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Digital Banking Tools for Farmers: Opportunities for Agricultural Companies in Moldova

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ABSTRACT

This report provides a snapshot of the agricultural sector and the status of financial inclusion in Moldova, examining how recent innovation in agriculture supports rural communities in improving financial inclusion. The report also highlights emerging monetization models and the roles of agricultural companies in the country. This report primarily targets agrotechnology companies seeking to develop a rural growth strategy by assessing farmers' credit risk using digital farm and farmer data. It will also be of interest to mobile money providers and fintech companies looking to launch and expand digital financial services for farmers.

1. Introduction

Agriculture dominates the rural economy of Moldova and makes a significant contribution to the national economy. It is the country's largest employer and accounts for over a quarter of the gross domestic product (GDP). Crop purchases remain highly informal and largely depend on the intermediation of informal traders. The sector faces a variety of long-standing challenges that affect farmers' livelihoods and limit growth opportunities. The use of digital technologies in agriculture has enabled stakeholders in the sector to mitigate some of these challenges, including limited access to agronomic advice and underdeveloped value chain structures. Other critical issues, such as farmers' limited access to credit and low associated financial inclusion levels, have been more persistent.

2. Literature review

Access to quality healthcare and educational services is limited in rural areas, where there are few hospitals and schools, and those that exist are often underfunded and poorly equipped. The poverty rate is significantly higher in rural areas compared to urban areas. Employment opportunities are scarce, with most jobs being concentrated in agriculture and few industries or non-agricultural jobs available.

Agriculture remains the primary source of income for many rural residents, but productivity is low due to outdated technology and insufficient infrastructure. Young people often leave rural areas in search of job opportunities in cities or abroad, leaving behind an aging and vulnerable population(Alexandru, n.d.).

Access to credit and other financial services is limited, hindering the growth of small and medium enterprises in rural areas. Women in rural areas face multiple barriers to education and employment,

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which contributes to the cycle of poverty. Environmental problems, such as waste, pollution, and unsustainable agricultural practices, exacerbate health and wellbeing issues in rural communities. Additionally, modern technologies, such as high-speed internet and other technological innovations, are rarely available in rural areas, limiting access to information and opportunities.

Many rural development projects rely on external funding and infrastructure, which may not be sustainable in the long term. These challenges highlight the urgent need for effective government strategies and policies that promote sustainable development and inclusion across all regions of the country. The development of rural areas in the Republic of Moldova requires a comprehensive approach, including investments in infrastructure, education, and healthcare, effective agricultural support policies, and programs to address migration and support the return of those who have left.

Furthermore, good governance and the fight against corruption are essential to ensure that resources are used efficiently and benefit rural communities(Cristea et al., 2020).

3. Material and methods

In the research, we strictly adhered to the ethical standards of scientific research, respecting both the objectives and the methods specific to research activities, in accordance with internationally recognized standards by the scientific community (*Republica Moldova: Probleme alese*, n.d.).

Firstly, the study's objectives were clearly defined and aligned with the goal of contributing to the understanding of the studied phenomenon, ensuring that the research was not influenced by external interests and adhered to the principles of scientific objectivity(*Grupul Băncii Mondiale - Dezvoltare internațională, sărăcie și durabilitate*, n.d.).

Regarding the research strategy, we chose data collection methods in a transparent and ethical manner, guaranteeing the protection of participants and respecting their rights. We applied standardized procedures to ensure that the collected data were valid and that no external influences could affect the objectivity of the results.

The research methods were appropriately selected to address the questions posed in the study. We used well-documented and widely recognized data collection techniques in the field, ensuring they were applied correctly and that the results could be replicated by other researchers in the future.

Regarding data analysis, we applied appropriate statistical techniques to correctly interpret the obtained information. The results were presented in a clear and objective manner, without distortion, and any limitations of the study were transparently discussed in the results section. Additionally, we adhered to the principles of transparency and accountability in their publication, in accordance with the requirements of international scientific journals.

4. Results and discussions

Agriculture dominates the rural economy of Moldova and makes a significant contribution to the national economy. It is the largest employer in the country and accounts for over a quarter of the gross domestic product. Crop purchases remain highly informal and largely depend on the intermediation of informal traders. The sector faces a variety of long-standing challenges that affect farmers' livelihoods and limit growth opportunities.

The range of digital applications in agriculture varies from solutions that provide agronomic advice to farmers, to high-tech, holistic tools involving satellites, sensors, and big data analytics. Access to markets improves links with formal crop buyers, allowing farmers to bypass multiple intermediaries and making purchases more equitable. Access to assets, especially agricultural assets and equipment, increases farmers' productivity and income. Access to services strengthens farmers' resilience and improves access to financial services.

