatekeeping power.

Legal and institutional frameworks regulating land and markets are publicly codified and, in principle, accessible. FAO's country analysis documents procedures for land consolidation support (eligibility, steps, documentation) (ACSA & FAO 2015), and the National Strategy for Agriculture and Rural Development 2023–2030 clarifies responsibilities for irrigation and market organization (GRM 2023a). In practice, however, smallholders and workers face capacity constraints, distances to administrative Centres, and the erosion of local infrastructure (e.g., closed mills, limited collection points), which raise transaction costs for engaging with formal procedures (Field Notes, March 2025). Digital information is increasingly used, but time constraints and uneven reliability limit its uptake (FG employees, Centre, June 2025).

Participation and consultation in decision-making are modest. At the enterprise level, negotiations are individualized; union structures in mechanized farms are weak, and voice channels tend to be one-to-one with managers (Field Notes, March 2025; FGs & Interviews, June 2025). Leaders do occasionally solicit views but retain decision power: *"He comes and says what needs to be done, then asks what we think... but in the end, he decides"* (FG employees, animal farm, South, June 2025). In land relations, long-standing lease ties foster continuity and trust (e.g., multi-year contracts; predictable in-kind rent), yet they rarely amount to landscape-level, inclusive consultation (FG mechanisers, Centre, June 2025; FG employees, Centre, June 2025).

Relations between non-farming landowners and large farm operators in Moldova's maize value chain are shaped by a complex interplay of trust, continuity, and power. Durable personal ties underpin predictable lease arrangements—often honoured even in difficult years through ad-hoc support such as extra grain or deferred payments (FGs & Interviews, June 2025). Yet these relationships are also rooted in social memory and hierarchies: in places like Căușeni, farm managers associated with former collective-farm elites are viewed more skeptically than newer entrepreneurs who returned from abroad and founded farms, seen as "more reliable" partners (Discussion plot owners, Căușeni, August 2025). While farm operators largely set the terms of engagement, landowners maintain a degree of leverage through contract stability, community norms, and, in some cases, long-standing intermediaries who manage leases for dozens of households (Interview with mechaniser, South, June 2025). These intertwined networks of dependence and trust ensure stability but also reinforce asymmetries of power and local influence.

Consent is chiefly individualized—expressed through private lease contracts—rather than collective FPIC-style processes. Land consolidation proceeds gradually via lease aggregation, which reduces the visibility of structured consent protocols. Public procedures for supporting land re-parcelling exist (ACSA & FAO 2015), but systematic, community-wide consent in everyday value-chain decisions is rarely documented in the field evidence (Field Notes, March 2025).

Overall, transparency and participation rest on a mix of formal rules and informal practice. Codified laws and written contracts provide clarity and predictability; yet proactive disclosure, inclusive consultation, and collective consent remain limited. Stakeholders largely rely on mediated relations with farm leaders—effective for continuity, but weak for shared decision-making and collective voice.

Equity, Compensation and Justice

Locally applied rules in Moldova’s maize value chain provide a baseline of security for landowners, but equitable access to land and water remains uneven. Maize production relies on leases between large enterprises and smallholders, who typically receive in-kind rents. Fieldwork in the South confirmed fixed grain payments: *“They give 500 kilograms per hectare, even if the harvest is bad”* (Plot Owners Discussion, Căușeni, August 2025). Such predictability is highly valued by owners, who depend on grain for flour, animal feed, or oil, and sometimes use it for informal barter. In Căușeni, for example, quota owners receiving about 700 kg of wheat or corn per 1.2–1.5 ha noted that grain could be exchanged for services such as house or yard repairs (Plot Owners Discussion, Căușeni, August 2025).

Payment is more often made in produce than in cash, especially in rural areas, where grain seeds directly support household self-sufficiency. Villagers emphasized the importance of having *grain for food and feed*, while absentee or urban owners tend to prefer cash (FG mechanisers, Centre, June 2025). Producing payment, however, comes with storage and processing costs, while cash carries inflation risks. Overall, the rent system is seen as fair when contracts are honoured, with typical payments ranging from 400 kg of wheat, corn and/or sunflower on smaller farms to 1.3 tons on large holdings, plus occasional extras such as flour or oil for holidays (FGs & Interviews, June 2025; Plot Owners Discussion, Căușeni, August 2025).

Land remains a critical safety net and inheritance asset. Most households are reluctant to sell, citing attachment, symbolic value, and its role in securing their children’s future: *“Land is for the children—we don’t sell”* (FG employees, Centre, June 2025). Those who do sell are typically heirs living abroad or households under urgent financial pressure. Participants noted that while most families try to hold on to their land quotas, some are sold in moments of urgent need. One young woman recounted that she had sold one of her land shares to cover urgent household repairs. (FG canteen workers, South, June 2025). Others confirmed that such sales occur mainly *“to survive,”* especially when households have multiple shares and can part with one while keeping others. Market prices vary between 50,000–100,000 MDL (~2,500–5,000 EUR)/ha, but many owners prefer annual rent to outright sale. At the same time, farm leaders and larger enterprises continue to accumulate plots, driving gradual land concentration at the expense of smallholders.

Gender disparities further reinforce these inequities: although women hold about 36 per cent of farm titles, they control only around 19 per cent of farmland and are often confined to smaller, less capital-intensive holdings. While legislation grants equal property rights, practical barriers and entrenched social norms still restrict women’s effective control and use of land resources (FAO 2022b).

Alongside leased quotas, most rural households maintain backyard garden plots that remain essential to food security. Families cultivate vegetables, fruit trees, and vines, while keeping poultry or small livestock. These gardens supply food and preserves but demand constant labour: *“In the village, even after work, you go home and there’s always something to do—the garden, the animals, the house”* (FG employees, Centre, June 2025). While some acknowledged the heavy workload—*“To get that one kilo from your garden, you’ve got to work for it. You’d rather go*

buy a kilo or two—you're rested" (FG employees, Centre, June 2025)—most saw them as indispensable. Backyard plots thus complement leased land as a more direct form of food security, albeit with higher household effort.

Land access is negotiated in the maize case reviewed primarily through voluntary leases and gradual consolidation. Compensation is embedded in these contracts and generally considered fair. However, dependence on local leaders to mediate contracts and payments concentrates power and reduces transparency. While this system maintains stability, it concentrates bargaining power in the hands of local leaders who broker deals, leaving smallholders dependent on personalized relationships rather than transparent statutory mechanisms (ACSA & FAO 2015; Bajura 2018; Field Notes, June 2025).

Formal conflict resolution mechanisms exist—through contracts, mediation bodies, and courts—but disputes are usually managed informally by farm heads. Owners and workers described this as trust-based but leader-centric, sustaining continuity while limiting transparency and collective bargaining. Landowners often rely on long-standing arrangements with intermediaries linked to large farms, who manage leases for dozens of households (Interview with mechaniser, South, June 2025). Field observations confirm that many farm heads not only oversee production but also act as informal community authorities, often subordinating or influencing local administrative representatives. This system provides stability but weakens the collective voice and leaves vulnerable groups with little recourse outside personalized relationships.

In sum, Moldova's maize value chain exhibits reliable but uneven systems of equity and justice. Secure contracts, predictable in-kind rents, and backyard plots provide households with food security and stable income. Yet equity is constrained by land concentration, weak bargaining power, gender disparities, and reliance on trust-based, leader-mediated arrangements rather than transparent and inclusive institutional safeguards.

Accessibility of Water for Daily Use and Irrigation

Access to water in Moldova remains uneven between urban and rural areas and between smallholders and larger agricultural enterprises. The Water Law No. 272/2011 provides a formal framework for water rights and irrigation use, yet in practice, access is shaped by geography, infrastructure, and local arrangements.

In Moldova, access to water is regulated by the Water Law No. 272/2011, which aligns with the EU Water Framework Directive and treats water as a public good; irrigation or industrial use requires permits issued by the Environment Agency, while households may use wells and springs for personal needs under sanitary norms. Larger irrigation systems are formally managed by the Agency for Land Improvements and Irrigation or, in some rehabilitated cases, by Water Users Associations (WUAs), but only about 10–12% of arable land is irrigated due to degraded infrastructure (Overcenco, Arhip & Traistă 2021). In practice, farmers and villagers rely heavily on wells, ponds, or small pumps, with local farm leaders or mayors often mediating access. Focus groups highlight chronic deficits, especially in southern regions: "There's no water. We can't do anything else. No irrigation. The spring channel is dry. Even the pond is dry" (FG animal farm, South, June 2025; Field Notes, March 2025).

Survey data from the ICJPS 2025 Social Resilience Survey highlight these disparities: while nearly half of urban respondents rate piped water services as "rather high" or "very high" quality (49.6% and 24.9%, respectively), only about one quarter of rural respondents share this view. In rural areas, 21.9% report having no piped water service at all, and 12.1% consider the quality "very low," compared to just 2.9% and 4.8% in urban areas (ICJPS Survey 2025).

Focus group evidence reinforces these findings. In some central villages, people rely on artesian wells: "We have water there, from an artesian well—the whole village uses it" (FG mechanisers, Centre, June 2025). Others emphasized trust in deep groundwater, even if test results are unclear: "*We use artesian water—from over 100 meters deep. The best filter is the earth itself. We kind of trust the quality*" (FG pig-farm employees, South, June 2025).

Yet inequalities persist: while some communities report sufficient and clean artesian water, others face chronic shortages (FGs & Interviews, June 2025).

For agriculture, around 217,000 hectares are officially equipped for irrigation, but much less is irrigated annually due to degraded Soviet-era systems and high pumping costs (GRM 2023a; Overcenco, Arhip & Traistă 2021). Farmers consistently report that rainfall variability and drought are decisive factors: *“We do everything on time, but still... it all depends on nature—if it rains, we get a harvest”* (FG animal farm employees, South, June 2025). Our survey confirms this perception: climate and irrigation constraints were by far the most frequently cited problems in maize production (28 mentions across all farm types/48 participants—households up to 10 ha, PFs between 10 and 380 ha, and AEs above 380 ha). Proposed solutions also converge on irrigation, with 13 mentions, making it the single most emphasized area for improvement. In practice, larger and better-capitalized farms near major rivers have greater access to irrigation infrastructure, while smallholders in central and southern regions rely on wells, ponds, or informal pumping, leaving them highly vulnerable to drought (World Bank 2023a).

The water dimension reinforces the land tenure challenges. Chronic irrigation deficits and recurrent droughts are widely recognized by farmers and workers (FGs & Interviews, June 2025). The national strategy assigns responsibilities for irrigation development and water management, yet field interviews indicate a persistent gap between policy ambition and local infrastructure realities (GRM 2023a; FAO 2022a; Field Notes, March 2025, including discussions with MAIA and FAO representatives). This gap has tenure implications, as access to reliable irrigation directly shapes the value of leased plots and influences long-term investment incentives.

Overall, although legal provisions and international initiatives (FAO, AFD, Swedish Environment Institute) support sustainable water management, significant inequalities persist in access to water for both daily use and irrigation. Larger farms benefit most from established infrastructure and formal systems, whereas smallholders remain reliant on wells, river water, and rainfall—leaving them particularly exposed to drought and climate variability.

5.3. Gender equality

Economic Activities: Women’s Participation and Risks of Exclusion

Despite a comprehensive legal framework supporting gender equality, significant disparities persist in Moldova’s agricultural sector, particularly in the maize value chain. Women participate visibly across these chains, yet their work is often informal, poorly paid, and offers limited opportunities for advancement. In practice, informality, task segregation, and restricted access to training and machinery continue to reinforce structural inequalities.

According to national data, women represent about 42 per cent of the agricultural workforce. Their participation is particularly high in family-based farming, where over 70 per cent of unpaid family workers are women—highlighting their central yet often invisible contribution to household agriculture. By contrast, women account for only one-third of salaried employees, reflecting unequal access to formal and better-paid positions. Among farm holders and patrons, the statistical base is too small for robust generalization, yet available evidence suggests that women remain a minority (BNS 2024c). This pattern underscores persistent gender gaps in land access, decision-making, and capital-intensive farming. Female participants also described a double burden of work: *“We do both men’s and women’s work”* (FG canteen workers, South, June 2025), with several expressing scepticism about reaching retirement age.

For historical reference, women were significantly under-represented among registered agricultural holding managers in 2011, accounting for only 14.3% (494 out of 3,446). Their educational profile also differed from that of men. While the largest share of managers overall held higher agricultural education ($\approx 42\%$), women were less likely to do so (28.9% vs. 44.0% of men) and were over-represented among those without any agricultural training (42.9% vs. 29.7%). Only 11–17% of both men and women held vocational or secondary-specialized agricultural

qualifications (BNS 2011). These disparities suggest persistent gendered barriers to accessing agricultural training, leadership roles, and professionalization within legally registered holdings.

Our survey data confirm the gendered distribution of agricultural labour. In maize-producing small farms (SHs, up to 10 ha), women make up around 36 per cent of employees, compared to about 23 per cent in peasant farms (PFs, 10–380 ha) and 20 per cent in agricultural enterprises (AEs, 380 ha and above) (see Table 5-1). These findings reinforce the national pattern of under-representation in larger, more mechanized enterprises. Gender disparities are even sharper in maize production, where technical and mechanized roles—tractor driving, pesticide spraying, combine operation—are almost exclusively performed by men, while women remain concentrated in manual or auxiliary tasks such as cleaning, sorting, or livestock care (Field Notes, March 2025; FGs & Interviews, June 2025). National strategies such as the *Gender Equality Program (2023–2027)* aim to close these gaps, yet rural evidence points to a persistent mismatch between policy ambitions and entrenched gender roles, particularly in mechanized professions (MMPS RM 2023; FAO 2022b).

TABLE 5-1: SOCIAL INDICATORS BY FARM CATEGORY – MAIZE VC

Farm category	Number of farms	Avg. women's share (%)	Avg. technical staff (accountant, manager)	Avg. mechanisers (number)	Avg. youth share (<30, %)
Peasant Farms (PF)	18	23.11%	1.94	1.44	2.00%
Agricultural Enterprises (AE)	15	20.24%	5.60	7.80	7.91%
Smallholders (SH)	15	36.36%	0.81	0.65	2.78%

Source: VCA4D field survey conducted in August–September 2025 (n = 48). Values are rounded for clarity.

Vocational education reinforces these inequalities. In 2023/24, women represented only 15–20 per cent of students enrolled in agricultural specializations at the secondary technical level (BNS 2024d; FAO 2022b). As one worker observed, *“If a woman studied and trained—like Andrei did with tractors and combines—she could do the job just as well, maybe even better than a man. But in his class, there were no girls at all. Women simply don’t choose that field”* (FG employees, Centre, July 2025).

National data (BNS 2024c) reveal a structural imbalance linked to unequal access to technical and mechanical training, shaped by cultural barriers and weak incentive mechanisms. Women are overrepresented in low-skilled and administrative roles, but underrepresented in mechanized and technical occupations. More precisely, while women constitute a majority (53%) of skilled agricultural workers with higher education (who account for 6% of the total), they remain a minority among those with secondary technical (25%) and post-secondary technical education (40%). This pattern reflects men’s stronger presence in mechanized roles and women’s concentration in less technical or administrative positions.

Although equal pay for equal tasks is generally respected in Moldova’s agricultural sector, women’s access to better-paid positions remains limited. During a focus group at a southern farm, employees confirmed that wages are the same for identical tasks but noted that *“there are fewer women who are trained, and that makes the difference”* (FG, South, June 2025). FAO (2022) refers to this as a “skills pipeline problem”: systemic and cultural barriers discourage women from pursuing technical training and higher managerial roles, which in turn restricts their mobility within agricultural enterprises. Thus, while equal remuneration is often reported for equivalent work, women’s underrepresentation in technical, mechanical, and marketing roles perpetuates income disparities. National data confirm that the gender pay gap in agriculture remains around 15–17% (ILO 2024b; BNS

2024a), a level broadly comparable to the economy-wide average depending on the indicator used (monthly or hourly earnings).

Informal and precarious work presents another major exclusion risk. The NBS' *Labour Force Survey* shows that 83.7 per cent of women in individual agricultural enterprises work without contracts, compared to 44 per cent of men. Even in larger enterprises, more than half of female employees remain informally employed, compared to 38 per cent of men (BNS 2024e; FAO 2022b). The 2017 "Day Labourer Law" created a framework for short-term contracts, but seasonal workers—predominantly women—rarely benefit from social insurance or medical coverage (Prohnițchi & Lupușor 2021).

In response to these shortcomings, an amendment to the law will enter into force on 1 June 2026, establishing a registry called "e-Zilieri," through which each day labourer will receive a digital voucher used to record information on the work performed. Under this system, every hour worked will count toward seniority and, subsequently, social protection entitlements. Since this legislative change had only just entered into force at the time this study was completed, it remains unclear to what extent the amendment will effectively contribute to the formalization of day labourer's work (Busuioc 2026).

Despite these barriers, women contribute at multiple points along the maize value chain. As smallholders, they often diversify production to ensure household food security and supply local markets. Smallholders as a whole accounted for about one-third of the national maize yield (BNS 2024a). On average, female landholdings are just 60–70 per cent the size of male-headed farms, which pushes many women toward mixed farming and vegetable production rather than heavily mechanized crops (FAO 2022b; Field Notes, June 2025). Women are also overrepresented in seasonal harvesting and sorting: in one large farm, 70 per cent of seasonal workers were women, most employed as day labourers (Field Notes, June 2025). Employers acknowledged that women could handle mechanized tasks but emphasized that training opportunities remain scarce.

Women are further concentrated in post-harvest processing—sorting, cleaning, and small-scale food preparation—where jobs are low-paid and offer little scope for advancement. In trade, they are highly visible in local and small-scale markets but largely absent from bulk cereal trade and exports, where capital and networks dominate.

By contrast, some women have secured more stable roles in administration and accounting. These positions, common in medium and large enterprises, typically provide formal contracts, stable wages of around 11,000 MDL per month (about €570/month), and partial responsibility for financial management. They remain one of the few entry points for women into management structures otherwise dominated by men (Field Notes, March 2025). National data indicate that women hold about half of administrative positions in agricultural enterprises and over 75 per cent of jobs in rural public administration institutions (BNS 2024c). While not fully representative of maize enterprises, these figures suggest that women nevertheless play a significant role in rural community life, even if underrepresented in senior leadership positions such as mayors or enterprise directors.

Access to resources and services

Women in rural areas own very few productive assets beyond land. According to FAO's national gender profile, they hold less than 12 per cent of agricultural machinery overall, with mini-tractors as a rare exception, and only about 8 per cent of irrigation machinery; 92 per cent of holdings with irrigation equipment are male-headed (FAO 2022b). These gaps significantly constrain productivity and adaptation potential, particularly under recurrent droughts. Smallholders in general operate with obsolete equipment and rarely purchase new machinery; this particularly disadvantages women, who already face lower levels of asset control (FAO 2019; FGs & Interviews, June 2025). Some female farm employees described ambivalent experiences with backyard garden plots: while such plots provide food security, they also contribute to women's workload when combined with formal

employment (FGs & Interviews, June 2025). The male-dominated technical workforce, while women are concentrated in non-mechanized roles, perpetuates their limited access to productive assets.

