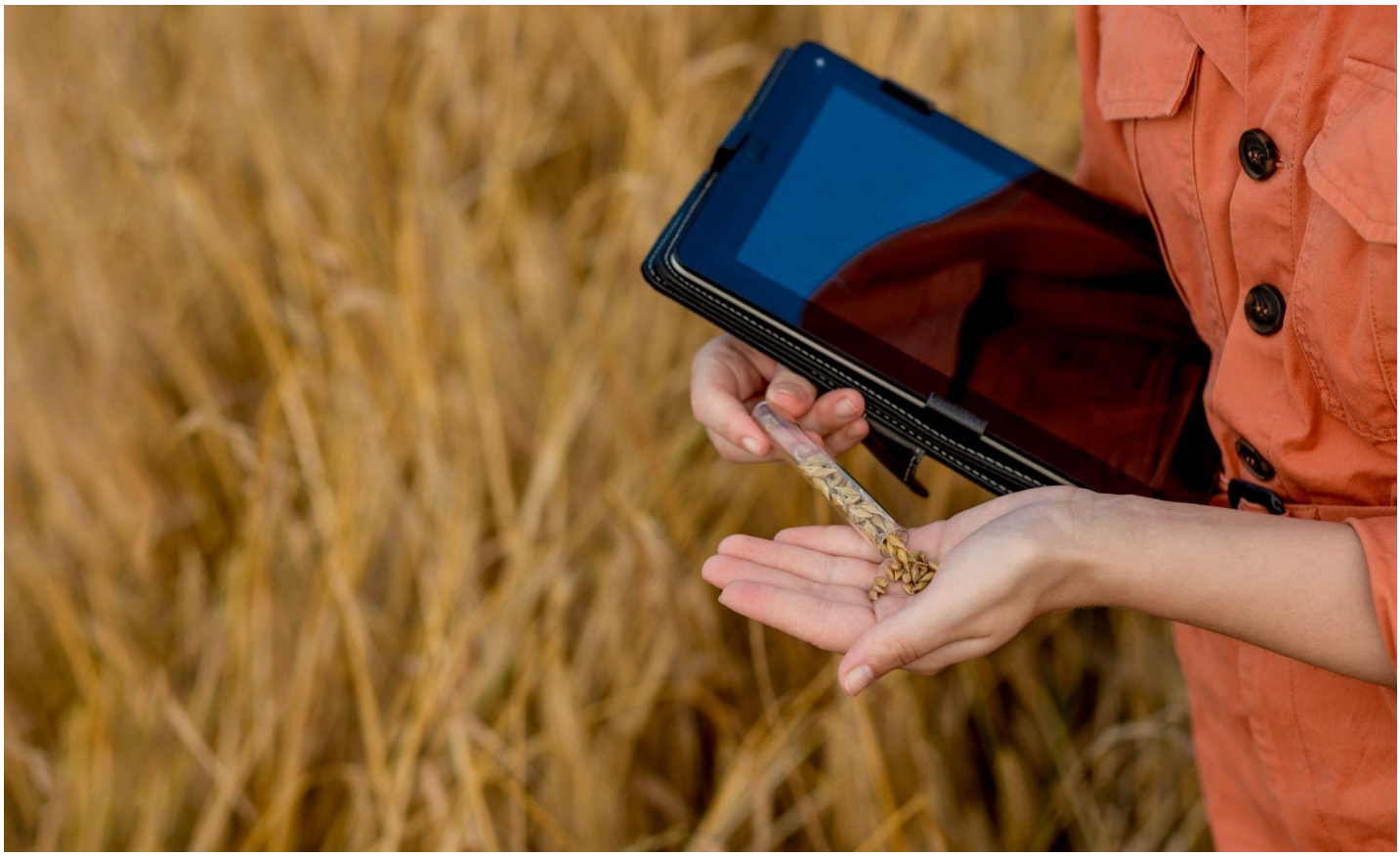

USAID Digital Agriculture Ecosystem Assessment - Tajikistan

Date: April 2022

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USAID Digital Agriculture Ecosystem Assessment