The range of digital applications in agriculture varies from solutions that provide agronomic advice to farmers, to high-tech, holistic tools involving satellites, sensors, and big data analytics. Despite the rapid urbanization in recent years, Moldova's population remains largely rural. Agriculture is the main employer for 50% of the country's working-age population, but agriculture, livestock farming, and fishing accounted for only 24.6% of GDP in 2022 (Figure 1), indicating low agricultural productivity.

Moldova has one of the highest shares of rural population among European countries, and its agricultural sector makes a significant contribution to the national GDP. The total population of Moldova is approximately 2.60 million people (2022). More than half of the population (53.2%) lives in rural areas, with a larger population distribution in the central region (29.6%). According to the distribution of the population based on regional economic activities, the largest portion of the population is employed in agriculture (48.9%). We observe here a multilingual workforce with varying levels of education, which impacts their differing abilities to invest and remain in the rural space.

For a simplified visualization of the relevance of agriculture in certain European markets, the following graphical representation from 2019 will be used:

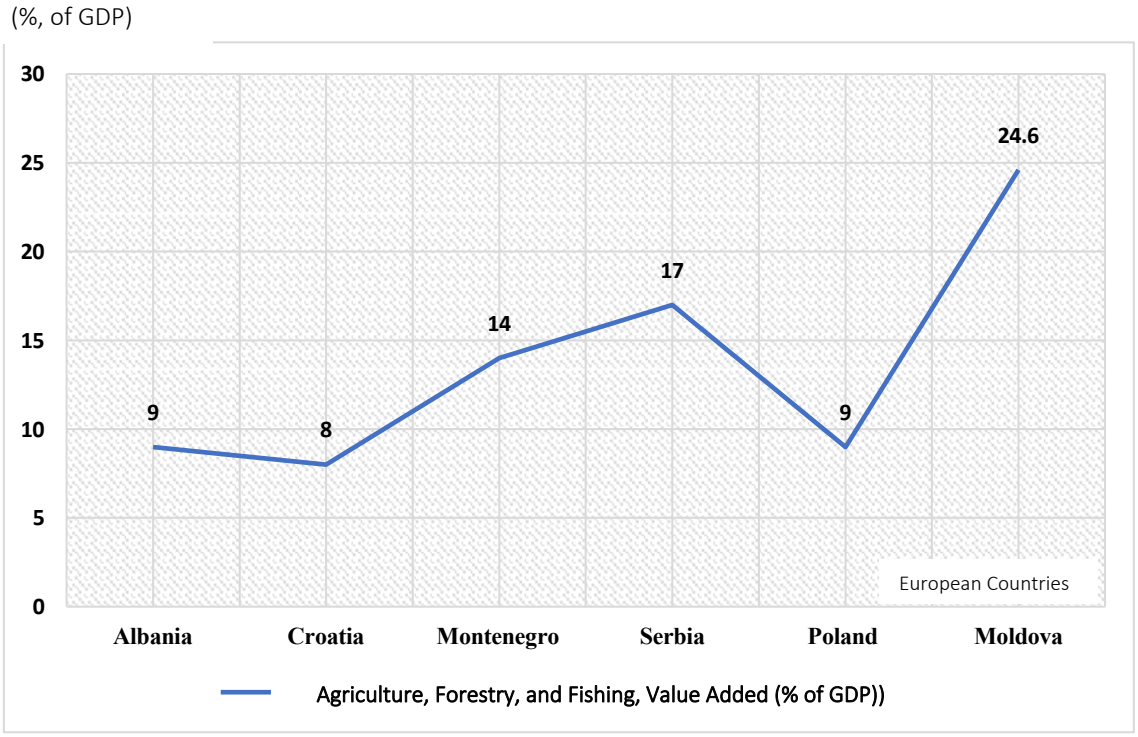

Figure 1. Relevance of Agriculture in Certain European Markets, 2024

Source: (Biroul Național de Statistică al Republicii Moldova, n.d.)

Moldova ranks second to last in poverty indicators in Europe, as measured by gross domestic product (GDP) per capita. According to the ranking of the richest and poorest countries, updated by the International Monetary Fund (IMF), Kosovo holds the last position with the lowest GDP per capita indicator.

However, despite considerable efforts made by the Moldovan state and its representatives, this result is reflected in the weak presence of foreign investors, who are slow to arrive.