In law, Moldova's policy framework affirms gender equality and non-discrimination, including in agriculture and rural development (MMPS RM 2023; GRM 2023a). In practice, however, women remain disadvantaged in land control. Although roughly one-third of holders are women, they manage only about 19 per cent of the land in agricultural holdings, and their average plot size is significantly smaller than that of male farmers (FAO 2022b). These disparities reduce women's ability to use land as collateral, limit their bargaining capacity, and constrain their participation in higher-value segments of maize chains.

Agricultural credit remains costly and collateral-based, restricting many farmers, particularly smallholders (FAO 2019). A MAIB consultant noted that women and men are offered equal access to agricultural loans, with documented examples of female farmers successfully obtaining credit at standard interest rates, which are considerably lower than micro-crediting schemes (Field Notes, March 2025). He also reported a positive trend in women entrepreneurs, including in agriculture, accessing credit: while only 8.8 per cent of business borrowers were women a few years ago, the share has now increased to 22–25 per cent. This change reflects both a gradual shift in mentality and stronger state support for women in entrepreneurship, including agriculture (Field Notes, March 2025). Local authorities in one central district also reported organizing initiatives to promote women entrepreneurs at national events such as the “Made in Moldova” exhibition (Field Notes, March 2025).

Despite these changes, structural barriers remain: mechanized and capital-intensive agricultural activities are widely perceived as a “male” occupation, leading more men to apply for loans, reinforcing gendered uptake patterns (FGs & Interviews, June 2025). Field research and survey findings show uneven uptake: some enterprises modernize via loans and subsidies, while others remain cautious due to debt risks (Field Notes, March 2025; Survey 2025). Donor and public programs—such as AIPA and MAFI subsidies, IFAD and ODIMM guarantees, and targeted women/youth schemes—exist, but their coverage is modest (FAO 2019; FAO 2022b; AIPA 2025).

Women farmers participate in extension and training less often than men, accounting for fewer than one-third of all holders who attended agricultural training (FAO 2022; BNS, 2024a). Those who do attend often report that the advice is infrequent and overly general, leading many to rely instead on informal networks for technical information (FAO 2022b; FGs & Interviews, June 2025). Moldova has several advisory programs targeting small producers, yet gaps persist in gender-sensitive content (e.g., food safety and processing) and in practical access related to time, travel, and communication constraints (Eurofound 2023; DTDA 2023).

Access to inputs is also a persistent challenge. Most inputs are imported and often costly or difficult to source locally, a problem affecting all farmers but especially burdensome for women, who have fewer assets and weaker networks (FAO 2022b; FGs & Interviews, June 2025).

Leadership, Decision Making and Empowerment of Women

Women in Moldova participate in local groups and some producer or workers' structures, but membership in farm unions or associations remains limited compared to sectors such as education or health. Union presence in cereal workplaces is generally weak, leaving few formal channels for collective voice (Eurofound 2023; DTDA 2023). Instead, women often rely on informal mutual-aid networks or engage through enterprise administrative teams (e.g., accounting), which connect them to organizational processes even without formal union membership (FAO 2022b; Field Notes, March 2025; FGs & Interviews, June 2025).

At the enterprise level, women are often employed in administrative and financial roles such as accounting, payroll, and HR. National data show that in 2024, women held about half of administrative positions in agricultural enterprises, despite representing only 42 per cent of the overall agricultural workforce (BNS 2024c). These posts sometimes involve coordinating small teams and can serve as entry points into organizational leadership.

However, leadership of producer groups, farm associations, and mechanized operations remains overwhelmingly male. Partial data from the National Bureau of Statistics indicate that women in senior positions as farm or cooperative leaders are almost absent (BNS 2024c).

As FAO (2022) observes, women's access to leadership in agriculture is constrained by structural barriers, including limited ownership of productive assets, underrepresentation in agricultural training, and time poverty linked to unpaid care responsibilities. Field evidence supports this view: women rarely advance into senior management posts related to mechanized production, irrigation, or marketing, where technical expertise and asset control are decisive. A notable exception is the influential cooperative Agrostoc, where women make up about 30 percent of the marketing department. Local authorities have also sought to highlight women's contributions by promoting successful female entrepreneurs in agriculture at national events (Field Notes, March 2025).

Women's influence within agricultural enterprises is often indirect. Accountants and administrators contribute to budgeting, compliance, and record-keeping, shaping aspects of financial management, yet strategic decisions on irrigation, input procurement, and marketing typically remain in the hands of male farm leaders and managers (FAO 2022b; Field Notes, March 2025). In public and community arenas, participatory mechanisms formally exist but are unevenly used. Evidence from irrigation initiatives and land-consolidation programs shows that smallholders—especially women—tend to be underrepresented where co-financing and technical requirements are high (FAO 2022b; FGs & Interviews, June 2025).

Women are active in workplace and community discussions on welfare, payroll, and HR issues and often participate in informal solidarity networks, but they are less visible in agronomic and technical forums where investment and production strategies are decided. This limited visibility reflects both structural and cultural constraints: weak union presence in agriculture, unequal access to specialized training, and “double-shift” responsibilities that reduce time, confidence, and opportunity to engage in higher-stakes decision-making (Eurofound 2023; FAO 2022b; FGs & Interviews, June 2025).

At the community level, women do participate in meetings and voluntary activities, often at slightly higher rates than men. According to the ICJPS 2025 survey, 23.6 per cent of women (vs. 20.5 per cent of men) reported sometimes attending community meetings, while 9.6 per cent of women (vs. 5.4 per cent of men) participated very frequently. In voluntary activities organized by local associations, 17.8 per cent of women (vs. 12.0 per cent of men) reported occasional participation, with women also more active in rural areas than in urban ones (35.1 vs. 21.7 per cent) (ICJPS 2025).

Women play a tangible organizational role in administrative and financial functions within the maize value chain, especially in larger agricultural enterprises. Yet agenda-setting and leadership power remain concentrated in male-dominated, technical domains linked to mechanization and marketing. Broader access to machinery and irrigation training, together with stronger women-focused producer groups, quotas, and inclusive consultation mechanisms, could enhance women's influence across agricultural enterprises, small farms and rural communities.

Hardship and Division of Labour

Field evidence consistently highlights the “double shift” borne by women in rural Moldova: combining waged or seasonal agricultural work with household and care responsibilities. Time-use surveys confirm this imbalance: women spend on average 4.6 hours per day on unpaid domestic and care work (3.8 hours among employed women), whereas men spend considerably less time on such activities, devoting more of their time to paid work (Palihovici 2021). Earlier analyses also found that women spend substantially more time than men on unpaid work, reinforcing a persistent gender gap (BNS 2013; Palihovici 2021). National statistics further show that women

make up about 75 per cent of unpaid family farm workers, underscoring their concentration in unpaid and often invisible labour (BNS 2024c).

In cereal enterprises, women's roles are clustered in administration, canteens, livestock care, and seasonal post-harvest tasks. These jobs are often compatible with family schedules but add to overall workloads and reduce rest. As canteen workers explained during a focus group: *"We work both at home and at the canteen... It's hard for women too. We do both men's and women's work. Everything. But we grew up during tougher times"* (FG, canteen workers, June 2025).

Mechanization in maize production has reduced some heavy manual labour, yet women are underrepresented in mechanized and technical posts, where physical strain is mitigated. Instead, they more often perform repetitive or physically demanding tasks such as cleaning, canteen work, and seasonal sorting, where ergonomic risks and fatigue remain high (Field Notes, March 2025; FGs & Interviews, June 2025).

Moldova's occupational safety and health (OSH) legislation requires employers to provide safe conditions and training, in line with international standards (ILO). In practice, however, enforcement is uneven—especially in seasonal and informal work segments—resulting in gaps in protective equipment, safe lifting practices, and heat-stress prevention. Interviews indicate that small farms sometimes hire informally "on the black market," bypassing formal contracts and OSH provisions (Field Notes, March 2025). Limited access to machinery training and irrigation-user groups further constrains women's uptake of labour-saving technologies that could ease workloads (Field Notes, March 2025; DTDA 2023).

In sum, women in maize production face cumulative burdens: heavier overall workloads due to the "double shift," concentration in low-status and physically demanding roles, and weaker protection under OSH regulations. Expanding women's access to mechanization training, formalizing seasonal employment, and ensuring consistent enforcement of OSH standards would help reduce risks and improve well-being in these value chains.

5.4. Food and nutrition security

Availability of Food

At the national level, food availability is generally not considered a critical issue. Moldova's domestic production of cereals (wheat and maize) has consistently covered consumption needs in recent years, even during periods of external disruption (WFP 2022; WFP 2024). However, production remains highly climate-sensitive. Managers and workers across sites described 2020–2024 as repeated "dry years"; enterprise data indicate that maize yields fell in 2024 versus 2023 (FGs & Interviews, June 2025; Field Notes, March 2025). Short lease horizons and extensive, low-value rotations dampen investment—especially in irrigation—despite strategy commitments to rehabilitate irrigation, upgrade storage/conditioning, and modernize logistics (GRM 2023a; UN Moldova 2023; Bajura & Gandacova 2023). WFP (2024) emphasizes that 57 per cent of Moldovans depend on climate-sensitive agriculture; the sector's share in GDP fell to 8 per cent in 2022, and the country faces, on average 4–5 severe droughts and 1–2 major floods per decade. Field evidence from March 2025 visits corroborates this pattern (maize yields ~1.5–3.5 t/ha in 2024 vs. ~5–6 t/ha in 2023) (Field Notes, March 2025).

Despite shocks, staple availability has been largely maintained. FAO and WFP (2022) confirmed that domestic cereals continued to cover consumption needs even as prices spiked with war-related logistics disruptions. WFP (2024) highlights persistent market inefficiencies and climate risks, and backs government efforts to stabilize supply through social food services, vouchers, and cash transfers that sustain demand for basics during shocks. At the community level, in-kind lease payments (wheat, maize, sunflower) remain a critical availability buffer. Field data document lease terms of roughly 500–800 kg grain/ha, used for household flour, oil, and animal feed (Field Notes, March 2025). Focus groups confirm: "Some grind the wheat into flour; others press sunflower seeds into

oil... it's more convenient to make your own flour and oil than to buy it throughout the year" (FG employees, Centre, June 2025).

Contribution of maize to daily diets

Maize, particularly maize flour, remains central to the Moldovan food system both nationally and in rural households. Historically, maize has been a staple food: porridge (mămăligă, similar to polenta) made from maize flour has long served as the daily bread substitute in rural Moldova, consumed alongside dairy, vegetables, or meat (Sturza & Moșanu 2021). This tradition persists, particularly in villages where maize flour is locally milled from harvests or from in-kind land lease payments (FGs & Interviews, June 2025). Such practices ensure that staple cereals and oils are available even in poor harvest years.

From a production perspective, maize is described as one of Moldova's most important cereal crops, serving both human diets and as feed for poultry and livestock (Sturza & Moșanu 2021; Field Notes, March 2025). Smallholder and household plots still account for a majority share of maize output (about 59% according to some sectoral estimates), which links it closely to rural consumption patterns. However, the availability of maize is increasingly exposed to climate and plant-health risks.

Recurrent droughts during 2020–2024 have substantially reduced maize yields, while changing temperature and moisture regimes have increased the risk of fungal contamination and mycotoxin occurrence (Sandulachi et al. 2021; Grajdieru et al. 2024). Although drought conditions may reduce the abundance of some fungal species, toxigenic *Fusarium* and *Aspergillus* strains remain widespread, and their harmful effects can be exacerbated by inadequate post-harvest storage. These risks disproportionately affect smallholders and household producers, who often lack adequate drying, storage, and quality-control facilities. As a result, food security and food safety in rural areas may be compromised, since contaminated maize can enter household diets directly through maize flour and other traditional products or indirectly through livestock and poultry fed with contaminated grain. Strengthening post-harvest management, storage infrastructure, and phytosanitary monitoring is therefore essential to reduce health risks and enhance the resilience of household food systems.

FAOSTAT food balance data indicate that the food supply quantity of maize in Moldova has remained relatively stable over the last five years, at around 14–15 kg per capita per year. This is significantly lower than in Romania, where consumption exceeds 30 kg per capita, but somewhat higher than in France (11–13 kg) and close to Ukraine (19–21 kg, with a drop in 2022 likely linked to the war). These figures confirm that maize remains an important staple in Moldova, though not at the same level as in Romania, where mămăliga holds a stronger cultural role. In Moldova, maize is still widely consumed in rural areas, alongside wheat flour and oil processed locally from leased quotas or household plots (FAOSTAT 2022; FGs & Interviews, June 2025).

Maize continues to underpin Moldova's food security and dietary patterns, especially in rural areas where mămăliga remains an everyday staple. FAOSTAT data confirm moderate per capita maize consumption. This reliance secures caloric sufficiency and cultural continuity, yet it also reflects a diet heavily weighted toward cereals, with implications for nutritional balance and resilience in the face of climate and market shocks.

Accessibility of Food

Since 2022, the accessibility of food in Moldova has been shaped by declining real incomes and rising living costs. Poverty has deepened: nearly one in three Moldovans now lives below the poverty line, with 14 per cent in extreme poverty. Rural households—especially those headed by women, pensioners, or persons with disabilities—are the most affected (WFP 2024; UN Moldova 2023). Food takes up a disproportionate share of household budgets: on average, 41 per cent of expenditure, rising to 57 per cent among the poorest quintile and nearly 50 per cent among families with three or more children (WFP 2024; BNS 2025). Energy poverty, affecting around 60 per cent of households, further restricts disposable income for food (WFP 2024).

Agricultural employment is central to rural livelihoods, yet wages remain among the lowest in the economy. Smallholders account for 62 per cent of national output, but agricultural pay averages 34 per cent below the national mean (WFP 2024). Field research underscores sharp disparities: skilled mechanisers may earn 15–22,000 MDL/month in peak seasons, while canteen staff, livestock keepers, or seasonal harvesters receive far lower wages, often with winter gaps or delayed payments (Field Notes, March 2025; FGs & Interviews, June 2025). These inequalities mean that only a minority of rural workers secure relatively stable incomes, while the majority remain vulnerable to inflation and food price shocks.

The war in Ukraine, rising energy costs, and repeated droughts since 2020 have all contributed to higher prices for bread, cereals, and edible oils (UN Moldova 2023; WFP 2022). To cope, rural households rely heavily on non-cash mechanisms—above all, in-kind lease rents of wheat, maize, and sunflower. Such payments provide both secure access to staples and a form of barter currency in times of price volatility (Field Notes, March 2025). In-kind rents are often processed locally into flour, ensuring household-level availability even in poor harvest years (FGs & Interviews, June 2025). Backyard gardens and poultry rearing also supplement access, though they require substantial time and labour inputs (Sturza & Moșanu 2021).

The maize value chain contributes to food access by providing staple crops, wage income, and in-kind lease payments. At the same time, the structure of these chains—seasonal, highly mechanized, and with persistent wage gaps—means that many rural workers remain price-exposed and income-insecure. In the longer term, greater formalization of agricultural work, targeted skills training, and integration of local producers into social food services are required to make participation in the value chains translate into more stable and equitable food access (DTDA 2023; Eurofound 2023; UN Moldova 2023).

Utilisation and Nutritional Adequacy

Moldova's food supply generally covers caloric needs but remains nutritionally imbalanced. Diets are heavily dominated by cereals and bread, while protein-rich foods, fruits, and vegetables are consumed less regularly (GRM 2023b; UN Moldova 2023). WFP (2024) estimates anaemia at about 26 per cent among women of reproductive age and children under five, reflecting poor dietary diversity and limited access to micronutrient-rich foods. At the same time, obesity affects around 19 per cent of adults and is projected to rise, confirming the coexistence of undernutrition and diet-related chronic disease risks. Sturza & Moșanu (2021) similarly emphasize this double burden of malnutrition, linking it to diets high in starch and fats but low in micronutrients.

Beyond quantity, maize availability is increasingly constrained by climate and plant-health risks. Repeated droughts since 2020 have reduced yields significantly, while shifts in temperature and humidity create favourable conditions for fungal contamination and mycotoxin accumulation (Sandulachi et al. 1921; Grajdieru et al. 2024). These pressures compound both availability and food safety concerns, as maize is consumed directly (flour, *mămăligă*) and indirectly through feed-based animal products. Thus, maize staple remains at the core of Moldovan diets, facing rising production volatility in the context of climate change.

Protein access has been further undermined by the long-term decline of small-scale livestock production. The World Bank (2023a) reports that livestock output in household settings has fallen for four consecutive years. Pig production in Moldova has undergone a marked structural shift since the late Soviet period. As pigs are the main livestock consumers of maize, these changes are closely linked to the maize value chain. In 1989, total pig stocks reached about 1.87 million head, of which the vast majority were held in agricultural enterprises (around 1.61 million, compared to 0.26 million in households). Following the transition of the 1990s, enterprise production collapsed, and by 1999 household production had become dominant (544 thousand head, compared to 317 thousand in enterprises). This pattern persisted into the 2000s, although at much lower overall levels (e.g. 283 thousand total in 2009). Since the mid-2000s, agricultural enterprises have partially recovered, reaching about 230 thousand head in 2024, but household production remains significant (around 120 thousand). By 2025, the

sector thus reflects a dual structure: larger modernizing enterprises alongside widespread small-scale household production (BNS 2025d).

Dairy production now covers only about two-thirds of national demand, with the cattle herd four times smaller than two decades ago (Apostu 2024). Fieldwork confirms these trends: “People don’t keep cows or pigs anymore, not even goats. Especially those from poor families” (FGs & Interviews, June 2025). While backyard poultry remains widespread, the disappearance of household livestock has reduced access to milk, meat, and barter opportunities, making families more dependent on cereals, oil, and garden plots for food security.

Policy frameworks stress the need to improve dietary quality by promoting greater consumption of fruit, vegetables, and protein sources (GRM 2023b; UN Moldova 2023). WFP’s 2024–26 plan includes nutrition education through school meals, community kitchens, and food vouchers, with an emphasis on diversifying diets while sourcing from local producers (WFP 2024).

Nationally, the maize value chain ensures caloric security by supplying staple cereals and oils. Locally, in-kind payments from leased land stabilize household access but also entrench grain- and oil-heavy diets. Without improved access to protein and micronutrient-rich foods, this reliance risks perpetuating the nutritional imbalances already visible in health statistics (WFP 2024; Chirsanova et al. 2020; Sturza & Moşanu 2021; Field Notes, March 2025).