List of acronyms/specialized technology

AD	Alternative Data
ATM	Automatic Teller Machine
CGAP	Consultative Group to Assist the Poor
DAI	Development Alternatives Inc.
ECA	Eastern Europe & Central Asia
Edutainment	Education Entertainment
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
FGD	Focus Group Discussions
FinTech	Financial technology
GDP	Gross Domestic Product
GoT	Government of Tajikistan
GSMA	Global System for Mobile Communications
IFAD	International Fund for Agricultural Development
JICA	Japan International Cooperation Agency
MFI	Microfinance institution
NBT	National Bank of Tajikistan
NGO	Non-government organization
OECD	Organisation for Economic Cooperation and Development
SHF	Smallholder Farmer
SIM	Subscriber Identity Module
SMS	Short Messaging Service
STK	SIM Toolkit
USAID	United States Agency for International Development
WBG	World Bank Group
WUA	Water Users' Association

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Executive Summary

COVID-19 has increased the need for digital interventions in Tajikistan, with rural communities containing some of the most vulnerable households having been cut off from accessing information and vital resources due to a lack of digital connectivity. USAID is dedicated to increasing food security in Tajikistan, an aligned country under the Feed the Future program – the U.S. Government's global hunger and food security initiative, and Digital Frontiers – a USAID-funded buy-in mechanism that works with key stakeholders to identify successful and sustainable digital development approaches and scale their impact globally.

The Government of the Republic of Tajikistan first established the need for a digital economy on the basis of the President's letter to the people 'about the directions of domestic and foreign policy of the Republic of Tajikistan' and according to 'Resolution No. 39' of the Republic of Tajikistan on 31 January 2019. USAID has embarked on a country-level digital agriculture ecosystem assessment in Tajikistan to understand better what opportunities, barriers and risks face the digital agriculture sector and identify areas of intervention for the Mission team.

In parallel with the Feed the Future Tajikistan agriculture, land governance and water activities, the Mission would like to use technology to reach smallholder farmers (SHFs) and scale its programs across the country. The study aims to explore the potential for digital agriculture services, platforms, systems and applications (apps) in the context of limited enabling infrastructure, access to inputs, extension services and internet connectivity in regions bordering Afghanistan and Uzbekistan.

With plots averaging just 0.2 hectares,[1] Tajikistan's smallholders operate low-profit farms with limited productive output. Reduced investment support, growing competition for land and water, rising input prices, lack of farm-to-market infrastructure and climate change threaten agricultural production, leaving many smallholders increasingly vulnerable. SHFs remain an underserved segment in the digital services market, with women and youth at a particular disadvantage.[2] The main barriers to digital access include the costs and risk associated with serving remote areas and small scale farms. However, investment in this sector is at least twice as effective in reducing poverty as growth in other sectors.[3]

This report takes an ecosystem approach to understanding the market landscape and farmer needs as they relate to accessing and using digital tools. The research methodology included discussions with farmers to gain insights into their needs, value chain analysis, uncovering sector bottlenecks, analyzing the state of digital connectivity and technology readiness.

The focus groups with SHFs revealed that access to markets, affordable finance and quality inputs are critical requirements for improving their agribusinesses. The discussions identified that although most farmers had access to smartphones that are linked to internet services, there is still low penetration of digital services at the SHF level. The scope and uptake of digital agricultural services is limited by expensive and low quality internet service, a lack of digital financial services products, steep collateral demands, and little or no adherence to privacy policies. Many digital products are designed for medium-scale farmers who cultivate on average 20 hectares of arable land. Medium-scale farmers have their own land and the capital to invest in verifiable inputs; they obtain advice from extension service providers and have the means to follow that advice, which makes them more productive. Better liquidity means that medium-scale farmers can afford the cost of financial services and fulfil formal banking requirements – they are often more digitally literate.