Food crops represent the largest portion of Moldova's agricultural production, including cereals (such as wheat, corn), oilseeds (such as soybeans and rapeseed), legumes (such as sunflower and sugar beet), and vegetables and fruits (such as potatoes and grapes). For a simplified visualization of the cultivation areas of the main commodity categories, 2024, the following graphical representation will be used:

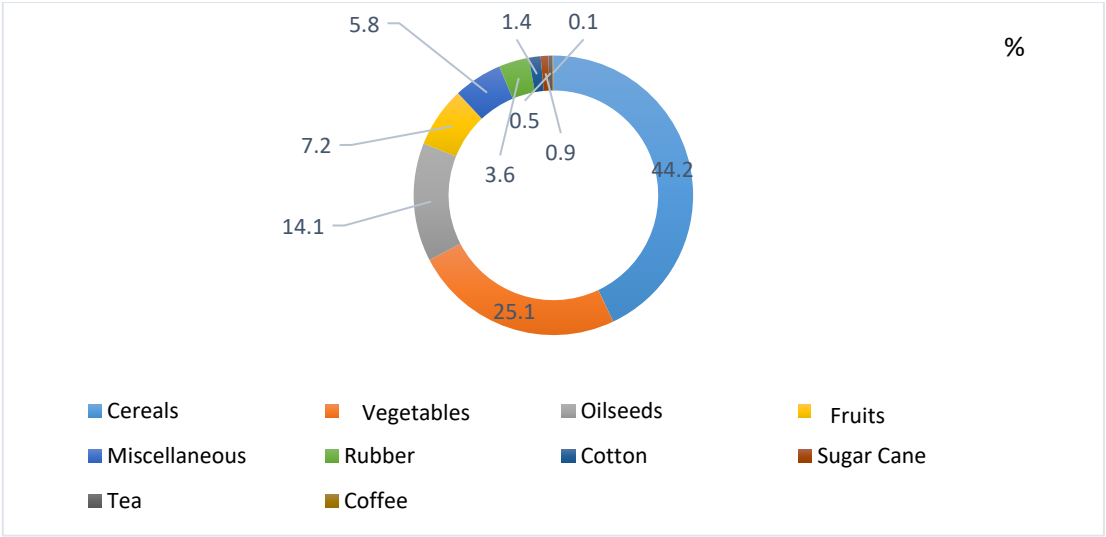

Figure 2. Cultivation Areas of the Main Commodity Categories, 2024

Source: (Biroul Național de Statistică al Republicii Moldova, n.d.)

Most farms grow rice during the monsoon season and other food crops during the cold and dry season, such as legumes, oilseeds, and corn. Cash crops, such as rubber, cotton, coffee, and tea, are under development and occupy a small cultivation area.