Food Stability

Outright caloric shortages are less common today, as domestic cereal production and in-kind lease payments in maize provide a baseline of staple access even in poor harvest years (WFP 2024; FGs & Interviews, June–August 2025). Focus groups repeatedly described leased plots as a critical safety net, while selling land quotas is widely resisted, highlighting their perceived role as long-term security assets (FGs & Interviews, June 2025). Backyard gardens further complement leased quota plots with vegetables, fruits, and preserves, though they require additional household labour (FGs & Interviews, June 2025).

Yet this safety net is increasingly stressed by climate volatility. Repeated droughts have sharply reduced maize yields, while shifting humidity and temperature patterns increase risks of fungal contamination and mycotoxins in maize (Grajdieru et al. 2024). These risks compound seasonal instability, affecting both the availability and safety of staples consumed directly and indirectly via feed-based products. WFP’s 2024–26 plan embeds shock-responsive cash transfers and investment in local food-service infrastructure to mitigate these pressures, aiming to stabilize access in lean months and shock years (WFP 2024).

Since 2022, spikes in food and energy prices—amplified by war-related trade disruptions and recurrent drought—have driven volatility in bread, cereals, and vegetable oils (UN Moldova 2023; WFP 2022). Low-paid and seasonal workers are particularly vulnerable, often relying on in-kind rents as a hedge against unaffordable market prices (FGs & Interviews, June 2025). Government strategies emphasize expanding storage capacity, modernizing grain conditioning, and promoting domestic processing to reduce dependence on imports and dampen future price swings (GRM 2023b).

The maize value chain plays a stabilizing role nationally and locally. They ensure that staples remain present on markets, deliver in-kind rents that buffer rural households during lean periods, and provide seasonal employment. However, this stabilizing effect is fragile and contingent on broader investment: irrigation infrastructure, improved storage and logistics, and responsive social protection systems are all critical to sustaining stability in the face of climate shocks and price volatility (Field Notes, March 2025; FGs & Interviews, June 2025; WFP 2024).

Moldova's food availability is broadly sufficient at the national level, with cereals (wheat, maize, sunflower) covering domestic needs; yet production is fragile, repeatedly hit by drought and, for maize, food-safety risks (mycotoxins). Accessibility remains the binding constraint: high poverty and energy costs, low/seasonal wages, and post-2022 price shocks push many rural households to rely on in-kind lease rents (grain, sunflower) and backyard plots to secure staples. Utilization is imbalanced: diets are cereal-dense (maize flour) with insufficient protein and micronutrient-rich foods, a pattern reinforced by the decline of household livestock and reflected in persistent anaemia alongside rising obesity. On stability, maize VCs help buffer shocks—keeping staples on markets and in pantries via in-kind flows—but their stabilizing effect depends on irrigation, storage/conditioning, testing/quality control, and shock-responsive social protection.

5.5. Social capital

Strength of Producer Organisations

The role of cooperative producer organizations in Moldova's maize value chain remains fragile and unevenly developed. Field missions revealed that many farms—especially peasant farms (PFs)—prefer individual machinery leasing and rely on vertical ties with farm heads rather than horizontal cooperation. As one mechaniser from a medium-sized farm in the Centre region explained, *"We helped another company that had land but not enough equipment in 2022, but once they bought their own machines, we went back to working just for our boss. We don't really have time to take on extra work elsewhere"* (FG mechanisers, Centre, July 2025). Such short-lived initiatives illustrate the weak cooperative culture observed in both fieldwork and literature.

Farmer heads interviewed during our field trips often stressed that Moldovan farmers "do not get along with each other" and tend to compete rather than cooperate (Field Notes, March 2025; FGs & Interviews, June 2025). Survey data confirm this tendency: when asked about the main problems in maize production, respondents consistently mentioned access to inputs, storage, markets, loans, irrigation, and machinery. Yet out of 48 interviewed farmers, only one pointed to cooperation as a possible solution. This highlights the limited role of formal collective action in addressing systemic challenges. The reluctance of small farms and family households to join larger cooperative structures may also reflect a form of "tacit resistance," what Visser et al. (2015) describe as "quiet food sovereignty"—a strategy through which smallholders seek to safeguard local food security and maintain social autonomy vis-à-vis more powerful landlords and cooperative structures (see also Piras et al. 2021).

Despite persistent reluctance among farmers, a notable share of agricultural holdings with legal personality are organized as cooperatives. According to the latest agricultural census (2011), cooperatives represented 5.9% of all legally registered holdings and managed 11.7% of the total agricultural area (BNS 2011). Interviews with cooperative representatives indicate relatively higher levels of efficiency and productivity, suggesting that—although still limited in number—their role may be increasing. Some cooperative models demonstrate clear advantages. The business cooperative Agrostoc, with over 150 members managing 130,000 ha, provides joint access to inputs, silos, seed production, and advocacy. Similarly, enterprises like Hirtop Mare in the Centre region pool resources and maintain shared storage facilities. Literature confirms that while Moldovan cooperatives continue to face distrust due to their historical association with kolkhozes and limited managerial capacity, they hold strong potential to rebuild trust and resilience if led effectively (Ignat 2017; Moraru et al. 2018; Savga & Savga 2024; Hejkrlik & Chaloupková 2021). This view was echoed by managerial staff in a large farm in Criuleni district, who noted that well-organized cooperatives could help counter market volatility (FGs & Interviews, June 2025).

Inclusivity within cooperatives remains uneven. Larger and better-capitalized agricultural enterprises (AEs) are more likely to participate, while smallholders—and women in particular—remain under-represented. This reflects broader structural inequalities: AEs have easier access to storage, bargaining platforms, and export markets, whereas peasant farms (PFs) often lack the critical mass to engage in joint marketing. As a smallholder from Criuleni district put it, *"For us the problem is not producing, but selling. We have no one to cooperate with, not enough quantity to reach the market"* (Field Notes, March 2025).

Leadership practices are still highly personalized. Workers repeatedly emphasized reliance on direct managers. This pattern of vertical cooperation was a recurring theme in group discussions (FGs & Interviews, June 2025). Yet cooperative governance models, such as the board structure at Agrostoc, show that more representative and accountable leadership is possible. Scholarly work also highlights the role of transformational leadership in fostering trust and inclusiveness, helping cooperatives move beyond the legacy of “Soviet-style” management (Hejkrlik & Leon 2021).

Finally, market negotiation power remains limited for individual smallholders but strengthened where farmers act collectively. Agrostoc reduces costs by pooling demand for fertilizers and seeds, while Hîrtop Mare achieves stronger bargaining positions with traders by aggregating output. In contrast, many unions and farmer associations are perceived as weak or politicized: as one enterprise manager put it, *“Farmers’ Force destroys more than it does—they play politics, not agriculture”* (Field Notes, March 2025). Nonetheless, cooperative models provide clearer evidence of resilience and bargaining leverage than isolated farm strategies.

Overall, producer organizations in Moldova’s maize chain face both limitations and opportunities. Cooperation remains low, shaped by historical distrust and practical constraints, yet successful examples like Agrostoc and Hîrtop Mare show that cooperatives can improve inclusivity, strengthen bargaining power, and contribute to rebuilding social capital.

Information Access and Knowledge Practices

Access to agricultural information among maize producers is uneven and mediated by farm size and leadership pattern. Larger enterprises typically benefit from direct ties with banks, processors, or cooperatives, while peasant farms and households depend on local leaders or informal networks for guidance. During focus groups, several workers emphasized that their main source of knowledge about technologies or practices remained the farm manager: *“Mostly from our manager. He’s proactive—he looks into things, learns, and passes the info to us”* (FG mechanisers, Centre, July 2025).

On the other side, workers in auxiliary roles (e.g. canteens) relied more on traditional knowledge, combining domestic recipes with occasional external tips: *“What I learned at home... dumplings, meatballs, schnitzels. Here, everything is from home. They’re satisfied. They say it tastes like mom’s cooking”* (FG canteen workers, South, July 2025). When information is sought independently, the internet and social media groups are often used, but time and resources limit regular engagement (Field Notes, March 2025).

Survey evidence (ICJPS 2025) confirms that community meetings, local authorities, and local media remain important information channels, but with significant gaps between rural and urban respondents. This reflects broader findings in the literature, which highlight the persistence of weak institutional advisory systems and the reliance of Moldovan farmers on personalized and informal networks (Ignat et al. 2017; Moraru et al. 2018).

Trust Between Actors

Trust in the maize value chain is primarily personal and localized. Farmers and workers often expressed confidence in their immediate group or leader but far less in broader institutions: *“We trust our boss and each other—but beyond that, trust is zero”* (FG mechanisers, Centre, July 2025). This points to a pattern of vertical trust centred on farm leaders, who also cultivate ties with local authorities, mayors, or police officers. Such relationships reinforce their authority but do not necessarily foster broader inclusiveness or the development of robust horizontal trust networks.

The ICJPS Survey (May 2025) illustrates this limited generalized trust: only 7.6% of respondents stated that “most people can be trusted,” while 39.1% said that “we must always be cautious.” Rural respondents were notably more cautious than urban ones.

Overall, our survey indicates moderate and broadly similar levels of trust across all farm categories. Average scores range from 3.1 to 3.7 on a 1–5 scale, with only small variations between PFs, AEs, and SHs. Farmers tend to express higher trust in banks (around 3.5–3.7) and moderate trust in processors and public authorities (3.1–3.4). Trust in other farms is slightly lower but still within the same range. While agricultural enterprises show marginally higher confidence in banks and government, and smallholders somewhat lower overall scores, these differences are not substantial and do not indicate distinct trust profiles by farm type.

Field visits confirmed that trust networks often expand over time through repeated personal interactions. For example, a farm leader in southern Moldova initially claimed he “did not trust anyone,” but later acknowledged a wide circle of trusted partners: fellow farmers, landowners, specific banks, processors, and the Farmers’ Force association, with which he participates in protests (Field Notes, March 2025). This demonstrates both caution and selective trust-building based on experience.

At the same time, survey data on access to credit (ICJPS 2025) highlight systemic barriers: survey respondents cited high collateral requirements, excessive bureaucracy, and unfavourable loan conditions as main reasons for being unable to access credit in crises. Focus group participants often contrasted distrust of microfinance institutions with a gradual increase in trust in major banks (e.g., MAIB), which were praised for offering more flexible repayment schemes (FGs & Interviews, June 2025).

Information flows and trust relations in the Moldovan maize chain remain narrow and person-centred. Farm heads act as primary brokers of knowledge and trust, while broader institutional frameworks—cooperatives, unions, government—retain lower credibility. Nevertheless, medium levels of trust in banks and processors, alongside examples of selective but durable partnerships, show that confidence can be cultivated.

Social Involvement

Participation in formal decision-making around maize agriculture remains limited. Lease contracts with farm managers constitute the main interface, providing continuity but leaving little space for genuine community deliberation. Focus groups confirmed that farm managers usually make production choices, while villagers are informed rather than consulted. Workers described themselves as “*told what to do*” with only occasional opportunities to suggest alternatives before the manager makes a final decision (FG animal farm, South, July 2025).

ICJPS survey data reinforce this picture: only about 25% of respondents reported attending community meetings frequently in the past three years, while 40.3% said they never attended, and another 15% “rarely” (ICJPS Survey 2025). Rural residents reported slightly higher attendance than urban ones, but overall civic engagement remains low.

Traditional practices—seed saving, small livestock care, food preservation, and barter—continue to complement wage work in maize enterprises. Women in particular combine seasonal agricultural labour with household-level processing and animal keeping. In one focus group, canteen workers explained that their recipes rely on skills “learned at home” (FG canteen workers, South, July 2025). However, no systematic policies exist to integrate traditional knowledge into agribusiness decision-making. Climate stress, especially recurrent droughts, also narrows the scope for local water management practices such as ponds or shallow wells. Respect for traditional knowledge thus remains implicit in household strategies rather than embedded in official value chain governance.

Voluntary collective action is modest. More than half of respondents (51.6%) reported never participating in voluntary community activities in the past three years, while only about 8% declared frequent or very frequent involvement (ICJPS Survey 2025). Field evidence echoes this pattern. Older practices of *clacă*—villagers helping one another with house building, funerals, or harvests—have largely disappeared. “*That sense of community used*

to be stronger—people would come over to help, make plăcinte together. Now that's gone. Everyone just hires workers or craftsmen” (Interview with employees, Centre, June 2025). Instead, solidarity tends to be confined to family or kinship ties.

At the same time, some agricultural enterprises continue to act as social anchors. For example, in one southern farm, the enterprise canteen collaborated with the village council to provide daily free lunches to over ten elderly and socially vulnerable villagers (FG canteen workers, June 2025). Employees described such initiatives as part of the farm's role in sustaining community cohesion, with the farm director often doubling as an informal local leader.

Overall, social involvement in the maize value chain remains weakly institutionalized. Participation in governance and voluntary activities is limited, while traditional knowledge persists mainly at the household level. Where communal solidarity exists, it is often mediated by agricultural enterprises acting as social hubs or by residual kin-based networks. Yet both field research and the literature converge on one point: well-governed cooperatives and transformational leadership can mobilize inclusive collective action, enhance market bargaining capacity, and strengthen social capital—with direct effects on food security, resilience, and the cohesion of rural communities (Visser et al. 2015; Moraru et al. 2018; Hejkrlik et al. 2023).

5.6. Living conditions

Health Services

Over the last decade, Moldova's health system has made notable progress in expanding medical coverage and infrastructure. The mandatory health insurance system (CNAM) now covers most of the population, while optimization reforms have consolidated and modernized medical facilities, improved equipment in district hospitals, and strengthened the network of family medicine Centres. These changes aimed to ensure quality care within a reasonable distance for all residents, rather than maintaining under-resourced clinics in every locality (Mosca & Richardson, 2022). The family doctor model, introduced nationally, has become the main instrument for providing essential and preventive services across the country.

Yet, despite these advances, rural-urban disparities in access and quality persist. Many villages still lack permanent doctors or have understaffed family medicine Centres, and residents depend largely on medical assistants for basic consultations. In emergencies, patients must often arrange private or community transport to the nearest district hospital (Field Notes, March 2025; FGs & Interviews, June 2025).

Quantitative evidence suggests relatively broad territorial access to primary healthcare services: in 2019, 90.6% of respondents reported having a permanent family doctor in their locality, while an additional 6.9% were served by a doctor commuting from another locality. Rural areas nevertheless appeared to be somewhat less well equipped than urban ones. Moreover, 74.2% of respondents reported being able to reach medical services within 30 minutes. However, these figures mask important staffing and capacity gaps (Danii et al. 2020). Similarly, the BNS (2022) report highlights persistent geographical imbalances in human resources, particularly in family medicine, exacerbated by migration and the aging of medical staff.

These constraints translate into unequal health outcomes. Studies show that rural residents experience significantly higher mortality from cardiovascular, digestive, and respiratory diseases, as well as from external causes, particularly work-related accidents among men (Penina 2022; Pahomii & Stîrba 2023). Such patterns indicate that disparities in morbidity and mortality also reflect broader differences in living and working conditions between rural and urban populations.

Optimization reforms have sought to improve quality in urban and district facilities while keeping primary care accessible through family doctors (MSRM 2024a). Yet, for many rural households, actual access is constrained by

waiting times, limited diagnostics, and distance to specialized care. According to BNS (2022), about 60% of patients schedule appointments, mainly by phone, but rural patients wait longer: 88% of urban respondents were seen within 20 minutes of their appointment, compared to 76.7% of rural ones.

Data from the 2025 ICJPS Survey reveal mixed perceptions of public health services. Access to medical care divides respondents almost evenly between satisfaction and dissatisfaction in both rural and urban areas, suggesting moderate yet ambivalent evaluations. Similarly, assessments of service quality show no major urban–rural gap, with both groups reporting comparable levels of satisfaction. These findings indicate that perceptions of healthcare are shaped not only by actual access and quality, but also by relative expectations and the normalization of inequality: rural populations, long accustomed to service deficits, may express less dissatisfaction than would be expected based on objective conditions.

At the same time, BNS data reveal gaps in patient rights and communication. Only 54.5% of inpatients signed consent forms (often at staff insistence), and only one in three patients accessed their medical file—rural residents being less informed than urban ones. These patterns underline the need to improve communication, transparency, and patient empowerment in both urban and rural contexts (BNS 2022).

Despite the extension of health insurance, out-of-pocket (OOP) payments and informal fees continue to constrain access. The introduction of the mandatory health insurance system (CNAM) has contributed to a gradual decline in OOP payments, which fell from about 48% of total health spending in 2000 to roughly 31% in 2020. According to the *Health Strategy 2030* (MSRM 2023), this reflects improved financial protection and a more formalized framework for accessing healthcare services. The BNS 2022 survey further shows that for COVID-19 care at home, households spent most on medicines (avg. 1322.6 MDL), with urban respondents paying more for tests and consultations, while rural respondents spent relatively more on medicines—reflecting different cost pressures.

According to the WHO & European Observatory (2023), Moldova still records one of the highest rates of catastrophic health spending in the WHO Europe region—affecting around 17% of households, mostly rural and low-income. Outpatient medicines remain the main driver of financial hardship. Despite the coverage expansion, the system remains hospital-centred, with more than half of CNAM’s budget directed to hospitals and only one-quarter to primary care.

Recent household data (BNS 2025) indicate that urban households spent 5.7% of total consumption on health, compared to 3.1% in rural areas. However, this lower share in rural settings likely reflects lower purchasing power and deferred care, rather than better protection. Consequently, rural families remain more vulnerable to catastrophic or impoverishing health expenses when serious illness occurs.

Field interviews confirm this trend. Workers in maize production often resort to self-medication or selective private consultations when public services are unavailable. Seasonal fluctuations in income make medical expenses particularly burdensome during off-season months (Field Notes, March 2025; FGs & Interviews, June 2025).

In sum, Moldova’s health sector has advanced considerably in coverage, infrastructure, and institutional capacity, supported by the CNAM system and successive optimization reforms. Yet these gains coexist with enduring territorial and social disparities that disproportionately affect rural and low-income populations. Persistent staff shortages, limited diagnostic capacity, and high out-of-pocket costs continue to restrict equitable access to quality care, particularly outside urban Centres. While formal insurance has reduced the prevalence of informal payments and improved financial protection, many households still face barriers that lead to delayed treatment or self-medication.

Quality of Housing

Most rural households in Moldova live in privately owned houses, a legacy of post-Soviet privatization that left rural ownership rates among the highest in Europe—around 99% compared to 95% nationally (IOM 2024). The ICJPS Survey (Q66) confirms a moderately positive perception: 43.2% of respondents rated their housing as “sufficiently good,” 32.5% as “good,” and 10.2% as “very good,” while 14.1% considered it “bad or very bad” (ICJPS 2025).