Many SHFs could be included in the digital ecosystem but, due either to lack of finance and/or digital literacy, are not adopting digital technologies. Whilst the formal financial sector has made strides to accommodate SHFs by building financial products suitable for them, the majority of SHFs still rely on informal sources for most savings and loans. SHFs prefer to invest in seed, animals and

[1] Schenck, L., Small family farming in Tajikistan - A country outlook, Family Farming Knowledge Platform factsheet, FAO 2018
[2] GSMA AgriTech Programme, GSMA 2020
[3] World Development Report 2008: Agriculture for development, World Bank

land as a way to 'save' and only keep bank accounts for the purposes of paying taxes. SHFs tend to limit their engagement with formal financial services providers: those who own farm machinery only take out compulsory insurance, whilst those who need capital to purchase physical assets typically borrow money from relatives rather than take on debt with high interest rates.[4] The focus group discussions with SHFs also revealed a mistrust of formal financial service providers.

In May 2021, two major banks in Tajikistan, Agroinvestbank and Tojiksodirot bank (covering 50% of the banking sector), were liquidated at the orders of national authorities following an enquiry into mismanagement. According to the National Bank of Tajikistan (NBT), this affected the deposits of 23,700 Agroinvestbank account holders and 3,500 Tojiksodirotbank customers where depositors' funds were not returned. This has caused the population to lose confidence and trust in formal financial institutions.

The digital sector is in its infancy. There are only three major players providing digital services for agriculture in Tajikistan: cooperative 'Sarob', which primarily focuses on farmer advisory services; the Neksigol group, which has an array of 18 agricultural technology products designed for different value chains, and the Association of Agriculture Producers of Tajikistan, which provides farmer advisory services introducing innovative technologies in the agriculture sector.[5] Suppliers of agricultural technology in Tajikistan, such as input suppliers and animal feed manufacturers, operate in a laissez faire regulatory environment in which the bureaucratic burden of formal registration and licensing is fairly low and there is limited formal enforcement of the regulatory regime.

[4] Lending interest rate (%) - Tajikistan, World Bank 2019

[5] Agriculture Information Platform launched in Tajikistan, Asia-plus, 3 November 2020

Key Recommendations

Access to finance: USAID/Tajikistan should support smallholders through provision of digital financial products that fit the needs of the SHFs (long-term soft loans or grant programs as an alternative to current high interest rates).

Innovation hub: USAID should promote the establishment of an innovation hub for agriculture technology to accelerate start-up innovation and sustainable business model development for scaling the adoption of digital technologies in Khatlon Feed the Future impact zone.

Digital capacity building: USAID should expand its existing and planned digital capacity building programs to focus on delivering results for SHFs, young women and the Ministry of Agriculture (MOA) and Committee for Food Security. These are the key groups, people and institutions that will drive change in the digital agriculture sector: (i) for the MOA - the programs should enhance delivery of e-extension services to smallholders; (ii) for the Committee for Food Security - programs should assist the Committee to attain international accreditation of its food testing laboratory and (iii) for women - gender should be mainstreamed across programs to enhance their digital inclusion, literacy and adoption rates.

Market linkages: USAID should facilitate market access for SHFs to local and international markets by setting up digital and physical platforms.

Data protection and digital literacy: USAID should support policy formulation for data protection by assessing existing policies and providing guidance on how to better safeguard the data rights of Tajikistan's rural farming communities. USAID should also advocate the expansion of digital literacy tools to enhance the inclusion of SHFs in the Feed the Future impact zones.

SHFs digital aggregation: USAID should facilitate the development of commercially oriented digital aggregation platforms by advocating effective engagement with the digital innovation and entrepreneurship of existing producer groups.

More information on linkages to Feed the Future in other countries, program interventions and proposed activities, potential partners and expected results is provided toward the end of this report.