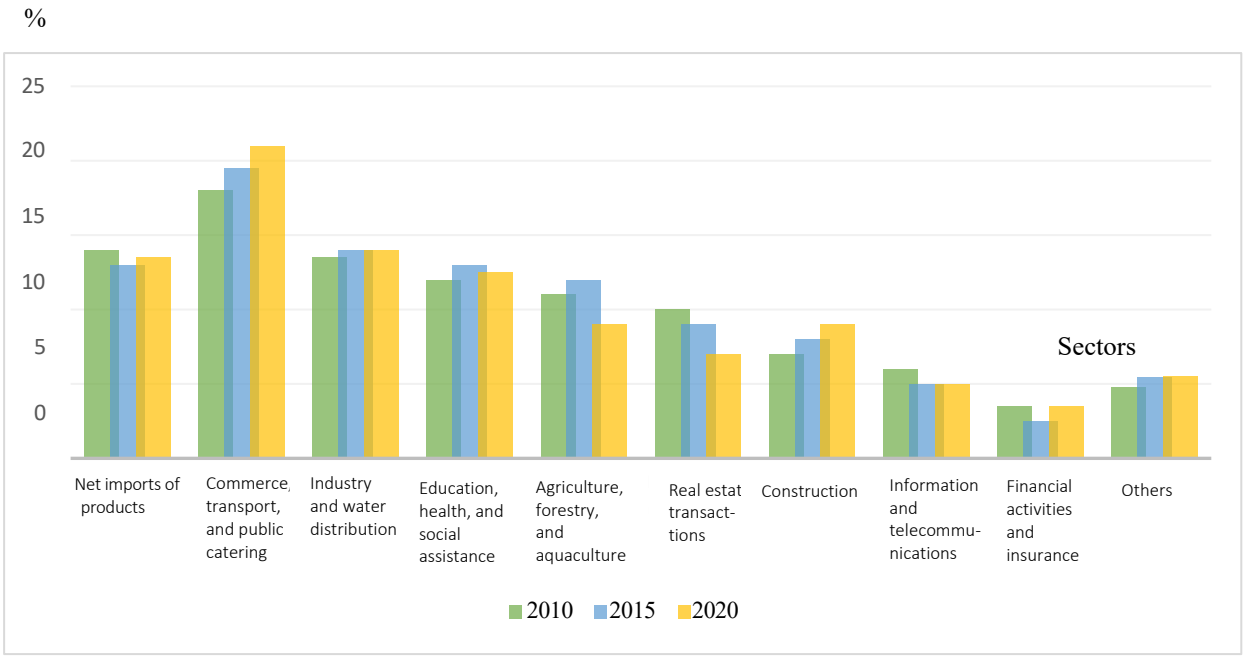

Figure 3. Contribution of Economic Activities to GDP Formation, %

Source: (Biroul Național de Statistică al Republicii Moldova, n.d.)

Since 2010, the economic structure of the Republic of Moldova has not undergone significant changes. Trade remains the sector with the highest contribution to GDP formation, maintaining its position as a leader, as the annual remittance volume remains constant. It is followed by the manufacturing industry, which in recent years has surpassed agriculture, thanks to the contribution of foreign investments and the growth of export capacities. On the other hand, agriculture remains a branch highly dependent on climatic conditions, with modest results, especially in years of drought.

Agriculture is the dominant labor sector in Moldova. As a result of the privatization reforms undertaken in the last decade, around 85% of households in Moldova currently own agricultural land. Moldova has experienced a sharp decline in agricultural production, largely due to changes in the subsidy system and access to markets that were ensured during the Soviet era, as well as a result of changes in the structure of agricultural households, land reform, and the decline in productivity associated with soil degradation and lack of irrigation infrastructure.

The northern region of the country is specialized in the production and processing of sugar beets, grains, fruits, and tobacco, and is characterized by relatively high thermal treatment, sufficient compared to the southern areas. The central region is specialized in grape production. The region is well heated by solar rays and is protected from northeast winds. The southern region is specialized in grape production, especially red grapes, corn, and sunflower.

Moldova has experienced a sharp decline in agricultural production, largely due to changes in the subsidy system and access to markets that were ensured during the Soviet era, as well as due to changes in the structure of agricultural households (high share of subsistence agriculture over commercial agriculture), land reform, and the decline in productivity associated with soil degradation and lack of irrigation infrastructure.

Reform measures were inadequate and were not accompanied from the beginning by a financing system that would have ensured technical and technological modernization and the formation of marketing chains on cooperative or private property bases.

Agricultural reform was delayed and carried out without a legal framework that would have facilitated the formation of market structures. Furthermore, the improvement of agricultural farm performance was not pursued.

Financial inclusion in Moldova is the second lowest among European countries. According to the 2022 Global Findex, of the 750,000 people in Moldova aged 15 and older, only 26% had an account at a financial institution or a mobile money provider in 2022 (25% for those living in rural areas) (Figure 4). The contribution of mobile money to digital financial inclusion has been minimal.