Field evidence from the 2025 field missions confirms this diversity: villages often display visible contrasts between recently renovated homes—frequently supported by remittances—and older, deteriorated dwellings in need of repair. Focus group participants associated these differences with income inequality, labour migration, and limited access to credit (Field Notes, March 2025; FGs & Interviews, June 2025).

Recent assessments underline that while the overall housing stock is not old (mostly built after 1960), its physical condition and energy performance are poor due to deferred maintenance and weak investment capacity among rural households (Sîrbu & Cujbă 2022; IOM 2024). Energy inefficiency, together with wood- or coal-based heating, contributes to fuel poverty in rural areas. Spatially, peri-urban areas and district Centres exhibit much better conditions, while remote northern and hilly southern communes show the lowest technical comfort, confirming persistent territorial inequality (Sîrbu & Cujbă 2022).

Despite progress in national infrastructure, rural housing remains significantly less equipped than urban housing. According to IOM (2024) and BNS (2024a) data, only about 42% of rural dwellings are connected to piped water and sewerage networks, compared with ~90% and ~86% respectively in urban areas. The same disparity extends to indoor sanitation: only 32–35% of rural households have indoor toilets, and around 40–45% have a bathroom or shower, compared to 86–89% of urban dwellings (BNS 2024a; Sîrbu & Cujbă 2022).

Access to safe drinking water remains a structural challenge. Approximately one-third of rural residents rely on shallow wells, many of which are microbiologically contaminated (FAO 2022a; IOM 2024). Progress in expanding centralized systems is steady for water supply (implementation rate ~94% of planned projects during 2016–2020) but slower for sewerage (67%), mainly due to high costs and the fragmentation of small localities (Sîrbu & Cujbă 2022).

Gas access is not near-universal: although natural gas supplies roughly 59% of the fuel used for space heating, with consumption concentrated in the Central region (including Chişinău), most households still rely on individual stoves using biomass. Nationwide, only about 18.3% of dwellings are connected to district heating; in rural areas, district heating is virtually absent—about 94% of households heat with individual stoves—whereas in urban areas, district heating predominates, with around 33% using autonomous systems and 19% still relying on stoves (World Bank 2023b; Renergy.md 2024).

The ICJPS survey (2025) indicates that both urban and rural respondents display mixed satisfaction with their housing and local infrastructure: rural respondents are almost evenly divided between satisfaction and dissatisfaction. This suggests a relative normalization of deprivation, as rural residents—historically less endowed with modern utilities—may express moderate satisfaction despite objectively weaker housing conditions.

Qualitative evidence mirrors these findings. While many rural participants report satisfaction with housing security and ownership stability, they express frustration over poor sanitation, heating costs, and difficult maintenance. Vulnerable groups—especially the elderly and low-income agricultural households—face disproportionately poor conditions and limited capacity to modernize their homes (Field Notes, March 2025; FGs & Interviews, June 2025).

Rural households—including many engaged in maize farming—generally enjoy secure tenure but modest housing quality, often constrained by outdated infrastructure and low energy efficiency. Recent modernization efforts have improved peri-urban and district housing, yet rural–urban disparities in access to water, sanitation,

and heating persist. Both quantitative and qualitative evidence reveal a dual reality: widespread housing security and resilience, coexisting with systemic underinvestment and infrastructural gaps that continue to affect the living standards of Moldova's rural population.

Education and Skills Development

Over the last decade, Moldova has maintained near-universal access to primary education, despite demographic decline and rural depopulation. According to BNS (2024b), in the 2023/24 school year, the country counted 1,201 primary and general secondary institutions, down from 1,243 in 2017/18, enrolling about 334,400 pupils. In relative terms, the number of learners per population actually increased—1,803 pupils and students per 10,000 inhabitants compared to 1,640 six years earlier—reflecting a smaller population rather than fewer students.

Administrative statistics show enrolment rates exceeding 100% in both primary and secondary education (BNS 2025), while recent administrative proxies confirm very high effective attendance in compulsory schooling. In the first semester of the 2024/25 school year, only 0.020% of children aged 7–16 were reported as out of school, including 0.006% in grades I–IV and 0.014% in grades V–IX, while the semester dropout rate stood at 0.085% overall (0.022% in primary and 0.063% in lower secondary education) (MEC 2025a; MEC 2025b). These figures suggest near-universal participation in compulsory education. For historical comparison, the last household-based survey (UNICEF & NBS 2014, MICS 2012) reported adjusted net attendance rates of approximately 99% in primary and 96% in lower secondary education, with slight rural–urban differences (urban: ~98% and 94%; rural: ~99% and 97%, respectively).

Government reforms have sought to optimize the school network and improve teaching quality through the creation of hub or model schools, better equipped and staffed to replace under-enrolled local institutions (MEC RM 2022). The continuity between education levels remains strong: in 2023/24, 98.7% of pupils advanced from primary to lower-secondary education, and 88% of lower-secondary graduates continued their studies the same year—split almost evenly between lyceum (45%) and vocational schools (43%). These indicators confirm that, in formal terms, access to basic education is broadly assured across the country (BNS 2024b).

Yet, rural disparities persist, especially in school infrastructure and staffing. The total number of teachers in general education fell from 28,588 in 2017/18 to 25,994 in 2023/24, with shortages most acute in mathematics, science, and foreign languages. Many rural schools still function with multi-grade classes and have fewer qualified staff, particularly in remote districts. The average pupil-to-teacher ratio stands at 12.8, but the rural reality is uneven: small schools have low class sizes but limited specialization, while urban Centres attract more experienced teachers (BNS 2024b).

Digital readiness has improved substantially, though a clear rural-urban divide remains. In 2023/24, schools used 14.3 computers per 100 pupils, almost double the level of 2017/18 (7.6). Rural schools increased from 6.1 to 10.8 computers per 100 pupils, yet still lag behind urban institutions (18.7 per cent). Over the same period, the total number of teaching devices more than doubled—from 25,570 to 47,883 units—thanks to targeted national and donor programs (BNS 2024b). Despite this progress, connectivity and digital literacy remain uneven, especially outside towns. Studies conducted in 2024 show that rural middle-school students excel at digital content creation but struggle with problem-solving skills, underlining the importance of teacher-guided, face-to-face learning even in an increasingly digital environment (Bărbuță, Ghețău & Iovu 2024).

Many rural adolescents face long commutes or relocation costs once they finish lower secondary school, and these expenses weigh heavily on household budgets. According to BNS (2025), education spending among rural households remains low and stable, averaging 0.6% of total consumption in 2021, 0.5% in 2022–2023, and 0.6% in 2024. By contrast, urban households increased their education expenditure from 1.3% in 2021 to 1.9% in 2024. This widening gap suggests that while city families invest more in tutoring, digital tools, and extracurricular

learning, rural families continue to allocate minimal resources, often limited to basic materials and transport—reflecting persistent inequalities in access to quality and post-basic education.

Even so, the general continuation rate has improved in recent years. In 2023, 88% of lower-secondary graduates pursued further education—45% entering lyceums and 43% vocational programs—while about two-thirds of lyceum graduates (67%) advanced to higher education. Over the last decade, the number of learners per population has increased across all levels, with particularly visible growth in vocational education—from 171 to 190 students per 10,000 inhabitants between 2017 and 2023. However, the relative number of graduates in vocational fields has slightly declined, from 51 to 49 per 10,000 inhabitants over the same period, suggesting that while participation is expanding, completion rates and throughput have not kept pace with enrolment growth (BNS 2024b).

The VET network now comprises 38 vocational schools, 37 colleges, and 13 Centres of excellence—specialized institutions established as regional hubs for advanced technical education and innovation—enrolling around 46,100 students (12,600 in vocational schools, 20,600 in colleges, and 12,900 in Centres) (BNS 2024b). In 2023, 11,900 students graduated from VET institutions, indicating steady throughput despite demographic pressures. The quality of facilities has also improved, especially in institutions renovated with EU and GIZ support, but many workshops and laboratories remain outdated, particularly in agricultural and food-processing profiles (Jin et al., 2019; Vodita, Ionascu-Cuciuc, Hincu, 2022).

Digital infrastructure in vocational schools has expanded markedly: in 2023/24, there were 21.5 computers per 100 students, up from 9.8 in 2017/18. However, alignment between curricula and real market needs—especially for maize production—remains limited. Employers continue to report that graduates often lack practical experience, as only a minority of VET students currently participate in dual or work-based training programs (Jin et al., 2019; Vodita, Ionascu-Cuciuc, Hincu, 2022).

Gender patterns also show persistent asymmetries. Women represent roughly 49% of pupils in general education, but 46% of VET students; besides, female students are concentrated in service and administrative fields, whereas men dominate technical and agri-mechanical specializations (BNS 2024b). Nevertheless, new data on digital competencies suggest that rural girls perform equally or better than boys in ICT content creation and online safety, implying that the gender gap is driven more by access and expectations than by ability (Bărbuță, Ghețău & Iovu 2023).

The merger of the Agrarian State University of Moldova (UASM) into the Technical University of Moldova (UTM) was less a managerial choice than a response to a chronic crisis in agrarian higher education. For over a decade, agricultural faculties faced shrinking cohorts, ageing staff, and weak practical training links—reflected in the steady decline in student interest in agriculture among Moldovan youth (Certan & Certan 2022). The reform aimed to modernize infrastructure, merge resources, and promote cross-disciplinary links with engineering and IT, exemplified by the upgraded Mircești campus (MEC RM 2025c). The merger underscores a systemic need for renewal; however, without sustained investment in practical, market-relevant programs and stronger employer engagement, the reform of higher agricultural education risks achieving efficiency on paper rather than real revitalization.

In the maize value chain, in-service and lifelong training opportunities are scarce and unsystematic. Large enterprises such as Bioprotect or Agrostoc occasionally organize short, seasonal workshops on machinery operation, pesticide safety, or production technology, yet these remain isolated initiatives rather than part of a coordinated professional training system (Field Notes, June 2025; Floris.md, 2025).

Survey evidence from the cross-border SME study (Gîrneț et al. 2023) shows that over 60% of rural SMEs lack formal staff training programs, and 40% of employees report no professional development in the previous three years. The most cited barriers are limited funds, low managerial awareness, and weak digital competence.

Similarly, the insufficient adaptability of rural labour has been identified as a key factor slowing innovation and technology adoption in agriculture (Sârbu & Cimpoieş 2022).

At the same time, digital capacity-building initiatives have started to emerge. The Digitalization of Entrepreneurship Capacity Building for Rural Areas of Moldova (Babin et al., 2024) documents pilot training programs in Cahul, Soroca, and Ungheni, organized by the Ministry of Economy and GIZ. These workshops demonstrated that basic ICT training—especially in bookkeeping and marketing—can improve efficiency and competitiveness among small and medium agricultural producers. Nonetheless, digital transformation remains partial: roughly half of rural SMEs still rely on manual accounting and non-digital communication tools.

Overall, Moldova’s education system provides broad and relatively equitable formal access, yet territorial, financial, and quality disparities still shape outcomes. Primary education is nearly universal, but rural schools face teacher shortages, weak infrastructure, and uneven digital connectivity. At secondary and vocational levels, participation has improved—88% of pupils continue after lower secondary—yet progress remains uneven. The VET sector, though increasingly modernized and digitally equipped, still struggles with limited employer engagement and gender segregation in technical fields. The merger of the Agrarian State University into the Technical University of Moldova illustrates both the need and the difficulty of revitalizing agricultural education amid declining student interest. In-service and lifelong learning also remain fragmented, leaving many agricultural workers and rural SMEs unprepared for technological change. Strengthening practice-oriented education, digital literacy, and public–private training partnerships is key to bridging the gap between access and real employability in Moldova’s maize value chain.

5.7. Social Profile Analysis of the Maize Value Chain in Moldova

The social performance of Moldova’s maize value chain is *moderate to substantial overall*, combining relatively secure access to productive resources and basic services with persistent labour-market vulnerabilities and social inequalities (Figure 5–1). The chain contributes significantly to rural livelihoods, household food security, and local economic stability, yet social benefits remain unevenly distributed across gender, age groups, and farm categories.

The Social Profile assessment shows a differentiated pattern:

- *Working Conditions (moderate to low)* – Labour legislation is broadly aligned with ILO standards, yet informality, weak labour inspection, limited collective representation, and an ageing workforce constrain decent work outcomes. OSH enforcement remains uneven, while seasonal workers often lack adequate protection.
- *Land and Water Rights (substantial)* – Land tenure is generally secure, lease arrangements are predictable, and access to agricultural land is broadly equitable. Although irrigation infrastructure and participation in resource-related decision-making remain uneven, overall access rights are well established.
- *Gender Equality (moderate to low)* – Women play an important role throughout the value chain but remain concentrated in lower-paid and auxiliary positions, with more limited access to land ownership, agricultural machinery, managerial functions, and decision-making roles.
- *Food & Nutrition Security (substantial)* – Maize production contributes significantly to national food availability, livestock feeding, and household resilience through in-kind lease payments and self-provisioning. While dietary diversity remains a challenge and climate risks may affect future stability, overall food security outcomes are positive.
- *Social Capital (moderate to low)* – Producer organizations and cooperative structures remain relatively weak, and civic participation is limited. Trust tends to operate through personal and informal networks rather than through collective institutions, constraining the sector’s capacity for coordinated action.

- *Living Conditions (substantial)* – Access to education, healthcare, housing, and basic infrastructure is generally widespread, while tenure security is nearly universal. Nevertheless, important disparities persist between urban and rural areas in service quality, transport connectivity, and economic opportunities.
- Overall, the maize value chain performs strongest in *land and water rights, food and nutrition security, and living conditions*, while *working conditions, gender equality, and social capital* remain the principal areas requiring further improvement.

Maize value-chain performance

Maize contributes substantially to food and nutrition security, offering reliable in-kind rents, wage employment, and national staples, remaining traditionally embedded in household food systems. Labour conditions and gender patterns within the chain are determined by male-dominated mechanisation, feminised auxiliary work, and ageing workforces. Social capital and cooperative organisation are weak, though slightly stronger around input and marketing cooperatives.

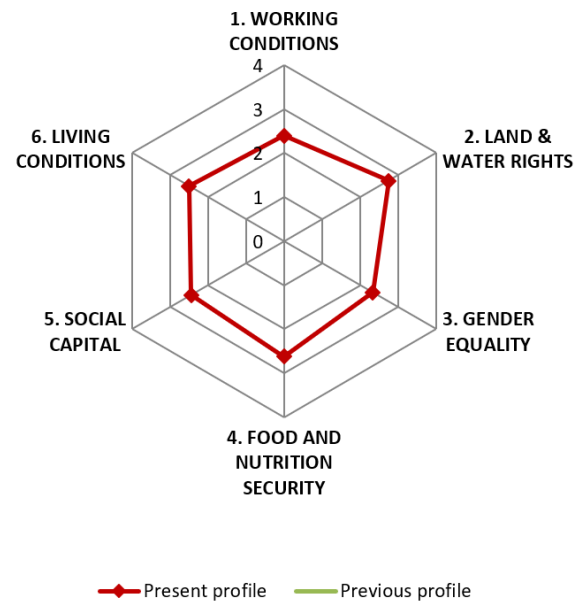


FIGURE 5-1: SOCIAL PROFILE RADAR DIAGRAM – MAIZE VALUE CHAIN IN MOLDOVA

5.8. Answer to Framing Question: Is the VC socially sustainable?

Maize remains one of Moldova’s most important staple crops and a foundation of rural livelihoods. Closely linked to sunflower through crop rotation and shared production systems, maize farming combines strong market relevance with deep community embeddedness. It relies on a small core of skilled mechanized workers—mostly men—with formal contracts and a certain degree of job security, alongside a much larger number of seasonal or informal workers—mainly women—employed daily, often without written contracts or social protection.

At the household level, family farms and smallholders play a central social and economic role. Although not registered as businesses, they lease land from numerous local owners under the post-privatization framework, thereby anchoring production in local communities and contributing directly to rural food security. Their labour relations are primarily informal and family-based, providing flexibility and resilience but little legal protection or social insurance.

Cooperation and trust among maize producers remain modest, while relations with public institutions are often transactional and individualized. Nonetheless, successful cooperatives and farmer associations demonstrate that collective action can improve access to inputs, storage, and markets. Unionization and wage negotiation remain weak—legacies of the Soviet past—but newer producer organizations representing grain and mixed-crop farmers are beginning to consolidate, offering a potential basis for stronger sectoral dialogue.

Gender gaps continue to shape the maize value chain. Women are underrepresented in technical and mechanized positions due to gendered perceptions and low participation in vocational agricultural training. They are more visible in administrative and auxiliary functions and, increasingly, among small and medium farm

owners—an encouraging sign of gradual change. Expanding women’s access to credit, training, and leadership roles would enhance equality and make the chain more inclusive.

Overall, Moldova’s maize value chain is socially embedded and economically significant, but still marked by selective inclusiveness and structural inequalities. Its sustainability depends on the interplay between informal trust and weak formal institutions—a pattern that ensures stability but limits transformation. Advancing inclusive development will require sustained investment in education, occupational safety, gender equality, and collective capacity so that maize production not only sustains livelihoods but also supports more equitable and resilient rural communities.

By deepening their social and economic integration into local areas, maize-producing enterprises can play a decisive role in improving the quality of life and vitality of Moldova’s countryside. This can be achieved through local employment of skilled labour, stronger cooperation among small and medium producers, and closer partnerships with financing, processing, and marketing institutions. These strategies would strengthen both the competitiveness and the social foundations of Moldova’s maize sector, enhancing the human and social capital that underpin its long-term sustainability.

6. IS THE VALUE CHAIN ENVIRONMENTALLY SUSTAINABLE?

6.1. Introduction

The objective of the environmental analysis of this VCA4D study was to identify the main environmental issues and to assess the environmental sustainability of the maize value chain in Moldova to support policy decisions aimed at improving the overall sustainability of the value chain through quantified and evidence-based information.

The field missions provided valuable insights into the environmental issues associated with the maize value chain in Moldova. Key challenges raised by stakeholders include soil degradation, climate change impacts, and the depletion of natural resources. These issues are connected to the changes that occurred in decades after privatization of the land which over the years has led to soil compaction, loss of soil structure, reduction of organic matter, and to decreased fertility.

Many environmental issues are already well recognized by farmers and other stakeholders, and a growing number are actively adopting their practices in response to changing agricultural conditions. However, both stakeholder discussions and current research highlight a critical gap: efforts remain fragmented, and much more is needed to ensure that the entire agricultural value chain becomes environmentally sustainable.

The environmental analysis is undertaken based on LCA inventory, environmental issues observed in the field, literature review and undertaken interviews with stakeholders.

The environmental analysis of the VC addresses also the **potential risk to biodiversity**. In this regard, a GIS-based spatially-explicit analysis to evaluate risks for biodiversity in areas of special conservation interest. Complementary biodiversity risk assessments conducted through stakeholder interviews and review of official documentation was carried out to investigate the actions in place for the management of biodiversity conservation.