Structure of this report

This report is organized into the following sections:

1. Introduction
2. Tajikistan agriculture
3. Digitalization of the economy
4. Ecosystem assessment
5. Recommendations
6. Conclusion

1. Introduction

In its ongoing support of several Missions through the Digital Frontiers project implemented by Development Alternatives Inc. (DAI), USAID conducted a digital agriculture ecosystem assessment for the USAID/Tajikistan Mission to better understand and support the country's digital economy transformation objectives.

In Tajikistan, NIRAS-LTS International conducted a country-level ecosystem assessment to build a strong knowledge base to inform USAID's digital agriculture activities and investments, and to provide the core framework for program decision making (including selection of value chains, selection of key strategic inflection points and possible partnerships).

This report can be used by institutions working to provide digital agriculture services to SHFs and by enabling actors (donors, investors and government bodies) with the aim of supporting and increasing the range, scale and depth of digital services offered to SHFs and boosting their productivity and income.

Through the learnings generated from this assessment, we aim to support the development of a vibrant ecosystem of digitally-enabled agricultural services. We believe that, through these activities, a wide variety of private and public ecosystem stakeholders can become involved, ultimately enhancing options and driving growth for SHFs.

1.1 Methodology

This report outlines major findings of the USAID/Tajikistan digital agriculture ecosystem assessment conducted from October 2021 to February 2022. The assessment utilized desk research, expert interviews and farmer focus group discussions (FGDs) as the primary data collection tools.

The interviews were transcribed and clustered according to the following categories: government agencies, the private sector, NGOs, academic institutions and donor agencies, with key informants strategically selected from each category. Each category was then analyzed to gain a deeper understanding of interviewees' perceptions, pain points and motivations.

In order to gain better insights into the SHFs' needs, FGDs were held in Jabbor Rasulov district in the Sughd region and Jaihun district in the Khatlon region. A total of 21 SHFs were in attendance across these discussions. An additional 52 people were also interviewed, comprising 31 different stakeholders.

1.1.1 Limitations

We note that data was often limited and this report therefore makes recommendations to address key research gaps in future assessments. Achieving the correct gender and age profile at FGDs was also a particular challenge, requiring the consultant team to proactively seek out women and youth farmers at their farms. Time was also a limiting factor as a majority of the interviewees allowed a maximum of one hour for the interviews. This was not enough time to complete all the interview questions.

1.2 Key country statistics

Table 1: Tajikistan general indicators[6]

Indicator (2019)	Unit	Tajikistan
Population	# of people	9,321,023
Rural population	% of population	72.494
Female population	% of population	50.8
Population ages 15-24	% of population	21.37
Population ages 25-64	% of population	59.55
Population >65	% of population	3.2
GNI per capita	USD	1,070

Table 2: Tajikistan financial inclusion indicators[7]

Indicator (2017)	Unit	Tajikistan
Financial access points (per 100,000 adults)*	#	22.89
Number of bank accounts	% of population	47.02
Account ownership at a financial institution or with a mobile-money-service provider, female (% of population ages 15+)	% of population	42.131

** Financial access points are defined as regulated access points where cash-in and cash-out transactions can be performed. This would include traditional bank branches and other offices of regulated entities such as microfinance institutions (MFIs) that perform these functions. This will also include automated teller machines (ATMs) (only those that perform cash-in as well as cash-out transactions).*

[6] Country Statistics - Tajikistan, World Bank 2019

[7] FinAccess Statistics - Tajikistan, World Bank 2017

Table 3: Tajikistan communication indicators[8]

Indicator (2021)	Unit	Tajikistan
Number of mobile phone subscribers[9]	#	10.04 million
Number of internet users	#	2.42 million
Number of mobile network operators	#	5
Mobile broadband users[10]	%	21.96
SIM penetration	#	10.14 million

With a large number of young people, a proliferation of bank accounts and 105% SIM card penetration, Tajikistan offers a good environment for digital agricultural transformation.