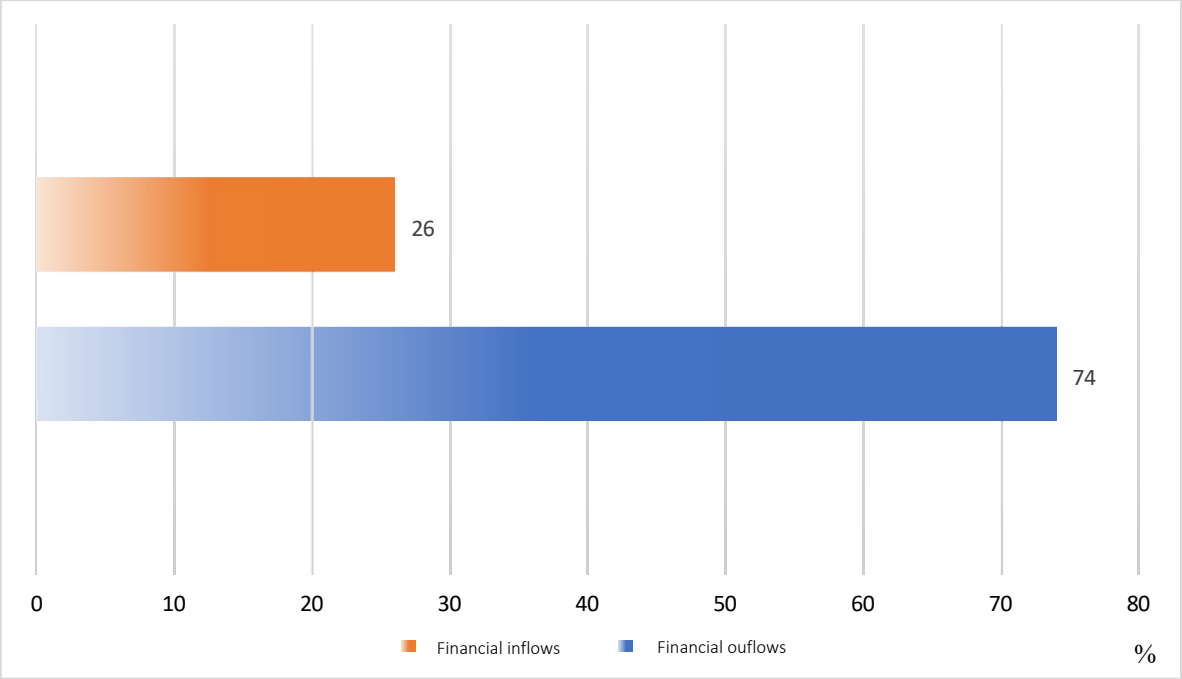

Figure 4. Overview of Financial Inclusion in Moldova, 2024

Source: (Dataset Detail | Prosperity Data360 | Prosperity Data360, n.d.)

Access to credit from formal financial institutions, such as banks and microfinance institutions (MFIs), is limited in Moldova, with only two out of 10 adults (19%) reporting that they have borrowed money from the formal sector in the past 12 months.

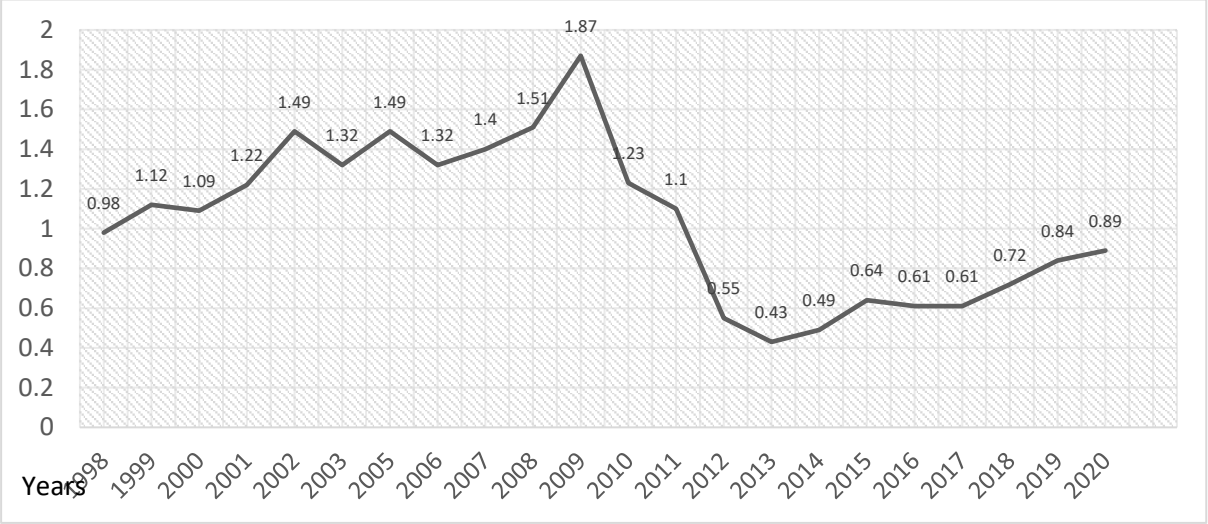

Figure 5. Share of Agricultural Loans in Total Loans Granted from 1998 to 2020 in Moldova

Source: (Mensah et al., 2019)

Agricultural reform was delayed and carried out without a legal framework that would facilitate the formation of market structures. Furthermore, there was no focus on improving the performance of agricultural enterprises. The business environment and the private sector operating in Moldova are part of a complicated ecosystem, which also impacts access to credit. The table presents the evolution of the share of agricultural credit access by foreign and domestic investors. In 2009, there was a peak in the encouragement to take out loans, due to the emergence of the banking market, which brought a diversified offer of financial products.