The sections of this chapter are the following:

- Section 6.2: Life cycle assessment (LCA)
- Section 6.3: GIS-based evaluation of risks for biodiversity
- Section 6.4: Synthesis of the environmental aspects.

6.2. Life Cycle Assessment (LCA)

An LCA of the maize value chain in Moldova was conducted to quantify the environmental impacts associated with the production of maize grain and maize flour. The assessment focused on **three areas of protection (mineral and fossil resources depletion, ecosystems quality, human health)** and on the impact of the VC on **climate change**.

The methodological framework consists of four phases:

1. Definition of objectives, functional unit (the unit to which impacts are referred) and system boundaries.
2. Life Cycle Inventory (LCI): description of the data used in the assessment.
3. Impact assessment: Based on LCI data.
4. Discussion of the LCA results.

6.2.1. Resources, ecosystem, health

Natural resource depletion

Field mission findings indicate that soil degradation particularly erosion and the loss of soil organic matter is among the most significant environmental concerns in Moldova's maize value chain. More than 80% of arable land is situated on slopes, and maize is commonly cultivated using conventional tillage practices. This method leaves the soil surface exposed and highly susceptible to both water and wind erosion. Moreover, deep and

intensive tillage accelerates the mineralisation of organic matter, leading to resource depletion, increased CO₂ emissions, and contributing to climate change. Farmers are generally aware of these challenges and are actively seeking sustainable solutions.

It is well established that Moldova's arable soils suffer from a deficient nutrient regime, primarily due to the insufficient application of fertilisers (Andries, 2016; Lungu, 2024). Discussions with farmers revealed that most apply mineral fertilisers at lower-than-recommended doses. This is driven by both the economic burden of rising input costs and the impact of prolonged droughts, which reduce the perceived return on investment in fertiliser. Moreover, farmers noted that they do not apply manure to maintain soil fertility because livestock farming is not practised. Field crop production in Moldova is no longer integrated with animal husbandry, as the livestock sector has been in long-term decline. Encouragingly, many farmers leave maize crop residues in the field after harvest, helping maintain soil organic matter. A few individual farmers have also begun to experiment with cover crops to improve soil health, though such cases remain rare.

Many studies have reported long-term depletion of organic matter, nutrient depletion, and an overall decrease in fertility (FAO, 2012; Andries et al., 2012; Boincean & Dent, 2019; Andries, 2022; Ilușca, 2023; Boincean, 2025).

TABLE 6-1: INPUTS, REMOVAL AND BALANCE OF NUTRIENTS IN MAIZE VC (BASED ON LCI AND CALCULATIONS)

Zone	Enterprises	Inputs with fertilizers, kg/ha			Nutrient removals with grain yield, kg/ha			Balance: -depletion +overfertilizations		
		N	P ₂ O ₅	K ₂ O	N	P ₂ O ₅	K ₂ O	N	P ₂ O ₅	K ₂ O
North	SH	13	4	15	76	31	77	-63	-27	-62
	PF	41	11	11	99	40	101	-58	-29	-90
	AE	18	7	7	120	48	121	-102	-41	-114
Center	SH	30	8	8	59	24	59	-29	-16	-51
	PF	26	16	16	76	31	77	-50	-15	-61
	AE	15	8	8	92	37	93	-77	-29	-85
South	SH	29	5	5	31	12	31	-2	-7	-26
	PF	30	2	2	38	15	39	-8	-13	-37
	AE	27	3	3	46	19	47	-19	-16	-44
Mean for conventional		25	7	8	71	29	72	-46	-22	-64
No till		23	6	6	97	39	98	-74	-33	-93
Organic		5	2	6	69	28	70	-64	-26	-64

The Life Cycle Inventory shows that, across all agro-ecological zones and production systems, nutrient removal with harvested maize grain exceeds nutrient inputs from fertilisers. This results in consistently negative nutrient balances, indicating progressive depletion of soil nitrogen, phosphorus, and potassium stocks, particularly in higher-yielding systems where fertiliser application rates remain low relative to crop uptake. Overall, maize production in the assessed value chain relies on soil nutrient mining, contributing to natural resource depletion and undermining long-term soil fertility and sustainability.

In a no-till system, improved soil health can enhance nutrient availability and uptake efficiency, supporting higher yields, but this does not offset the observed negative nutrient balances and therefore does not eliminate the risks of long-term nutrient depletion.

Although organic management practices may enhance soil biological activity and internal nutrient recycling, these processes mainly redistribute existing soil nutrients and do not fully compensate for nutrient exports. Consequently, organic production in the assessed value chain relies on the depletion of inherent nutrient stocks, contributing to the depletion of natural resources and posing risks to long-term soil fertility and sustainability.

Fertiliser use recommendations are primarily provided by input supply companies, whose guidance is driven by the sale of fertiliser products rather than to site-specific soil conditions. In recent years, recurrent drought events

and increasing fertiliser prices have compelled maize producers to reassess their fertilisation strategies, primarily by reducing application rates. Field-level stakeholder consultations indicate that only around 5% of field-crop farmers in the Republic of Moldova base fertiliser applications on soil testing results. For most producers, soils are never analysed for nutrient status, and fertiliser application decisions are therefore not grounded in scientific assessment or structured nutrient management practices.

Diesel fuel consumption represents a significant component of fossil energy use in crop production and varies substantially across farming systems depending on soil management intensity. Conventional agriculture, along with conventional tillage systems, exhibits the highest diesel demand due to repeated operations such as disking, ploughing, seedbed preparation, mechanical weed control, harvesting, and in-field transport. Each additional pass increases fuel consumption and contributes to higher non-renewable energy use and associated greenhouse gas emissions.

No-tillage - conservation agriculture systems demonstrate the lowest diesel consumption per hectare. The elimination of ploughing and secondary tillage significantly reduces the number of machinery passes, resulting in lower fuel use, reduced fossil energy depletion, and decreased CO₂ emissions.

Across the maize value chain, diesel use for post-harvest operations, particularly grain harvesting, transport, drying and storage, contributes to total energy demand. Years with higher grain moisture at harvest increase fuel and energy requirements for drying. Such years are sporadic in Moldova, occurring once every 10 years. Reducing diesel consumption through optimised field operations and the adoption of conservation practices represents a key opportunity to mitigate fossil resource depletion and climate impacts within the agricultural value chain.

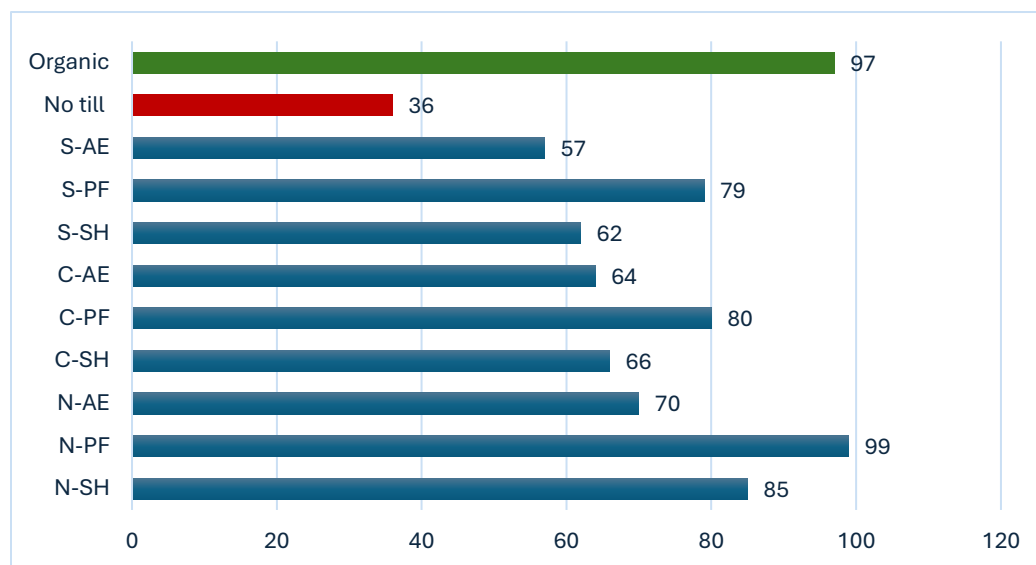


FIGURE 6-1: DIESEL CONSUMPTION AT THE CULTIVATION STAGE OF MAIZE VC, L/HA

To reduce natural resource depletion in Moldova's maize value chain, priority should be given to conserving soil, water, and energy resources that underpin long-term agricultural productivity. This can be achieved by expanding no-tillage conservation agriculture, including reduced tillage systems, with reduced tillage serving as a short-term transitional practice and no-till as a long-term objective, alongside permanent soil cover and diversified crop rotations. These measures slow the depletion of soil organic carbon and preserve soil productivity.

Promoting balanced nutrient management based on farm-level nutrient budgets, site-specific fertilization, and greater integration of organic amendments and legumes is essential to prevent long-term nutrient mining.

Reducing dependence on non-renewable energy inputs through fewer machinery passes and optimised fertiliser use, together with measures that stabilise yields through crop and hybrid diversification, can significantly lower natural resource depletion across the value chain.

Soil Degradation

Soil erosion is a serious problem for approximately one-third of all agricultural land in the Republic of Moldova. In a country where most of the poor rural population cultivates land to secure food, soil quality is crucial⁹.

Maize is possibly the most widespread crop in the Republic of Moldova, closely linked to agricultural traditions and the 'guilty' culture of soil erosion. It is a row-crop cultivated most frequently in wide rows where hybrid seeds are sown, predominantly heat-loving hybrids for which black soil is crucial for uniform germination. Over time, this crop can become the guardian of Moldova's soils because of the amount of plant residues it produces, which can cover and protect the soil.

As most arable land is located on sloping terrain and traditional farming relies on intensive soil tillage, soils are highly exposed to water and wind erosion. Significant topsoil loss has already occurred, and without changes in land management practices, this degradation process is likely to continue.

Soil erosion has been identified by the scientific community as a major environmental concern (Leah & Leah, 2015; Leah, 2017; Cojocaru & Bacean, 2018; Bejan et al., 2020; Popov, 2022; Crişmaru, 2022; Eco-TIRAS, 2023).

No tillage Conservation Agriculture (CA) has been promoted for a long time, and the team has observed that some farmers are applying that type of agriculture, and many farmers and stakeholders are familiar with its principles and advantages. However, there appear to be several reasons why this type of farming has not seen wider adoption.¹⁰ Despite the progress made in the sector, a number of serious gaps persist related to methodological aspects of applying conservation agriculture technologies and practices, which are of particular importance for the success of this type of agriculture.

Two FAO studies (FAO, 2022; Favre, 2024) emphasize the success of farmers who have adopted sustainable agricultural practices, reporting both lower production costs and more stable yields. Additionally, a national climate change adaptation program targets the crop production sector, focusing specifically on the promotion of conservation agriculture. Despite these initiatives, the adoption of such practices remains limited across the country.

Notably, recent policy developments include the adoption of a new *Land Code* (April 2025) and a Government Decision on "Soil Protection Measures within Agricultural Practices" (May 2025). However, these policies appear to reintroduce older frameworks dating back to the 1990s, raising concerns about the long-term effectiveness of current soil protection strategies. They have made many efforts toward conservation agriculture, but recent documents show old approaches reappearing.

Between 2011 and 2015 a policy of promotion of Conservation Agriculture (CA) in the Republic of Moldova began at the national level. The initiative focused on reducing fuel consumption in crop production, limiting soil degradation from water and wind erosion, and increasing the agricultural sector's resilience to climate variability and climate change. These measures were introduced in a context of declining soil quality and increasing climatic pressures affecting crop-based value chains, including maize.

The development and promotion of CA in Moldova were initiated and supported with the assistance of international development partners, particularly IFAD, FAO, World Bank, EU, the GEF Small Grants Program, the Austrian Government, and the Government of Japan.

⁹ <https://www.worldbank.org/ro/results/2013/08/08/moldova-more-trees-means-more-food>

¹⁰ Government of the Republic of Moldova. UNDC of Republic of Moldova. https://unfccc.int/sites/default/files/NDC/2022-06/MD_Updated_NDC_final_version_EN.pdf.

Since 2011, the Unit for the Implementation of IFAD Programs (UCIP-IFAD) has included a Conservation Agriculture (CA) component in every IFAD-supported project, promoting climate-resilient and sustainable farming practices across Moldova. With IFAD's support, over 11 demonstration plots were established, more than 3,700 farmers were trained through field schools, over 500 grants were awarded, and key publications and an international CA conference were funded. Under the World Bank's Moldova Agriculture Competitiveness Project (MAC-P), 192 grants were awarded from 2012 to 2020 to support sustainable land management, including Conservation Agriculture (CA), covering 58,649 ha with over 45.6 million MDL (\approx 2.4 million USD). Most funds were used for no-till equipment, with additional support for irrigation and water storage. In 2021, the Fourth Additional Financing allocated 3.4 million USD to further soil productivity investments (Study_CCB 2023).

FAO has supported Moldova through multiple climate change adaptation and resilience initiatives, including a GCF readiness grant of USD 685,000 to mainstream adaptation into agricultural planning and establish a climate-smart platform (including Conservation Agriculture) in 2022¹¹.

EU contributed to the development of many development initiatives, including support for the National Program of Conservation Agriculture 2020–2025¹². The GEF – UNDP Small Grants Program (2012–2017) funded local CA initiatives. Austria supported the “Support for Sustainable Agriculture and Climate Adaptation” project (2013–2017), while Japan provided \$4.8 million for “Sustainable Land and Soil Management” project¹³.

In 2016, the Ministry of Agriculture approved Order No. 79, establishing the technical requirements for the application of Conservation Agriculture systems. On this basis, dedicated agricultural machinery for Conservation Agriculture became eligible for subsidies¹⁴. In parallel, two programmes aimed at the development and promotion of Conservation Agriculture were designed; however, neither programme was effectively implemented.

The National Fund for the Development of Agriculture and Rural Environment (FNDAMR) began providing subsidies for CA machinery. Until 2022, the subsidy policy provided 30% cost compensation, with a ceiling of 500,000 lei per unit of machinery. Starting from 2023, the subsidy mechanism was updated to allow 50% compensation, with a maximum of 1 million lei per unit. According to AIPA reports, in 2021, subsidies were provided for 290 machinery units, covering approximately 55,000 hectares. In 2023, 233 machinery units were subsidized, covering about 32,643 hectares^{15,16}.

The IFAD study (Study_CCB 2023), which constitutes the only existing assessment and serves as the basis for official data, indicates that Conservation Agriculture is practised on a limited share of Moldova's farmland, covering about 21,112 ha, with an average of roughly 300 ha per farm.

Experts consider the officially reported area under Conservation Agriculture to be underestimated. Their estimates suggest that 60,000–70,000 ha is managed using CA practices, including 30,000–40,000 ha cultivated by members of the Community of Practice. Assuming a total CA area of 70,000 ha and considering that maize accounts for 30.6% of Moldova's 1,596,000 ha of cropland, an estimated 21,420 ha of maize were cultivated under CA systems in 2023.

¹¹ <https://www.fao.org/europe/news/detail/Moldovan-agriculture-set-to-become-more-resilient-against-climate-change/en>

¹² https://enlargement.ec.europa.eu/system/files/2017-03/eni_2014_c2014_5140_final_annual_action_program_for_moldova_agriculture_and_rural.pdf

¹³ Fourth National Communication of the Republic of Moldova under the United Nations Framework Convention on Climate Change. / on line: https://unfccc.int/sites/default/files/resource/Moldova_CN4_En_web_070218.pdf

¹⁴ https://www.legis.md/cautare/getResults?doc_id=92067&lang=ro

¹⁵ <https://maia.gov.md/ro/content/evaluation-national-fund-development-agriculture-and-rural-environment-years-2017-2021>

¹⁶ [//aipa.gov.md/sites/default/files/Raport%20gestionare%20FNDAMR%20pentru%20anul%202023.pdf](https://aipa.gov.md/sites/default/files/Raport%20gestionare%20FNDAMR%20pentru%20anul%202023.pdf)

Although two FAO missions have observed that the no-till farmers are doing better than conventional farmers, the methodological issues persist¹⁷. Moldova is using an alternative concept, CA, called 'conservative agriculture', that is inconsistent with international norms. This adaptation includes land preparation practices such as disk ploughing, locally referred as 'mini-till', which cannot achieve climate change adaptation and mitigation as well as land degradation goals. This nomenclature variation also leads to a variety of interpretations of the actual practices covered by the terms, often resulting in misunderstandings amongst stakeholders (Favre, 2024; Zbanca et al. 2025)

The study (Study_CCB 2023), included two groups of respondents: a general sample of farmers and a sample of companies practicing Conservation Agriculture. Regarding the reasons for refusing to adopt Conservation Agriculture (CA) practices, respondents from the general sample most frequently cited a lack of confidence in these practices (25%) and insufficient financial resources (25%), while a lack of the necessary knowledge was mentioned by 8% of respondents. Among the companies practicing Conservation Agriculture, insufficient financial resources emerged as the main constraint, being identified by 50% of respondents.

In many of the reviewed documents, Conservation Agriculture is not clearly defined and is often equated with no-till and minimum tillage technologies. Subsidies were likewise allocated separately for no-till and minimum tillage, although both were grouped under Conservation Agriculture. As a result, many farmers favoured minimum tillage, as it was perceived as easier to adopt due to reduced soil disturbance and the absence of mouldboard ploughing.

The adoption of no-till Conservation Agriculture was a revolutionary and largely spontaneous process. In 2008, the first farmer, V. Ceornii, adopted it to reduce soil erosion and costs, later observing improved soil structure and the appearance of earthworms. Since 2014, UTM has run a Master's programme in Conservation Agriculture, whose graduates actively apply and promote these practices.

Frequent droughts, particularly in 2020, prompted farmers to seek viable climate adaptation solutions. Current Conservation Agriculture adopters have been influenced by practices from Ukraine, including exposure to no-till educational content and occasional technical consultations.

The promotion of Conservation Agriculture (CA) in Moldova has been gradually incorporated into the country's strategic documents on agriculture, rural development, and climate change adaptation^{18, 19,20,21,22}.

Maize is an important and crop-specific commodity. It is a heat-loving crop that emerges best in tilled, bare, residue-free soils, which are also the conditions under which hybrids are currently tested for official registration in Moldova. Under Conservation Agriculture, soils are cooler and covered with residues, and crop emergence may be uneven. Testing maize hybrids for official registration under Conservation Agriculture conditions could support wider adoption of these systems and contribute to reduced soil degradation.

¹⁷ <https://openknowledge.fao.org/items/5d5b73c2-f69f-40ad-bd7f-e86625babd16> FAO. 2022. *Special report – FAO Crop and Food Supply Assessment Mission (CFSAM) to the Republic of Moldova*. Rome.