[8] Digital 2021 - Tajikistan: Datareportal 2021

[9] This includes people registering with their passports, legal and physical entities, some have two SIM cards, one for using better call tariffs, another for the internet. One person cannot have more than 2 SIM cards from the same mobile network operator.

[10] Individuals using mobile broadband (% of population) - Tajikistan, World bank 2017

2. Tajikistan agriculture

Agricultural productivity in Tajikistan is very low, with a low percentage of arable land and high levels of land degradation. The agriculture sector is split between two distinct farming systems: (i) the uplands, where potato, wheat, horticulture and livestock farming take place and (ii) the lowlands, where cotton is cultivated in irrigated areas. These two farming systems are differentiated by geography and topography.

Only 28% of Tajikistan is agricultural land. Of this, 21% is cultivated and another 76% is pasture. The country relies heavily on irrigation – nearly 70% of cultivated land is irrigated.[11] Due to climatic conditions, agriculture in Tajikistan is dependent on that irrigation, which in some regions is highly energy-intensive due to the high-lift pumping schemes needed as a result of the topography.[12]

Total grain production in 2020 (harvest of the first and second seasons) is estimated at 1.3 million tons. Wheat production, the country's main food product, is estimated at approximately 845,500 tons. Barley and oat harvests are below average in yield due to the reduction of crops planted during the season as a result of climate change. Barley yield depends on rainfall and extractable soil water. Most of the barley is cultivated in the Sughd region in the north of the country where, due to climate change, droughts are becoming more frequent. Production of potatoes, another main crop, is estimated at 916,000 tons.[13]

Tajikistan is considered one of the most vulnerable countries to climate change in Central Asia. The agricultural sector is severely affected, resulting in water stress, high losses from disasters and low productivity. In this regard, advisories, alerts, and robust early warning systems are essential for farmers and rural dwellers to mitigate and adapt to changes in the climate.[14]

As a direct result of COVID-19, borders were closed and prices for agricultural inputs have increased leading to decreased demand for some inputs such as seed potatoes. USAID, the EU and JICA have responded with funding to bring seed potatoes to the country for distribution to smallholders.[15]

[11] Lerman, Zvi and David Sedik, *The Economic Effects of Land Reforms in Tajikistan*, FAO Regional Office for Europe and Central Asia Policy Studies on Rural Transition No. 2008-1, October 2008

[12] Family Farming Knowledge Platform: Tajikistan, Food and Agriculture Organization FAO) of the United Nations

[13] Special Report: 2020 FAO/WFP Crop and Food Security Assessment Mission (CFSAM) to the Republic of Tajikistan (18 March 2021), Relief Web,18 March 2021

[14] Advanced weather data benefit Tajik smallholder farmers, FAO, 20 April 2021

[15] IFAO, EU provide 60 tonnes of potato seeds to Tajik farmers, FAO regional Office for Europe and Central Asia, 8 May 2020

2.1 Value chain mapping

Value chain (VC) analysis reveals millions of SHFs working across a spectrum of structured to highly unstructured agricultural activities. Based on our analysis against key criteria, a number of value chains are prime for leveraging utilizing technology to impact smallholders.