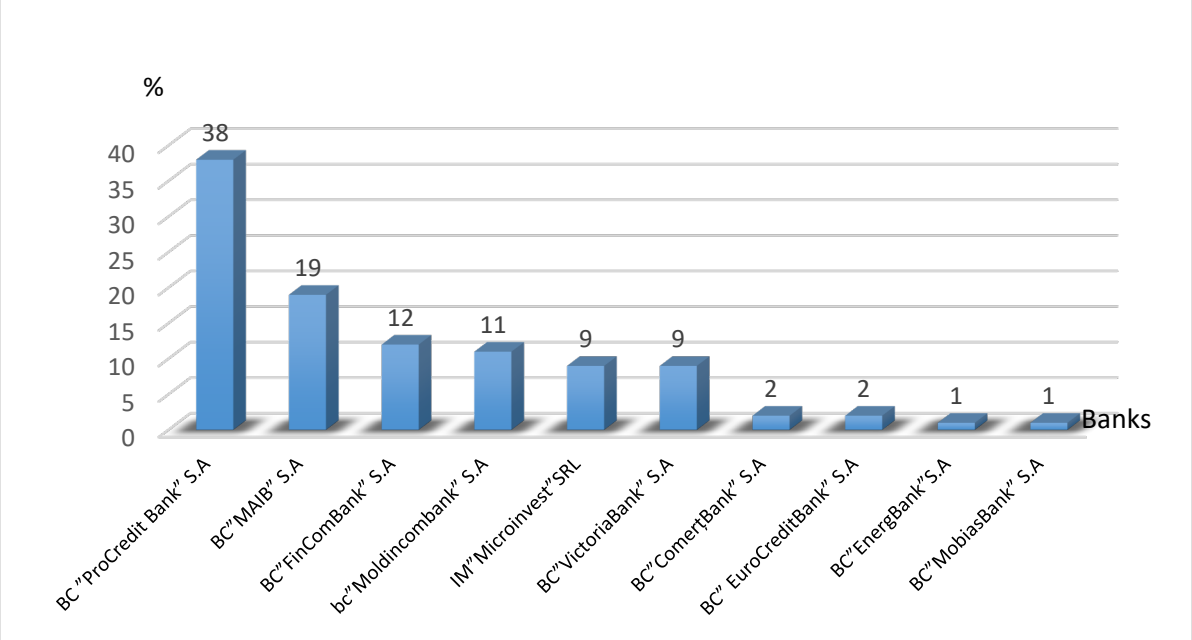

Figure 6. Share of Banks from Which Credit is Accessed, %

Source: (Money and Credit - November 2024 | Bank of England, n.d.)

The accessed loans were used for:

- Seeds, planting material, and support systems;
- Fuel and lubricants;
- Fertilizers (both mineral and organic), including plant and animal protection products;
- Animal feed;
- Greenhouse modules, film, and other materials for the construction/reconstruction of greenhouses, solar houses, and tunnels;
- Agricultural machinery and equipment, irrigation systems, hail and rain protection equipment;
- Technological equipment, construction materials for physical infrastructure, as well as for the equipping and renovation of agricultural enterprises;
- Breeding animals;
- Construction and technological equipping of agro-tourism guesthouses;
- Technological equipment and machinery for the development of post-harvest infrastructure and primary processing in rural areas.

The banking credit market was the least affected by the crisis and started to recover its losses the fastest. More than half of the growth this year is due to mortgage loans, which in 2020 had already increased by 570 million lei. The reform measures were inadequate and were not accompanied from the beginning by a financing system that would have ensured technical and technological modernization and the formation of marketing chains based on cooperative or private property systems