¹⁸ Updated Nationally Determined Contribution of the Republic of Moldova https://unfccc.int/sites/default/files/NDC/2022-06/MD_Updated_NDC_final_version_EN.pdf

¹⁹ Government Decision No. 1009 of 10-12-2014 on the approval of the Strategy of the Republic of Moldova for adaptation to climate change until 2020 and of the Action Plan for its implementation https://www.legis.md/cautare/getResults?doc_id=49220&lang=ro#

²⁰ Government DECISION No. 409 of 04-06-2014 on the approval of the National Strategy for Agricultural and Rural Development for 2014-2020 https://www.legis.md/cautare/getResults?doc_id=76222&lang=ro#

²¹ Government Decision No. 624 of 30-08-2023 on the approval of the National Climate Change Adaptation Program until 2030. https://www.legis.md/cautare/getResults?doc_id=140163&lang=ro

²² Government DECISION No. 56 of 17-02-2023 on the approval of the National Strategy for Agricultural and Rural Development for 2023-2030 https://www.legis.md/cautare/getResults?doc_id=136318&lang=ro

Despite long-standing technical knowledge and sustained efforts to promote Conservation Agriculture, soil degradation remains a persistent environmental pressure in Moldova's maize value chain, indicating that existing institutional and policy responses have not yet translated into widespread changes in land management practices.

By the mid-1960s, the first soil erosion control practices based on scientific research began to emerge, including contour tillage, non-inversion tillage, interrupted furrowing, deep strip loosening, soil fissuring, strip cropping, and the establishment of buffer strips with perennial grasses, among others (Andrieș, S., & Filipciuc, V., 2016). Later, in the 1980s, these measures were incorporated into academic publications and into the developed agricultural systems.

In 2003, the Government adopted first program with the main objective of conserving and enhancing soil fertility, particularly in degraded soils with low productive potential^{23,24}. A second initiative, the *Program for the Conservation and Enhancement of Soil Fertility (2011–2020)*, included objectives to address soil degradation on 877 thousand hectares of arable land. According to evaluations of the action plans for 2011–2013 and 2014–2016, implementation activities mainly targeted *pond rehabilitation and riverbed cleaning*. The evaluations concluded that overall results were considered symbolic^{25,26}.

A new Program for Land Improvement 2021–2025 was adopted, with objective is to implement measures to halt land degradation and enhance soil fertility through the modernization and expansion of land improvement systems, as well as the adoption of modern technologies and environmentally friendly agricultural practices. Estimated costs reached 4.27 billion lei, with most funding expected from external sources²⁷. Implementation difficulties included a lack of specialists, weak uptake of projects, insufficient modern service providers, lack of forest planting material, and difficulties in securing beneficiary contributions²⁸. Information campaigns were conducted in almost every district; however, advance subsidies from AIPA had not been granted by mid-2025.

Recently adopted the Land Code introduced specific chapters on soil protection, covering obligations for landholders (Article 64), protection measures (Article 65), territorial-organizational measures (Article 66), agro-, silvo-, and hydro-ameliorative measures (Articles 67–69), and anti-erosion soil protection (Article 70)²⁹. The Law on the Use, Conservation, and Protection of Soils, adopted in June 2025, reinforced these provisions, requiring agricultural landowners to undertake measures in accordance with Articles 64–71 of the Land Code³⁰

23 Government Decision No. 728 of June 16, 2003 on the Approval of the Program for the Utilization of New Lands and the Enhancement of Soil Fertility in the Year 2003 https://www.legis.md/cautare/getResults?doc_id=78461&lang=ro#

24 PROGRAM FOR THE UTILIZATION OF NEW LANDS AND THE ENHANCEMENT OF SOIL FERTILITY (Part II: Enhancement of Soil Fertility) https://www.legis.md/cautare/getResults?doc_id=28339&lang=ro

25 The expected results according to the indicators established in the Program for the Conservation and Enhancement of Soil Fertility for the Years 2011–2020 (for the period 2011–2018). <https://maia.gov.md/sites/default/files/PressReleas/Documente%20Atasate/Comunicat%20Indicatori%20de%20rezultat%20Program%202011-2018.pdf>

26 REPORT of the Performance Audit Have the Measures Provided in the Program for the Conservation and Enhancement of Soil Fertility for the Years 2017–2020 Achieved the Expected Results? https://www.ccrm.md/ro/decision_details/1077/hotararea-nr-70-din-21-decembrie-2020-cu-privire-la

27 GOVERNMENT Decision No. 864 of 09-12-2020 on the approval of the Land Improvement Program for the purpose of ensuring the sustainable management of soil resources for 2021–2025 and the Action Plan for 2021–2023 on its implementation https://www.legis.md/cautare/getResults?doc_id=125027&lang=ro

28 Informative note to the draft Government decision on the approval of the Action Plan for 2024–2025, on the implementation of the Land Improvement Program for the purpose of ensuring sustainable management of soil resources for 2021–2025 https://particip.gov.md/index.php/ru/document/stages/anunt-privind-initierea-consularilor-publice-asupra-proiectului-hotararii-de-guvern-pentru-aprobare/11638?utm_source

29 Land Code No. 22/15.02.2024 https://www.legis.md/cautare/getResults?doc_id=142192&lang=ro#

30 Low on the use, protection and conservations of soil. https://gov.md/sites/default/files/media/documents/sedinte-de-guvern/2025-06/NU-317-MAIA-2025_0.pdf

Technical regulation “Measures for Soil Protection within Agricultural Practices” (Government Decision No. 265/2025)³¹ presents detailed obligations for landowners for soil protection, the document in question replaced the previous measures adopted in 2008³². A comparison of the section on erosion control measures for arable land shows an almost 100% alignment.

In recent years, efforts have been made to promote and implement Conservation Agriculture; however, these efforts have not been fully embedded within national soil management policies. Consequently, the coexistence of multiple soil protection paradigms and the incomplete integration of Conservation Agriculture into the core soil management framework continue to limit the effectiveness of erosion control measures and undermine the long-term sustainability of the maize value chain.

Human Health

The life-cycle impacts of the maize value chain on human health are primarily associated with *occupational exposure during the cultivation stage*. Based on the interpretation of Life Cycle Inventory (LCI) data and field mission observations, potential human health risks arise mainly from the *handling and application of mineral fertilizers and plant protection products*.

Mineral fertilizer use within the assessed maize value chain is generally low. As a result, the potential human health impacts related to fertilizer application are considered limited, particularly given the absence of intensive fertilization practices across most production systems. Diesel consumption was not assessed from a human health perspective, as the analysis focuses on direct occupational exposure rather than indirect emissions pathways

Among plant protection products, herbicides were the main products reported in maize cultivation. One respondent also mentioned the use of fungicides, but only in very limited quantities, while no insecticides were reported. The highest herbicide application rates were observed under no-till conservation agriculture systems, reaching up to 3.5 kg/ha of commercial product, while substantially lower quantities were applied in other production systems. Differences in application rates reflect variations in the concentration of active substances in commercial formulations rather than increased treatment frequency. All herbicides used belong to toxicity classes III and IV, indicating relatively low acute toxicity.

TABLE 6-2: MINERAL FERTILIZERS AND PESTICIDES USED IN VALUE CHAIN (BASED ON LCI AND CALCULATIONS)

Zone	Enterprises	Mineral fertilizers, kg/ha	PPP, Kg/ha
North	SH	0	1,17
	PF	140	0,66
	AE	70	1,07
Center	SH	105	1,30
	PF	130	1,32
	AE	70	0,82
South	SH	95	0,62
	PF	75	1,0
	AE	80	1,0
	No till	90	3,5
	Organic	0	0

31 Government Decision 265/2025 of 07.05.2025 regarding the approval of the Technical Regulation “Measures for Soil Protection within Agricultural Practices” https://www.legis.md/cautare/getResults?doc_id=148867&lang=ro

32 Government decision No. 1157 of 13-10-2008 regarding the approval of the Technical Regulation “Measures for Soil Protection within Agricultural Practices” https://www.legis.md/cautare/getResults?doc_id=24317&lang=ro#

The Republic of Moldova aligns its pesticide regulatory framework with EU legislation, and products classified as posing high risks to human health or the environment are not authorised for use. Within this regulatory context, potential human health risks are therefore primarily linked to *exposure during handling and application*, rather than to the intrinsic toxicity of the products used.

Field missions and stakeholder consultations revealed that the *use of Personal Protective Equipment (PPE)* including gloves, respiratory and eye protection, and protective clothing is infrequent during the handling of agricultural inputs. The absence of PPE in stock at several input suppliers further suggests limited demand, reflecting low awareness and weak implementation of basic occupational safety practices at farm level. This constitutes the most relevant human health concern identified within the maize value chain.

Overall, based on LCI data and field observations, human health risks in the maize value chain are *low in terms of input toxicity and quantities*, but *potentially significant at the level of occupational exposure*, particularly due to inadequate use of protective equipment during routine farm operations.

6.2.2. Climate change

The evaluations of the global warming potential associated with maize value chain are based on interpretation of Life Cycle Inventory (LCI) data. The climate change analysis focuses primarily on the cultivation stage, where the main climate-related pressures are generated. Post-harvest stages, including storage, transport, and processing, contribute additional climate-related pressures through fuel and electricity use but do not fundamentally alter the relative performance of production systems established at farm level. In this regard nitrogen fertilization levels and diesel consumption at the cultivation stage are used as proxy to provide insight into the effect of climate change of maize cultivation.

Nitrogen input intensity is analyzed as the main climate-related driver since soil emissions of nitrous oxide (N₂O), resulting from nitrogen fertilization, is a potent anthropogenic greenhouse gas. Nitrogen input refers to the total amount of nitrogen applied to soils. Irrespective of fertiliser type, including nitrogen from ammonium nitrate, urea, compound fertilizers (NPK), and organic fertilizers.

In Table 6–3, maize grain yields of each production system are put in relation to nitrogen fertilization levels and diesel consumption (nitrogen values represent total applied nitrogen calculated from fertilizer inputs for internal comparative purposes only).

TABLE 6-3: DIESEL CONSUMPTION, APPLIED NITROGEN AND YIELD ACROSS PRODUCTION SYSTEMS

Production system	Applied nitrogen (kg N/ha)	Diesel consumption (L/ha)	Grain yield (t/ha)
North Conventional	24	85	3.8
Centre Conventional	24	70	3.0
South Conventional	29	66	1.5
Mean Conventional	26	74	2.8
No-till	23	36	3.8
Organic	5	97	2.7

Diesel consumption for mechanical operations represents a transparent indicator of climate-related pressure at the cultivation stage. It reflects the intensity of mechanization, number of field operations, and degree of soil disturbance. Differences in diesel use across production systems are therefore interpreted as technology-driven variations in direct energy-related climate pressure.

Diesel consumption levels are classified as low, medium, or high strictly on a relative basis within the analyzed LCI, without reference to external benchmarks.

TABLE 6-4 GROUPING OF PRODUCTION SYSTEMS BY DIESEL CONSUMPTION (LCI-BASED)

Criterion	Group 1 Low diesel consumption	Group 2 Medium diesel consumption	Group 3 High diesel consumption
Technological characteristics	Minimal soil disturbance; reduced number of mechanical operations; typically, no-till or minimum-operation systems	Partial soil preparation; combination of reduced tillage and conventional operations	Intensive tillage: multiple soil preparation passes; conventional mechanization patterns
Indicative LCI range (internal)	~36–60 L/ha	~60–80 L/ha	~80–99 L/ha
LCI-based climate interpretation	Lowest direct energy-related climate pressure	Moderate climate pressure	Highest direct climate-related pressure

Diesel consumption groups are defined exclusively based on relative differences observed within the Life Cycle Inventory.

The comparison shows that reductions in diesel consumption within conventional systems do not necessarily coincide with reductions in nitrogen input or higher yields. No-till systems achieve the highest productivity (alongside North-conventional) with substantial fuel savings while maintaining nitrogen inputs comparable to conventional systems. Organic systems significantly reduce nitrogen input but exhibit the highest diesel consumption and lower yields, reflecting increased mechanical operations and lower productivity. Organic systems significantly reduce nitrogen input but exhibit the highest diesel consumption, reflecting increased mechanical operations.

Systems combining reduced diesel consumption with stable yields are likely to improve climate efficiency. Conversely, systems with low nitrogen input but high diesel consumption and reduced yields may experience lower climate efficiency, despite reduced fertiliser-related pressure.

Overall, climate change implications in the maize value chain are primarily shaped by farm-level technology choices. Interventions targeting cultivation practices therefore represent the most effective leverage point for reducing climate-related pressure, while improvements in logistics and processing efficiency provide complementary benefits.

The analysis indicates that the most effective strategy to reduce climate-related pressure in the maize value chain is to promote reduced-tillage and no-till production systems that significantly lower diesel consumption while maintaining nitrogen inputs and yields at levels comparable to conventional systems, with the additional benefit of having the lowest level of soil disturbance. This balanced configuration offers the greatest potential for climate-smart performance at farm level, which dominates climate-related impacts along the value chain.

In the long term, reducing climate-related pressures along the value chain would require a transition towards no-till production systems, complemented by using leguminous cover crops.

6.2.3. Climate Change Impact

Although water use was not quantified within the Life Cycle Inventory, water availability remains a critical environmental factor for maize production. Under conditions of increasing climatic variability, declining precipitation, and recurrent droughts, water availability is becoming an increasingly important factor affecting maize productivity in Moldova. Therefore, water availability and soil moisture conservation are important considerations when assessing the long-term sustainability of the maize value chain. These considerations are particularly relevant in the context of ongoing climate change.

Climate change is increasingly affecting the Republic of Moldova, causing rises in average annual temperatures and intensifying extreme phenomena such as frequent droughts and heavy rainfall. National climate assessments indicate a clear trend of aridization (Nedea et al., 2018).

It is projected that climate change will significantly impact the climatic and hydrological regime of the Republic of Moldova, resulting in a reduction of surface water flows by approximately 16–20% by 2030. There will be a gradual increase in the annual average temperature of about 2°C over the period 2010–2040, along with a decrease in total annual precipitation of around 13%, confirming the trend towards increased climatic instability and a higher frequency of extreme events³³.

Droughts represent the most severe climatic hazard affecting agricultural production in Moldova. Since the beginning of the 21st century, recurrent drought events have caused repeated yield losses, with particularly affected years including 2000, 2003, 2007, 2011, 2016, 2020, 2022, 2023 and 2024. These events have significantly impacted production variability across agricultural value chains³⁴.

Maize, together with winter wheat and sunflower, is the main crop cultivated (by cultivated area) in Moldova. The harvests of these crops vary annually in a similar pattern and are strongly influenced by changing climatic conditions.

TABLE 6-5: AREA, YIELD AND SHARE IN TOTAL ARABLE AREA ON MAIN CROPS PRODUCED IN MOLDOVA

Crops / Unit		2020	2021	2022	2023	2024
Wheat	Area of cultivation, thousands of hectares	311.4	341.7	332.0	377.0	269.0
	Yield, t/ha	1.9	4.6	2.6	4.1	3.2
	Share in total arable area, %	20.3	21.9	21.0	23.6	23.5
Grain maize	Area of cultivation, thousands of hectares	546.4	522.3	526.0	489.1	462.5
	Yield, t/ha	1.9	5.7	1.7	2.8	1.6
	Share in total arable area, %	35.5	33.5	33.3	30.6	29.5
Sunflower	Area of cultivation, thousands of hectares	387.3	392.1	440.2	391.9	419.8
	Yield, t/ha	1.3	2.5	1.4	1.9	1.5
	Share in total arable area, %	25.2	25.2	27.9	24.6	26.8

Source: National Bureau of Statistics of the Republic of Moldova: Agriculture.

Climate change and drought were the most frequently mentioned problems farmers faced during maize cultivation in 2023.

Year 2023 was the second warmest year on record, with an average annual temperature of +11.0 to +13.3°C, exceeding the long-term norm **by 2.2–2.9°C**. In Chişinău, an average temperature of +12.7°C was recorded, representing an absolute record over 129 years of observations. The summer was characterized by extreme heat, with a **maximum temperature of +39.5°C** recorded in August in Făleşti (the northern part of Moldova). Annual precipitation totals were below average: 330–510 mm (65–85% of the norm) in the northern zone, 335–515 mm (65–95% of the norm) in the central zone, and 385–450 mm (75–90% of the norm) in the southern zone. The September–October drought resulted in only 10–40 mm of precipitation across approximately 70% of the territory. In addition to drought and heatwaves, extreme events such as late-spring snowfall, torrential rainfall, hailstorms, and strong wind gusts of up to 27 m/s were reported in April and July, causing damage to the national economy³⁵.

Maize is a crop with a high-water requirement, and optimal yields depend on sufficient water throughout the growing season. Water shortages at any phenological stage significantly affect biomass accumulation and grain

³³ https://unfccc.int/sites/default/files/resource/NAP_Moldova_2024.pdf

³⁴ <https://www.meteo.md/>

³⁵ https://www.meteo.md/images/uploads/clima/anul_2023.pdf

development; maize is susceptible to soil-moisture stress during all growth phases (Cakir, R., 2004), decreasing quantitative and qualitative yield. At the same time, maize is susceptible to high temperatures; exposure of maize to heat stress, characterized by temperatures 1.5–17 °C above the optimal growth threshold, resulted in a 32.7–40.9% reduction in yield (Shiduo et al., 2024).

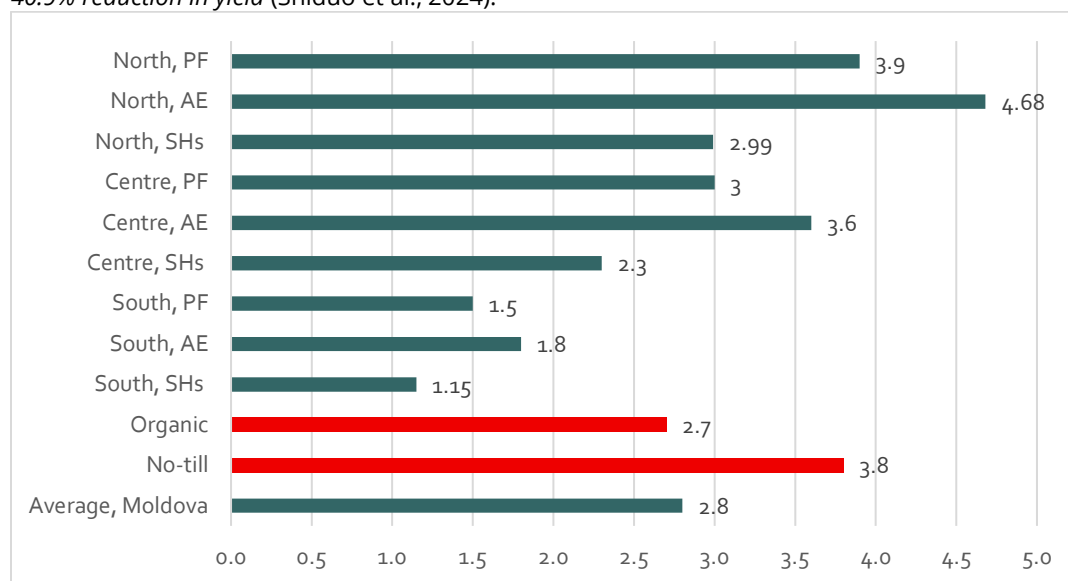


FIGURE 6-2: YIELD OF MAIZE ACCORDING TO THE INTERVIEW, T/HA, 2023

Overall yields were low despite the high yield potential of the cultivated hybrids, reflecting strong climate-related constraints. Reduced precipitation, combined with increased heat stress (high temperatures), was the main limiting factor, increasing the environmental impact intensity per functional unit due to lower output levels. The highest average yield was recorded in the northern zone (3.8 t/ha), while the southern zone, characterised by the lowest rainfall, showed the lowest yields. No-till conservation agriculture achieved higher yields (3.8 t/ha) than conventional agriculture (2.8 t/ha), indicating partial mitigation of climate stress; in years characterized by drought and heat stress, the performance of no-till systems is consistently superior to conventional systems, as also confirmed by scientific studies (Pittelkow et al., 2015; Anderson, 2016; Steward et al., 2018).