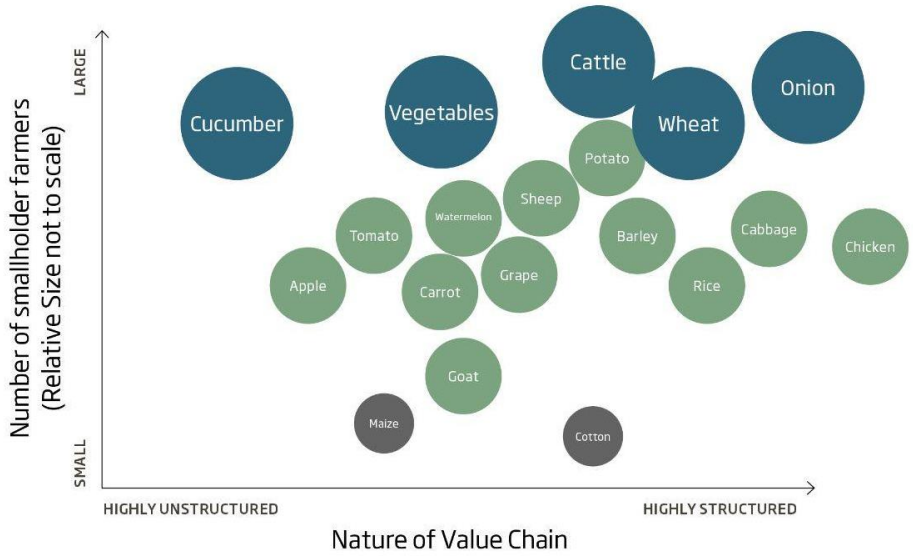


Figure 1: Tajikistan ecosystem value chain mapping[16]

Due to limited availability of data, value chain mapping is based on a mix of secondary research and in-person interviews with SHFs and value chain actors. The colors relate to large, relative and small number of smallholders engaged in the VC.

With support from the government, highly structured value chains are emerging. For example, in the chicken or poultry value chain processors are taking the lead in contract farming, which has encouraged SHFs to produce more broilers and eggs.

Serving SHFs can be a complex puzzle for service providers. Most of them operate in multiple value chains that range from highly structured to loosely structured agricultural activities. However, market development opportunities await projects that can successfully serve smallholders. Lack of adequate extension services and low penetration of digital tools to supplement extension services remains a constraint encountered by Tajik smallholders.

[16] Tajikistan, Mikael Kauttu, Karim Sissoko, IFAD, 2019 and Tajikistan - FAOSTAT, FAO 2018

The research team developed the following criteria to identify the value chains most ready for digital technology adoption:

1. **Large number of smallholders in the value chain:** They are usually unstructured and involve multiple middlemen. These value chains include staple foods that are in high demand.
2. **Presence of women and youth:** These are considered key as women and youth are mainly engaged in them because the daily requirement for labor-intensive activities.
3. **Farmer aggregation in the value chain and farmer access points:** These are relatively- to highly-structured with an established channel to reach the SHFs. Digitalizing them becomes easier as farmers are already structured with established channels to access inputs and markets.
4. **Growth trends indicative of income potential within the value chain:** These are smaller in size, but they offer high income potential either because they are expected to grow over the next few years or are typical cash-crops.
5. **Contribution to food security and nutrition:** These value chains typically affect the food security and nutrition of the country.

Based on our analysis of these VCs against key criteria, the research team selected chicken, apricot and orchard fruits, dairy, and horticulture vegetables (such as cucumbers, carrots and tomatoes) for deep dive activities leveraging the use of technology to impact farmers. Farmers can be aggregated using digital platforms/tools to receive necessary services and to be linked to local and international markets, eliminating middlemen, ensuring traceability and improving product quality.

Table 4: High potential value chains

Value chain	Nature of value chain	Criteria met
Poultry	Highly structured	• Large number of smallholders • Farmer aggregation is possible • High participation of women and youth
Apricot and orchard fruits	Structured	• High income potential • Contribution to nutrition
Dairy	Highly structured	• Large number of smallholders • Farmer aggregation is possible • Contribution to food security and nutrition
Horticulture: cucumber, carrots, tomatoes and other vegetables	Unstructured	• Large number of smallholders • Contribution to food security and nutrition

2.1.1 Poultry

The poultry value chain presents an important opportunity to scale digital agricultural services to large numbers of SHFs. Nearly all Dekhan (individual or family-run) farms rear chickens for either domestic or commercial use. Poultry farming could be considered one of the most lucrative agricultural business ideas. It requires relatively modest capital to begin, since small farmers can start from their houses, providing there is sufficient space to take the number of birds required and can provide feed. Tajikistan produced 22,800 tonnes of poultry meat and 761 million eggs from January to October 2020. The MOA reported a 90% increase in poultry meat production and 33% increase in egg production between 2019 and 2020. The production growth in the poultry industry has been made possible with significant government support – in 2013, the Tajik government fully exempted local poultry farms and companies engaged in feed production from taxes for 12 years.