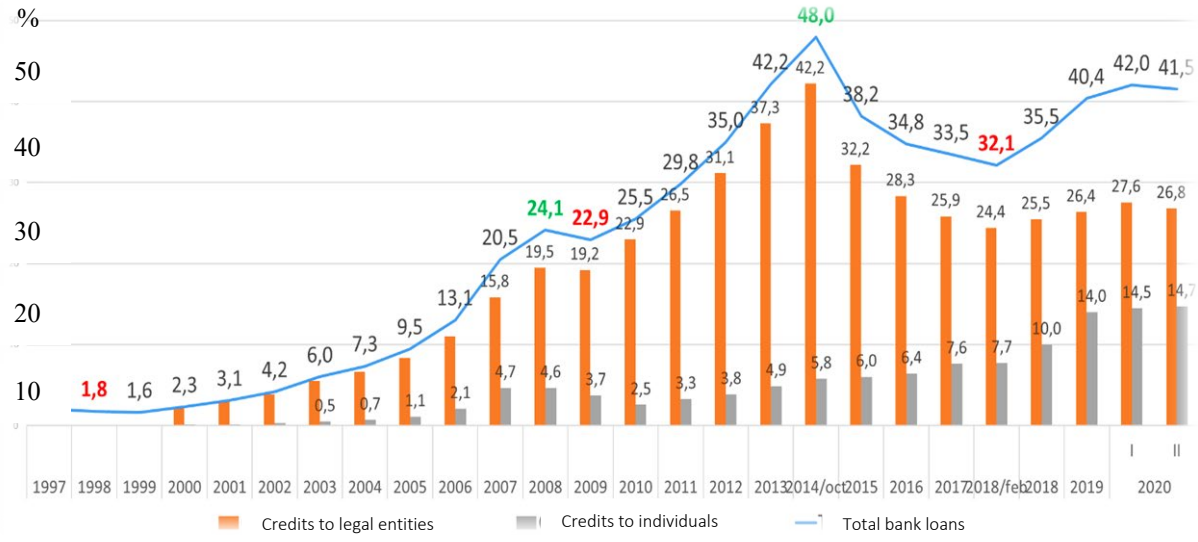

Figure 7. Evolution of Banking Loans in the Republic of Moldova for the Period 1997-2020

Source: (Money and Credit - November 2024 | Bank of England, n.d.)

The agricultural reform has been delayed and carried out without a legislative framework to facilitate the formation of market structures. At the same time, there has been no focus on improving the performance of agricultural enterprises.

Farmers need financing for both agricultural and non-agricultural activities (Figure 4), and they often have to resort to loans to meet these needs. The timing of this financing is unique for agriculture.

In Moldova, low agricultural productivity is attributed to factors such as the insufficient supply of quality public services and the labor-intensive nature of current agricultural practices. This low productivity, in turn, results in lower yields and profits, making it harder for farmers to invest in their businesses and farms.

In Moldova, digital tools play a significant role in addressing the productivity gap created by insufficient agricultural extension services. As a result, farmers have turned to other sources of credit to meet their financing needs. The National Bank of Moldova currently applies annual interest rate caps of 13% for guaranteed loans and 16% for non-guaranteed loans.

For private banks, the low interest rate caps do not justify the risk of granting non-guaranteed loans to farmers. Even when guarantees are available, private banks are reluctant to seize farmers' assets to recover losses, as this would have a negative impact on their reputation. Private banks may also be unwilling to serve rural clients due to a lack of expertise in assessing credit risk and weak internal risk management systems.

"For a simplified visualization of the types of formal lenders in Moldova and the services they provide to farmers, the following table will be used" (table 1). These financial services are essential for supporting Moldovan farmers, and their access depends on the specific needs of each farm. Additionally, there are government support programs and international agreements that can provide additional sources of financing for agriculture.

Table 1. Types of formal lenders in Moldova and the services they provide to farmers

Type of Credit	Description	Example
State Bank (BNM)	Loans are provided for 22 types of crops, although 90% are still for rice. MADB currently extends seasonal loans, based on group guarantees, of up to 150,000 MMK (102 USD) per acre of rice and 100,000 MMK (68 USD) per acre of other crops, up to a maximum of 10 acres. The disbursement of funds is often delayed. The annual interest rate is subsidized by the state and capped at eight percent.	Commercial Banks
Private Banks	Few banks offer customized products and services in their portfolios that meet the needs of farmers. Most private banks lack the tools and expertise to analyze value chain activities and assess the credit risk of farmers. Banks require collateral, such as land, buildings, or cash deposits. The most common form of collateral for farmers is the Form 7 Land Use Certificate, which grants farmers the right to cultivate land. However, not all farmers have access to Form 7.	Microcapital Microinvest

Source: (Money and Credit - November 2024 | Bank of England, n.d.)

Thus, the credit products offered to farmers in Moldova by microfinance companies, such as Agrario Futuro and Agraro Stagione, are essential for supporting agricultural activities. These loans allow

farmers to cover seasonal expenses, purchase necessary resources for production, and improve the infrastructure of their farms. With flexible loan amounts that can vary significantly, these financial solutions help to enhance the sustainability and competitiveness of the agricultural sector in Moldova. Access to such financing is crucial for the development of the agricultural sector, providing farmers with the tools needed to meet market demands and face economic challenges(Rahoveanu et al., 2022).