Within the agricultural community, there is a persistent assumption that farmers repeatedly cultivate maize hybrids in medium-maturity groups, with little hybrid diversification on the farm. Farmers select medium-maturity hybrids in the expectation that conditions will be favourable and that high yields will be achieved. Increasing climatic variability has made the cultivation of a single maize hybrid across the entire farm highly risky, as periods of peak crop water demand increasingly coincide with soil moisture deficits and high temperatures, exposing crops to combined drought and heat stress. Of the five years presented in Table 1, only in 2021 did maize yields exceed 5 t/ha, while the average yield for the remaining four years was only 2.0 t/ha.

Moreover, it is suggested that early hybrids be cultivated with expectations of lower yield potential but higher yield stability, which remains more consistent year on year, contributing to a more sustainable value chain³⁶. Additionally, it is advised that each farm grow 3-4 hybrids from different maturity groups to adapt to climate change³⁷. The most widely cultivated hybrids from questionnaires were grouped according to the FAO maturity group classification, with the earliest group FAO 100 and the latest FAO 700. The results of the grouping are presented in Table 6-6.

³⁶

https://moldova.un.org/sites/default/files/2021-04/Final%20Moldova%20Drought%202020_Crop%20Assessment%20Report%2016%20March%202021.pdf

³⁷ <https://maia.gov.md/ro/content/recomand%C4%83ri-privind-la-zonarea-culturilor-agricole>

TABLE 6-6: HYBRIDS CULTIVATED ACCORDING TO FAO AND RECOMMENDATION FOR ROM

FAO Maturity group	Number of days	Hybrids cultivated according to the FAO maturity group	Hybrids		Recommendation for RoM, %
			Number	%	
FAO 100	95 -100	0	0	0	
FAO 200	100 -105	Adevey (1) ¹ ; DKC 3972 (4); KWS Kavalier (1).	6	10	20
FAO 300	105 -110	Pioneer 9889 (9); Pioneer 8834 (2); Pioneer 9610 (5); BC 323 (2); Alibi (2); SUM 307 (1); Papparazzi (4); Zbruci (1); LG 31388 (3); LG 31377 (2); Furti CS (1); ES Method (1); LG 30389 (1); Pioneer 9903 (1); KWS Oltenio (1); Sy Torino (1); DKC 4098 (1); DKC 5092 (1); SB 3020 (1).	40	67	60
FAO 400	110 -115	Porumbeni 461 (3); Porumbeni 458 (7); FILIGRAN (1); GW 3378 (2); KWS Intelegents (1).	14	23	20
FAO 500	115 -120	0	0	0	

¹Number of times the hybrid was mentioned by farmers.

A general overview of the results does not fully confirm the hypothesis that farmers in the value chain cultivate only medium-maturity hybrids, as the 60 identified hybrids span three maturity groups and are in proportions recommended for the Republic of Moldova.

A more detailed investigation revealed that, out of 57 maize growers, 36 cultivate one hybrid, 14 two, and 7 three hybrids. In many cases, these 2 or 3 hybrids cultivated belong to the same maturity group, or it is difficult to determine whether they are widely cultivated hybrids or hybrids purchased on a limited basis for the farmer's personal trial.

Broad agronomic analyses indicate that longer-growing varieties (often higher FAO) are more sensitive to water scarcity than shorter ones because they extend their growth during hotter, drier parts of the season, increasing total water demand (Meng 2016). Several studies demonstrate that early-maturing maize hybrids (≈90–105 days to maturity) tend to experience less late-season water stress and lower cumulative water use compared to late-maturity hybrids. Early maturity contributes to a drought escape strategy, making these hybrids better suited to dryland and rain-fed environments (Grewer 2024; Wang et al. 2024; Badu-Apraku et al. 2021).

The weak development of the agricultural extension service and the absence of local demonstration activities comparing maize hybrids from different companies under the same agro-climatic conditions limit farmers' ability to assess hybrid performance under climate variability and increasing weather-related risks. Consequently, hybrid selection relies primarily on information transmitted through input supply chains rather than through independent, field-based advisory and extension mechanisms.

Under conditions of declining precipitation and limited irrigation potential, climate change increasingly constrains water availability for maize production, making improved water-use efficiency through soil moisture conservation practices more critical than further expansion of water abstraction.

The promotion of extra-early and early-maturing maize hybrids can serve as a short-term adaptation strategy for the value chain by increasing hybrid diversification and enabling the maintenance, or even the enhancement, of production levels, including the use of maize as a second crop. A stronger market presence of these hybrids would further support their adoption as catch or insurance crops when primary crops are adversely affected by climatic shocks.

A long-term strategy will fall under the umbrella of no-till conservation/regenerative agriculture, with practices based on natural principles and aimed at improving soil health by keeping the soil permanently covered with a wide diversity of cultivated hybrids (at least 3–4) adapted to local conditions. This approach involves varying sowing densities depending on water availability and weather forecasts, as well as integrating cover crops into the system.

6.3. Biodiversity

A GIS-based analysis was carried out using Corine³⁸ land use and land cover map (full legend of the Corine is shown in

APPENDIX) along with the map of protected areas showing the Emerald Network of Areas of Special Conservation Interest³⁹. These two geographically-explicit databases were used to identify any overlap between annual crop-growing regions and protected natural reserves. Emerald sites cover 8.1% of the Moldovan territory, covering 2,744.6 km². By 2022, Moldova had designated 61 Emerald sites.

Figure 6-3-A shows the resulting elaboration, in which land use and land cover categories from Corine are shown exclusively for the areas of special conservation interest. The vast majority of these areas are covered by forest or areas in conversion to forest (categories 311, 312, 313, 324) of Corine land cover map, shown in shades of green in the figure. In particular, the presence of category 324 – areas undergoing conversion to forest –, corresponds to information received from stakeholders, according to which there is a very low risk of agricultural encroachment into non-agricultural land and a process of natural reforestation of areas previously cultivated is even taking place. Nevertheless, according to stakeholders, there are some cultivated plots inside small, protected areas, but the phenomenon is not observed in large national parks. Management plans for some protected areas are in place, but they are not sufficiently updated, nor appropriately enforced.

Also, wetlands, water basins and rivers (411, 511, 512, shown in blue and light blue in Figure 6-3-A are widespread within the conservation areas.

Figure 6-3 B shows arable land within Emerald sites (category 211, mostly concentrated in the Gagauzian region and to a lesser extent in the north-eastern national border).

³⁸ Corine Land-Cover in Eastern Partnership Countries.

³⁹ Emerald Network data (vector) - the Pan-European network of protected sites version 2024.

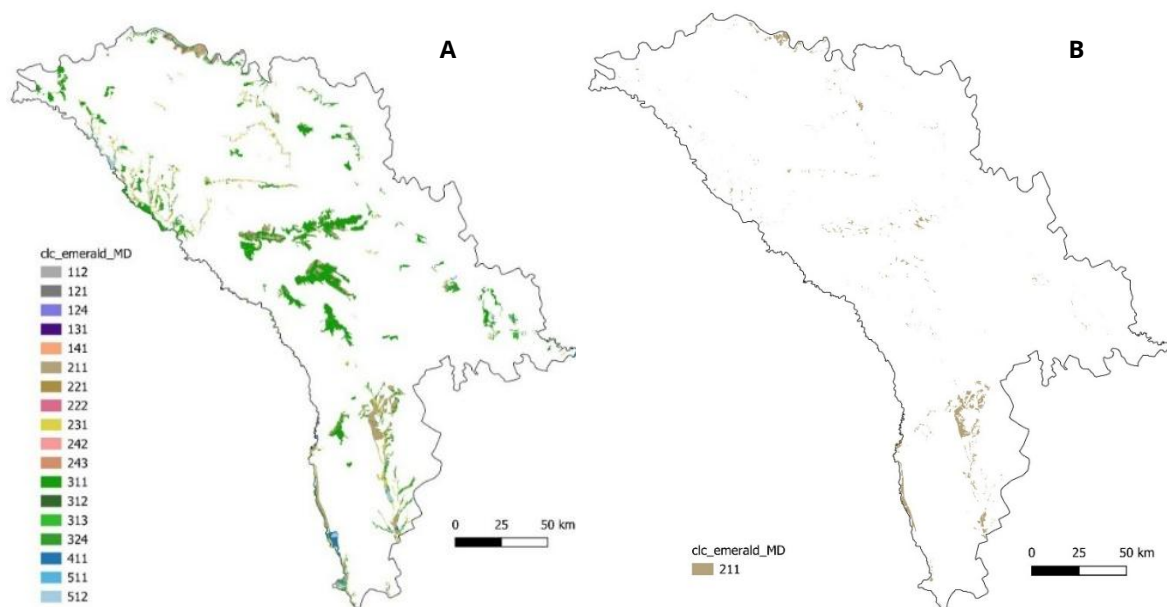


FIGURE 6-3 (A, B): GEOGRAPHICALLY-EXPLICIT BIODIVERSITY RISK ASSESSMENT.

A-land use and land cover categories from Corine within the Emerald Network of Areas of Special Conservation Interest, B-Corine category 211 (non-irrigated arable land) within the Emerald sites.

Source: own GIS elaboration using Corine land-cover map and Emerald Sites map.

Moldova is committed to align the Emerald network sites management to Natura 2000 standard⁴⁰, transforming the Emerald sites into Natura 2000 sites. This process is expected to improve the management of the existing Emerald Network sites by establishing new management strategies, in line with the EU conservation standards. Biodiversity in agricultural landscapes is also influenced by the limited presence of natural vegetation patches and landscape elements within cultivated areas. The size, continuity, and diversity of these features, such as hedgerows, grassy strips, riparian buffers, and tree belts, play a critical role in supporting pollinators, natural pest enemies, and farmland bird populations. In many parts of Moldova, these structures are sparse or fragmented, which reduces ecological connectivity and habitat quality.

Although the risk of agricultural encroachment into protected areas appears limited in Moldova, biodiversity concerns should also consider agro-biodiversity within farming landscapes. There is still limited information on the biodiversity of Moldovan agricultural systems, including soil organisms, pollinators, farmland birds, beneficial insects and crop genetic diversity. The expansion of cereals and the progressive consolidation of agricultural land may contribute to larger and more homogeneous fields, simplified crop rotations and fewer field margins, buffer strips or semi-natural habitats, which can reduce habitat diversity and ecological connectivity. In addition, the widespread use of imported hybrids and varieties, which may not always be well adapted to drought and heat conditions, can increase genetic uniformity and reduce the use of locally adapted genetic resources. Therefore, the main biodiversity risk is less related to the conversion of protected areas and more to the homogenisation of agricultural landscapes and crop genetic resources, highlighting the importance of diversified rotations, field margins, cover crops and the conservation of locally adapted varieties.

6.4. Synthesis of the environmental aspects

⁴⁰ LIFE23-PRE-EL-LIFE-RENATA/101148675

Natural resource depletion within the maize value chain is closely associated with the long-term degradation of soil resources, which remain the foundation of agricultural production in Moldova. The evidence collected through field observations, stakeholder consultations, literature review and policy analysis indicates that soil degradation continues despite decades of scientific research, public investment and policy interventions aimed at promoting sustainable land management. The environmental challenge is therefore not primarily related to the availability of technical solutions, as effective measures for soil conservation and sustainable crop production, such as no-till, residue retention, cover crops and diversified crop rotations, are already known and have been successfully demonstrated under Moldovan conditions. Rather, the persistence of soil degradation suggests limitations in the large-scale adoption and effective implementation of these practices across the agricultural sector.

As a result, the sustainability of the maize value chain depends on its capacity to preserve soil resources while maintaining agricultural productivity. Strengthening the transition towards production systems that protect soil functions, reduce resource depletion and enhance resilience to climatic stress, particularly conservation agriculture, no-till, residue retention and diversified crop rotations, remains one of the key environmental priorities for the sector.

Human health does not appear to be a major environmental constraint within the maize value chain based on the life-cycle assessment results and the agricultural practices observed during the study. The assessment suggests that the principal concern is not the intrinsic hazard of the authorised products themselves, but rather the level of exposure associated with everyday farming practices, particularly chemical plant protection, pesticide handling and field application. The findings indicate that human health outcomes depend largely on the extent to which occupational safety principles, including the use of personal protective equipment and safe handling procedures, are integrated into farm management. Consequently, the environmental sustainability of the value chain is influenced not only by the choice of agricultural inputs but also by the capacity of producers to apply them responsibly and safely. Strengthening awareness, training and compliance with basic safety measures would therefore contribute to reducing potential health risks without necessarily requiring substantial changes in production systems.

Climate-related pressures within the maize value chain are primarily determined by management decisions taken at the cultivation stage. The assessment indicates that production systems, including conventional tillage, reduced tillage, no-till and conservation agriculture, differ considerably in their capacity to balance productivity and resource-use efficiency, demonstrating that technology choice is a key factor influencing climate performance. The results suggest that reducing climate-related pressures does not necessarily require lower production levels, but rather production systems capable of maintaining yields with lower energy requirements, reduced diesel consumption and reduced soil disturbance. Consequently, the environmental sustainability of the value chain depends on its ability to promote farming practices that simultaneously support productivity, resource efficiency and resilience to increasing climatic variability.

Given the growing frequency of droughts and extreme weather events in Moldova, strengthening the adaptive capacity of maize production systems becomes an important component of climate sustainability. The transition towards production systems that improve both mitigation and adaptation outcomes, especially conservation agriculture, no-till, residue retention, cover crops and diversified crop rotations, therefore represents one of the main opportunities for enhancing the long-term environmental performance of the value chain.

While the previous aspect concerns the contribution of the value chain to climate-related pressures, climate change also acts as an external constraint on the performance and sustainability of maize production.

Climate change represents one of the most significant environmental challenges affecting the maize value chain in Moldova. The analysis shows that the sector is increasingly exposed to droughts, heat waves and growing climatic variability, which directly influence production stability and the efficiency with which natural resources are transformed into agricultural output. The findings suggest that the environmental sustainability of the value

chain is becoming progressively dependent on its capacity to adapt to changing climatic conditions. Production systems that are better able to conserve soil moisture, such as no-till, residue retention, mulching, cover crops and diversified crop rotations, maintain productivity under water stress and reduce vulnerability to extreme weather events are likely to play an increasingly important role in ensuring the long-term viability of maize production.

The assessment further indicates that climate adaptation should be considered a central component of environmental sustainability rather than a separate objective. As climatic pressures intensify, the resilience of production systems will become a key determinant of both environmental and economic performance across the value chain.

Biodiversity does not appear to be under substantial direct pressure from the expansion of maize cultivation into protected areas. The assessment suggests that the main biodiversity challenges associated with the value chain are linked less to the occupation of conservation areas and more to the ecological quality of agricultural landscapes themselves. Practices such as diversified crop rotations, cover crops, field margins, buffer strips and hedgerows can contribute to improving habitat diversity and ecological connectivity within agricultural landscapes.

The long-term conservation of biodiversity therefore depends on maintaining functional connections between agricultural production and natural ecosystems. Landscape elements that support ecological connectivity, habitat diversity and ecosystem services remain important for sustaining biodiversity within intensively cultivated regions. As a result, biodiversity conservation should be viewed not only as a protected-area issue, but also as an integral component of sustainable agricultural land management.

Overall, the value chain presents a relatively low direct risk to areas of special conservation interest, while opportunities remain to strengthen biodiversity outcomes through improvements in the ecological functioning of agricultural landscapes.

7. SYNTHESIS & RECOMMENDATIONS

7.1. Answering the framing questions

The economic sustainability of the Moldovan maize VC is shaped by a combination of opportunities and structural constraints. Primary production remains highly exposed to climatic risks, particularly recurrent droughts and extreme temperatures, which significantly affect yields and production stability. At the same time, international trade is constrained by high logistics costs and limited access to seaport infrastructure, reducing the competitiveness of Moldovan maize exports in regional and global markets. Nevertheless, the processing and domestic utilisation segments offer important opportunities for value addition and improved economic resilience. **Maize producers operate in an environment characterised by high production costs**, largely driven by dependence on imported inputs, including fertilisers, hybrid seeds, and crop protection products. Rising labour and mechanisation costs place additional pressure on farm profitability, without always being accompanied by proportional gains in productivity. Many farmers rely on technical credit provided by input suppliers, which facilitates access to production inputs but also creates financial dependency and exposes producers to repayment risks in years of poor harvests or adverse market conditions.

The performance of the maize VC is closely linked to the development of domestic processing and utilisation industries. Sustainable growth requires investment in modern drying, storage, feed manufacturing, starch processing, and other value-adding facilities capable of serving both domestic and export markets. While primary processing activities are relatively low in labour intensity, downstream industries, particularly compound feed production, livestock farming, and food processing, can generate substantial multiplier effects in terms of employment and rural economic development. These sectors provide important pathways for increasing value addition and reducing dependence on exports of unprocessed grain.

Economic performance differs considerably between the export-oriented and domestic value-added segments of the VC. Activities focused primarily on the export of raw maize grain are more vulnerable to fluctuations in international markets and logistics costs, whereas domestic processing and integration with the livestock sector generate higher levels of value added and more stable economic returns. This dual structure highlights the strategic importance of expanding national processing capacity and strengthening linkages between maize production and downstream industries as a pathway towards greater competitiveness and long-term sustainability. Farm liquidity remains a persistent challenge across the sector. Limited access to affordable finance, high borrowing costs, and the accumulation of negative VAT balances continue to constrain producers' ability to invest in modern technologies and effectively manage cash flow. In this context, improving the business environment, facilitating access to finance, and encouraging investment in processing and logistics infrastructure will be critical for strengthening the competitiveness and economic sustainability of the maize VC in the Republic of Moldova.