Demand for domestic poultry continues to increase due to reduced dependence on imported poultry products, an increasing population and cultural preferences. The MOA reported that several companies from Kyrgyzstan and Uzbekistan have appealed to Tajik authorities seeking permission to import eggs.[17]

The commercial poultry industry is highly structured. Farmers are organized in outgrower schemes that allow for easier digitalization with already established access/entry points (e.g. Avesto Group is a group of companies operating in various sectors of the Tajik economy) and provided with training and necessary inputs in order to deliver high quality poultry products. Coupled with the large presence of women and youth in this value chain, there are opportunities to develop digital tools that encourage SHFs, especially women and youth, to acquire better poultry rearing skills and provide access to financial products. Poultry farming can be used as an entry point for the adoption of digital services in other value chains.

2.1.2 Apricot and other orchard fruit

The apricot and orchard fruit value chain has high potential for low-income SHFs looking to grow for export. Kuraga (dried apricots) is often referred to as Tajikistan's alternative currency and national pride, with turnover of over USD 100 million.[18] Tajikistan has at least 55,000 ha of apricot orchards. This figure increases by 1,000 hectares annually, achievable by allocation of new land in both north and south of the country. This implies an increase in apricot production which stood at an officially recorded 45,000 tons in 2020. It is asserted that the actual volume of apricot production in Tajikistan is not less than 200,000–220,000 tons per season. Considering that the minimum selling price of dried apricots is USD 2 per kg and the maximum (when exporting high-quality products) reaches USD 7 per kg, the country annually receives about USD 120–180 million from dried apricots alone - and this is deemed a conservative estimate.

About 10% of the world's apricots are concentrated in four districts of the Sughd region in the Fergana Valley. Dried apricots are one of the most reliable means of savings in Tajikistan, and dried apricots are also used for making payments, substituting actual currency. Local residents trust dried apricots no less than the US dollar and perhaps even more than the local currency, the Tajik somoni.

By investing USD 1,500–2,000 per hectare, in 3-4 years one can obtain about USD 5,000–7,000 in revenue from dried apricots without taking into account transportation costs, sulfur dioxide (which inhibits bacterial development in the fruit) and packaging. Five hectares can deliver up to USD 20,000 in net profit, which is of great significance for an average family in Tajikistan. Of course, these figures vary depending on factors including apricot yields, varieties and processing practices such as drying and storing.

The apricot kernel is also valuable due to its vitamin B17 content. Also known as amygdalin, vitamin B17 has properties which are known to fight cancer. This product is now in high demand both locally and internationally. In the Khatlon region of Tajikistan, apricots ripen several weeks earlier than anywhere else in the region and developing export potential of fresh apricots gives great opportunity for many farmers there to generate additional income. USAID is supporting nurseries to introduce improved varieties and scale up production.

Farmer groups and processors can serve as key entry points to reach farmers and scale up any digital interventions.

The government actively encourages farmers and entrepreneurs to invest in the growing of apricot trees by making it illegal to cut down or uproot them without the permission of a special state commission. This rule is strictly enforced.

[17] Tajikistan increases poultry meat and egg production, ISHIDA, 11 December 2020

[18] Karuga, dried apricots in Tajikistan, East fruit, 22 November 2020

2.1.3 Dairy

One of Tajikistan's major resources is its 3.3 million ha of pasture. Dairy is a promising value chain for digital agriculture services in Tajikistan as it is well structured, highly organized and with a large number of SHFs involved. Self-help groups (unified groups of socially and economically vulnerable women that conduct income generating activities) and processors can serve as key entry points to reach farmers and scale up any interventions.