The National Commission of Financial Market collects and analyzes a series of data about clients to calculate a numeric score (the credit score) that is used to assess the borrower's risk profile.

In the Republic of Moldova, farmers can access several types of credit to support agricultural activities and develop their business. These credits are offered by commercial banks, microfinance institutions, and international organizations.

Recently, agricultural companies have started to explore new use cases, such as smart agriculture and digital procurement, to expand their value proposition, differentiate themselves from competitors, and strengthen their business model (Table 2).

Table 2. New Use Cases in Digital Agriculture

Smart Agriculture (Access to Assets)	The company Agropiese TGR aims to address the low agricultural mechanization rate in Moldova by connecting farmers with owners of agricultural machinery to rent equipment (e.g., harvesters, tractors). Although most users still pay for renting equipment in cash, payments using mobile money are also available. A special application is used to track the use of assets. Through this service, farmers can use fewer resources to increase yield and profitability, while machinery owners can better utilize their assets.
Smart Agriculture (Disease Monitoring)	The Gismeteo application from Impact Terra uses satellite-based information to capture vital agricultural data, such as extreme weather, pest outbreaks, floods, and local or large-scale droughts. The company then combines this data with advanced crop calendars and artificial intelligence-based predictions to generate personalized agronomic information. The app allows Impact Terra to provide farmers with useful advice on agricultural activity schedules and inform them about changing conditions affecting their crops. For farmers, this solution allows them to better time their planting, manage pests and diseases, and reduce crop losses.
Digital Procurement (Traceability)	Through its mobile app, Smart Farmer recently launched a digital ledger in which farmers record important information about their activities, such as farm expenses (e.g., hired labor), production practices (e.g., pesticide use), and harvests. Analyzing this information empowers farmers to make more informed decisions and increase production and profits, while sharing this information allows farmers to meet sustainability and traceability initiative requirements.

Source: own processing, 2025

The use of digital technologies in agriculture can bring multiple benefits:

- ✧ Increase in economic and environmental performance: Digitalization can help farmers make better decisions, optimize their operations, and increase productivity, leading to higher profits and a more sustainable agricultural sector.

- Environmental sustainability: The use of digital technologies can help farmers reduce their environmental footprint by optimizing resource use, reducing waste, and applying precision farming techniques.
- Improvement of working conditions for farmers: By automating tasks and optimizing operations, digital technologies can help reduce the physical and mental workload of farmers, leading to better working conditions.
- Increase in transparency along the supply chain: Digitalization can contribute to improving traceability and transparency of agricultural products, enabling consumers to make more informed choices.

5. Conclusions

The Government of Moldova has set three economic objectives; one of them is to increase agricultural and livestock production through modern techniques and strengthen overall development in other sectors of the economy. Currently, the agriculture sector plays a crucial role in Moldova's economy.

Agricultural applications in Moldova can capture a wide variety of data to create a path to financial inclusion for farmers. The digital footprints generated by these tools can help develop economic identities for small farmers. When shared with the National Commission for Financial Market (CNPF), this data can be used to determine the creditworthiness of farmers and facilitate access to credit for more farmers(Popescu et al., n.d.).

A variety of data points are useful for the CNPF to verify the borrower's identity, identify regular sources of income, and identify alternative non-agricultural sources of income for mitigating losses. However, certain types of data are more effective in supporting credit cards and evaluating farmers' creditworthiness.

Agricultural companies can play a proactive role in assessing farmers' credit. As agrotechnology companies in Moldova recognize the role they can play in creating economic identities for farmers, two emerging business models can help guide them in forming relationships with the CNPF to support credit evaluation.

To expand their value proposition, agricultural companies need to rethink their business model. The potential of digital data to create a pathway to financial inclusion for farmers can generate new revenue streams for agricultural companies. To take advantage of monetization opportunities, companies must be bold and make the necessary organizational changes to adapt their business model to address new threats and opportunities in their operating environment. With many agricultural companies in the startup phase, investor support may be required to provide financial backing to support radical changes.

Agricultural companies that underwrite loans to farmers may face challenges in expanding their farmer financing service. For agricultural companies, proactively engaging in the credit evaluation of farmers can be the first step toward offering and underwriting loans directly to farmers. Although this may seem like a natural extension of their current role in Moldova, there are challenges. Underwriting loans requires sufficient liquidity to meet farmers' loan demands. It also requires agrotechnology companies to acquire and maintain a unique set of capabilities that fall outside their usual responsibilities, such as

the ability to develop customized credit scoring models that comply with a range of regulations while also meeting customer needs.

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