Economic growth in Moldova's maize value chain is only partially inclusive. Although the sector generates employment, income, and food security for a broad range of rural actors, benefits are distributed unevenly. Smallholders, women, and young people face persistent barriers in access to assets, training, formal employment, and markets, while larger enterprises capture a disproportionate share of profits and public support. Strengthening cooperation, skills development, and equitable access to resources would improve inclusiveness and resilience.

Moldova's maize value chain is a socially embedded and economically important sector that supports rural livelihoods through a combination of commercial farming, family-based production, and local land-leasing arrangements. While a relatively small group of skilled, predominantly male mechanized workers benefits from formal employment and greater job security, much of the workforce—especially women engaged in seasonal and auxiliary activities—remains informally employed and lacks adequate social protection. Smallholders and family farms continue to play a crucial role in food security and community resilience, despite limited access to formal support mechanisms. Cooperation among producers, collective bargaining, and trust in public institutions

remain relatively weak, although emerging producer associations and cooperatives demonstrate the potential for stronger collective action. Persistent gender inequalities, particularly in access to technical occupations, training, and leadership positions, further constrain inclusiveness. Overall, the social sustainability of the maize value chain depends on strengthening human and social capital through improved education, occupational safety, gender equality, producer cooperation, and closer integration with financial, processing, and marketing institutions, thereby fostering more resilient and equitable rural development.

The maize VC demonstrates a relatively moderate environmental impact, with cultivation remaining the dominant source of pressure across the assessed categories. Life Cycle Assessment (LCA) results indicate that environmental performance is largely determined by field-level management decisions, particularly soil management, fertilisation, fuel use and crop protection practices. Natural resource depletion is closely linked to long-term soil degradation, while climate-related pressures are driven primarily by mineral fertiliser use and associated greenhouse gas emissions from agricultural soils. Human health impacts appear relatively low, but stakeholder feedback highlights that risks are mainly associated with insufficient use of personal protective equipment and weak compliance with safety procedures during pesticide handling and application. Biodiversity is not under substantial direct pressure from maize expansion into protected areas, although the ecological quality of agricultural landscapes remains important. Expanding conservation agriculture practices, particularly no-till, residue retention, cover crops and diversified crop rotations, together with improved nutrient management aimed at increasing nitrogen use efficiency and optimising fertiliser application, offers the most effective route for improving soil health, resource efficiency, climate resilience and long-term environmental performance. In addition, maintaining field margins, buffer strips, hedgerows and other landscape elements would help strengthen biodiversity, reduce erosion and improve ecological connectivity within agricultural landscapes.

7.2. From SWOT to TOWS: Strategic Priorities for the Maize VC

Taking into consideration the SWOT analysis presented in the economic, social, and environmental assessments, the TOWS matrix identifies strategic actions that build on the strengths of Moldova's maize value chain, address its weaknesses, capitalize on emerging opportunities, and mitigate potential threats. The proposed strategies aim to enhance the long-term economic viability, social inclusiveness, and environmental sustainability of the maize sector.

The TOWS matrix identifies strategies to: (a) use strengths to maximise opportunities (SO); (b) overcome weaknesses by capitalising on opportunities (WO); (c) use strengths to mitigate threats (ST); and (d) minimise weaknesses to reduce vulnerability to threats (WT).

TABLE 7-1 THE TOWS MATRIX FOR THE MAIZE VC IN MOLDOVA

	Strengths (S)	Weaknesses (W)
	<ol style="list-style-type: none"> 7. Maize is a well-established strategic crop in Moldova 8. Strong domestic self-sufficiency and export surplus 9. Presence of mechanised medium and large agricultural enterprises 10. Secure land tenure and stable lease arrangements 11. Community embeddedness and contribution to rural food security 12. Growing adoption of conservation agriculture (especially no-till) 	<ol style="list-style-type: none"> 1. Extreme dependence on rainfall and near-absence of irrigation infrastructure 2. Fragmented land structure and large number of small farms 3. Low productivity compared with EU benchmarks 4. Ageing agricultural workforce and weak generational renewal 5. Weak producer cooperation, collective action, and social dialogue 6. Insufficient adoption of sustainable soil, water, and biodiversity management practices
Opportunities (O)	SO Strategies	WO Strategies
<ol style="list-style-type: none"> 1. EU accession process and access to modernization funds. 2. Expansion of climate-smart, digital, and precision agriculture. 3. Expansion of irrigation and water-management investments. 4. Strengthening producer organizations, cooperatives, and collective action. 5. Investment in rural human capital, vocational training, and generational renewal. 6. Growing demand for sustainable and certified agricultural products in EU markets. 	<ul style="list-style-type: none"> • Use Moldova's strong maize production base and export surplus to attract EU modernization funds and investments in value-added processing, traceability, and Farm-to-Fork systems. • Scale up conservation agriculture and precision farming through existing mechanized enterprises and subsidy programmes. • Build producer organizations and cooperative models on existing local networks and community-based land-leasing systems. • Strengthen the role of maize in food security while promoting traceable, certified, and sustainable production for EU and premium markets. • Use established farm enterprises as hubs for vocational training. • Support integrated maize-livestock and circular-economy approaches. 	<ul style="list-style-type: none"> • Prioritize EU and public investments in irrigation systems. • Strengthen producer organizations and cooperative structures. • Expand vocational training, dual education, and advisory services. • Promote women's and youth participation through targeted access to training, machinery, finance, and leadership positions. • Improve extension services supporting sustainable soil, water, and biodiversity management practices. • Facilitate access to digital technologies, market information, and precision-agriculture tools among small and medium farms.
Threats (T)	ST Strategies	WT Strategies
<ol style="list-style-type: none"> 1. Increasing frequency and severity of droughts and climate extremes 2. Land degradation, soil erosion, and declining soil fertility 3. Global price volatility and unstable commodity markets 4. Geopolitical disruptions affecting trade, logistics, and input supply chains 5. Continued rural depopulation, migration, and labour shortages 6. Dependence on imported fertilizers, seeds, and other agricultural inputs 	<ul style="list-style-type: none"> • Expand conservation agriculture. • Strengthen domestic food-security functions and local maize supply chains. • Use mechanization and technological modernization to compensate for labour shortages. • Diversify domestic and export markets through value-added maize products. • Promote soil conservation and crop-rotation systems to maintain long-term productivity. • Encourage collective risk-management mechanisms, agricultural insurance, and farmer cooperation to improve resilience to economic and environmental shocks. 	<ul style="list-style-type: none"> • Accelerate irrigation development and integrated water-resource management. • Improve soil fertility management and reduce dependence on imported fertilizers through precision nutrient management and conservation practices. • Strengthen agricultural advisory services, research-extension linkages, and environmental monitoring systems. • Support farm consolidation, land cooperation, and machinery-sharing arrangements. • Improve rural living conditions, education, and employment opportunities. • Promote stronger producer representation and social dialogue to improve farmers' bargaining power and adaptive capacity during market and geopolitical crises.

7.3. The risk analysis

The risk analysis presents the identified risks, which are partially being identified in the SWOT matrix and partially being identified by the experts based on information reached. The probability column identifies risks which are the most probable (1 least probable, 3 most probable). At the same time, the severity is being measured on the range from 1 to 4 (least severe to most severe). The severity is observing the 4 components of the VC methodology, the economic growth, inclusiveness, social sustainability and environmental sustainability. The

resulting values are defined by the expert panel. The highest risks scored *a) climate resilience due to slow adoption of conservation agriculture and b) lower yields due to poor fertiliser management and climate stress, c) high migration of youth and d) prevailing geopolitical issues.*

TABLE 7-2 THE RISK ANALYSES OF THE MAIZE VALUE CHAIN IN MOLDOVA.

Risk description	Probability	Severity			
		Growth	Inclusiveness	Social sustainability	Enviro. Sustainability
Increasing frequency and intensity of agricultural and atmospheric droughts, leading to significant reductions in maize yields.	3	2	2	2	4
Appreciation of the national currency, which reduces the competitiveness of maize exports on international markets.	2	3	2	2	2
Shortage of skilled labour for managing modern agricultural enterprises, including the operation of advanced machinery, digital technologies, and precision farming systems.	2	2	3	3	2
Insufficient drying, storage, and processing capacity for maize	2	3	2	2	1
Limited access to finance due to high farmer indebtedness and elevated borrowing costs.	3	3	3	2	2
Declining domestic demand for maize as a result of reductions in livestock numbers and the contraction of the livestock sector.	3	3	2	2	2
Declining yields due to poor fertilizer management and climate stress	3	3	2	2	3
Loss of rural milling operations undermines rural economic resilience, food security	2	2	3	3	1
Applying the subsidy requirements (cross-compliance) will lead many farms to fail to meet these conditions.	2	2	2	2	2
Aging of the workers in value chain and high outward and inward migration of youth from rural areas	3	3	3	3	2
Weak producer cooperation and limited collective action reduce bargaining power and innovation diffusion	3	3	3	3	2
Geopolitical disruptions (the war in Ukraine) affecting trade, logistics, and agricultural input supply chains	3	3	3	3	2

	1	2	3	4
Severity	Low	Moderate	High	Extreme
	1	2	3	
Probability	Low	Moderate	High	

7.4. Recommendations

Based on the surveys, interviews and own observations, the team formulated possible recommendations. They are divided into 5 sections: I) Financial issues; II) Social inclusion; III) Environmental sustainability; IV) Modernisation and value addition; V) Governance and institutions.

Pillar	Focus Area	
I. Financial Stability & Market Structure	Addressing fiscal issues, improving liquidity, and enhancing market transparency.	Find a solution to the VAT issues that strain farm liquidity and cash flow.
		Enable companies to gain cheaper credits and cheap short-term loans . Those would enable farmers to purchase inputs, reducing dependency on input providers (technical credits).
		Strengthen the financial management of agricultural enterprises (risk analysis, budgeting) to enhance financial governance.
		Providing differentiated subsidies for farmers who implement efficient irrigation systems and digital crop monitoring.
		Establish a direct payment per hectare for maize producers applying sustainable agricultural practices. Support should be conditional on compliance with climate and environmental performance criteria.
		Introducing zero-tax incentives for profits reinvested in farm modernization, including the purchase of machinery, irrigation systems, digital technologies, and post-harvest infrastructure.
II. Social Inclusion & Labour Conditions	Improving worker welfare, safety, and addressing the aging workforce and emigration.	Invest in rural human capital. Expand vocational training and dual education in agri-mechanics, irrigation, and food processing; link curricula to enterprise demand and promote women's enrolment.
		Implement training and awareness campaigns for farmers and workers on safety procedures (fertilization, pesticide application).
		Empower women and youth. Facilitate access to land titles, credit, and machinery training for women; support youth start-ups and succession schemes in agriculture.
		Implement targeted grant schemes, training, and incentives, and develop programs to support youth to return and start agricultural production.
III. Environmental Sustainability & Climate Adaptation	Promoting climate-smart practices and efficient resource use.	Put pressure on the support of Conservation Agriculture (CA) for better soil and water management.
		Improve fertilisation management to reduce emissions and enhance sustainability.
		Explore policies for livestock reintegration to close nutrient loops through manure use.
		Restore, maintain and increase hedgerows and tree belts in agricultural landscapes, alongside the implementation of agroforestry practices.
		Further promote commitment to align conservation areas to the Natura 2000 standard.
IV. Modernization, Capacity & Value Addition	Enhancing competitiveness, R&D, and moving up the value chain.	Implement investments into precision farming , given the size and scale of Moldovan farms.
		Provide an e-agricultural platform for a wide range of information (market data, weather forecasts, advisory services).
		Develop capacity building (education and mainly extension service centres).
		Support diversification of agricultural production and support processing and market entry .
		Strengthen cooperatives and collective bargaining. Support the professionalization of producer organizations, enhance transparency, and encourage horizontal cooperation.
V. Governance and Institutional Alignment	Streamlining public administration and ensuring alignment among stakeholders.	Establish a working group of key stakeholders (Ministries, associations, international experts) to update soil conservation legislation in accordance with international standards.
		Strengthen labour inspection and OSH control during peak seasons, and tie employer incentives to compliance with contracts, insurance, and safety standards.
		Push for the digitalisation of the government agenda , mainly the agenda related to the Agency of Interventions and Payments in Agriculture (AIPA).

Improve rural services and wellbeing. Continue rural investment in health, sanitation, and digital infrastructure to reduce disparities and retain skilled populations.

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8. APPENDIX

List of appendix items

APPENDIX 9-1. LIFE CYCLE INVENTORY LIST OF MAIZE (CULTIVATION)	121
APPENDIX 9-2. LIFE CYCLE INVENTORY LIST OF MAIZE (STORAGE AT WAREHOUSE), FUNCTIONAL UNIT: 1 KG OF GRAIN AT WAREHOUSE GATE	121
APPENDIX 9-3. LIFE CYCLE INVENTORY LIST OF MAIZE (TRANSPORT), TRANSPORT TO MILL (INDUSTRIAL, LOCAL). UNIT: 1 KG OF TRANSPORTED GRAIN	121
APPENDIX 9-4. LIFE CYCLE INVENTORY LIST OF MAIZE (TRANSPORT), TRANSPORT TO EXPORT. UNIT: 1 KG OF TRANSPORTED GRAIN	122
APPENDIX 9-5. LIFE CYCLE INVENTORY LIST OF MAIZE (MILLING), FUNCTIONAL UNIT: 1 KG OF MAIZE FLOUR IN 1 KG PACKAGE AT MILL GATE (INDUSTRIAL MILL)	122
APPENDIX 9-6. LIFE CYCLE INVENTORY OF MAIZE(MILLING), FUNCTIONAL UNIT: 1 KG OF MAIZE FLOUR AT MILL GATE	122
APPENDIX 9-7. LEGEND OF THE CORINE LAND COVER MAP (LAND USE AND LAND COVER CATEGORIES).	123

9.1 APPENDIX TO ENVIRONMENTAL ANALYSES (LCA)

9.2.1 Life Cycle Inventory

APPENDIX 9-1. LIFE CYCLE INVENTORY LIST OF MAIZE (CULTIVATION)

	Unit	North			Centre			South			No-till	Organic
		SHs	PF	AE	SHs	PF	AE	SHs	PF	AE		
Inputs/ha	Unit											
Land occupation	m ²	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
Seed	kg	20	20	20	20	21	18	20	21	20	16	19
Ammonium Nitrate	kg	0	25	10	30	30	20	45	10	30	50	
UREA 46%	kg	0	45	15	25	0	0	20	55	30	0	
NPK	kg	0	70	45	50	100	50	30	10	20	40	
Organic fertilizer (compost)	kg	2500	0	0	0	0	2543	0	0	0	0	1000
Diesel, mechanical operations	L	85	99	70	66	80	64	62	79	57	36	97
Herbicide	kg	1,17	0,66	1,07	1,30	1,32	0,82	0,62	1,11	1,0	3,5	
Fungicide	kg	0	0	0	0	0	0	0	0	0	0	
Water (Well)	L	400	400	400	400	400	400	400	400	400	400	
Transport of inputs to local warehouse*	kg.km	63,702	281,769	264,642	209,880	256,392	154,692	192,072	173,166	166,800	168,300	69,600
Transport of inputs to farm	kg.km	1637	3894	3466	2884	3334	3705	2349	2641	2370	2182	1740
PP bags (seed, fertilizers)	kg	0,55	0,55	0,55	0,55	0,55	0,55	0,55	0,55	0,55	0,55	
Outpus/ha	Unit											
Grain (at commercial moisture)	t	3.0	3.9	4.7	2.3	3.0	3.6	1.2	1.5	1.8	3.8	2.7
Inert waste disposal (PP seed&fert bags)	kg	0,55	0,55	0,55	0,55	0,55	0,55	0,55	0,55	0,55	0,55	

* Transport of fertilizers and pesticides from plant to local warehouse (assumed 1,500 km Russian origin, 600 km other origins).

APPENDIX 9-2. LIFE CYCLE INVENTORY LIST OF MAIZE (STORAGE AT WAREHOUSE), FUNCTIONAL UNIT: 1 KG OF GRAIN AT WAREHOUSE GATE

input/output	material	unit	amount	description
INPUT	maize grain	kg	1.05	maize grain from warehouse, transported to mill (pre-cleaned grains)
INPUT	transport of grains from farm	kg.km	10	assuming 10 km from farm to warehouse
OUTPUT	maize grain	kg	1	considering 5 % loss at warehouse

APPENDIX 9-3. LIFE CYCLE INVENTORY LIST OF MAIZE (TRANSPORT), TRANSPORT TO MILL (INDUSTRIAL, LOCAL). UNIT: 1 KG OF TRANSPORTED GRAIN

input/output	material	unit	amount	description
INPUT	transport of grains to industrial mill	kg.km	75	assuming 15 km from household to mill
INPUT	transport of grains to local mill	kg.km	15	assuming 75 km from warehouse to mill (1 to 150 km)

APPENDIX 9-4. LIFE CYCLE INVENTORY LIST OF MAIZE (TRANSPORT), TRANSPORT TO EXPORT. UNIT: 1 KG OF TRANSPORTED GRAIN

input/output	material	unit	amount	description
INPUT	transport of grains to port of export	kg.km	450	assuming transport distance to the port of Constanța (RO)

APPENDIX 9-5. LIFE CYCLE INVENTORY LIST OF MAIZE (MILLING), FUNCTIONAL UNIT: 1 KG OF MAIZE FLOUR IN 1 KG PACKAGE AT MILL GATE (INDUSTRIAL MILL)

input/output	material	unit	amount	description
INPUT	maize grain	kg	2.53	grain from warehouse, transported to mill (pre-cleaned grains)
INPUT	electricity	Wh	379	150 Wh/kg entering grain
INPUT	paper package	g	8	kraft paper, 1 kg packaging (8 grams paper packaging per 1 kg flour)
OUTPUT	flour	kg	1.0	extraction rate 40-50 % (allocated by mass), at extraction rate 40% with 1% less moisture
OUTPUT	Bran+germ cake residue	kg	0.25	25-30% (allocated by mass)
OUTPUT	residue	kg	0.10	10 % residues (part of embryo, tip cap, seed coat)

APPENDIX 9-6. LIFE CYCLE INVENTORY OF MAIZE(MILLING), FUNCTIONAL UNIT: 1 KG OF MAIZE FLOUR AT MILL GATE

input/output	material	unit	amount	description
INPUT	maize grain	kg	1.03	maize grain from warehouse, transported to mill (pre-cleaned grains)
INPUT	electricity	Wh	151	150 Wh/kg entering grain
OUTPUT	flour	kg	1	extraction rate 97% (allocated by mass)
OUTPUT	screenings	kg	0.3	3% cleaning loss