The milk yield of dairy cows has been reported to be as low as 1–2 kg/day. The main constraints in dairy production are unproductive breeds, poor animal nutrition, pests, diseases and inadequate feed during the winter. Addressing these challenges could result in a 150–300% increase in milk production.[19]

Skills and knowledge levels of many SHFs could be improved by providing e-extension services on animal husbandry, nutrition and pasture management. An effective digital extension service that would address such issues, potentially with the engagement of USAID, could include:

- Increased access to financial services.
- Improvements of skills and knowledge in the processing sector.
- Better organization of farmer associations and co-operatives.

USAID via its ACAT project already has experience providing access to finance and linking processors to smallholders – it has disbursed 392 microloans and trained 64 smallholders in financial literacy. This practice can be expanded to reach out to many more smallholders.

2.1.4 Horticulture: cucumber, carrots, tomatoes and other vegetables

Tajikistan has excellent climatic conditions for growing a wide range of fruit and vegetables. There are many promising microzones, access to high-quality water for irrigation, and long traditions of viticulture and horticulture.[20] Tajikistan also benefits from the lowest labor costs in the Commonwealth of Independent States (CIS). This is a critical factor for competitiveness as fruit and vegetable production is highly labor intensive. With proper management, the profitability of such activities is high and farmers with access to quality seeds and inputs growing cucumbers in seasonal greenhouses without heating in an area of just 0.04 ha can receive 12,000 Tajik somoni (TJS) per season, of which 45% is the cost of inputs, materials and labor. Such seasonal greenhouses can produce three crops per annum. The initial investment for a seasonal greenhouse is up to 20,000 TJS.

The value chain is, however, largely disaggregated with the majority of farmers selling to brokers, traders or directly to customers. Lack of access to local and external markets is a significant bottleneck. Farmers cannot determine the price of their product based on the costs incurred, rather the market sets the price. There are a few identified actors currently organizing the market (such as the East Fruit online platform that links producers and buyers and provides market information), which could impact the ability to distribute digital agricultural products and services. They have a telegram trade platform where sellers and buyers from East Asia and Central Asia share information on product availability. Few people use it in Tajikistan, and those who do are mainly exporters. To what extent this tool is helping close the deal might be hard to monitor: effectiveness of placing a message depends on information – price, contact details, picture and proper description, and an address to attract the buyer. Key unmet needs include informational tools to support improved crop management, pricing information to give farmers better bargaining power when selling to brokers, more efficient trading platforms and access to financial products to purchase high quality seeds and inputs.

For farmers to receive better prices at harvest time and consumers to receive better prices at peak times, there is a need for post-harvest structural change. This should include better access to modern

[19] The Feed-Livestock Nexus in Tajikistan: Livestock Development Policy in Transition, FAO, 2016

[20] Cordonnier, Dr. C., *Fruits and Vegetables in Tajikistan*, ECTAP

storage facilities and finance for storage (warehouse finance) as well as training on value added services such as canning and drying. The Gissar Sitabr Agro is an example of a modernized refrigerated warehouse. This is a company located in Hissar that provides rental of refrigerated chambers, advice on horticulture and cold storage and linkage to external markets. The company has experience of working as a logistical center (to accept, sort, pack, mark, palletize, load and unload) based on international standards and looks for partners to aggregate farmers for horticulture value chains. Such companies could be an entry point to reach out to farmers with digital aggregation platforms that can provide bundled services.

2.2 Understanding smallholder farmers in Tajikistan

Smallholders and family farms – defined as ranging from 0.2–2ha in size – are the most common economic players in agriculture in Tajikistan. Despite three decades having elapsed since the introduction of land reforms, smallholders and family farms still face considerable difficulties in doing business.

The head of a smallholder household in rural Tajikistan, which comprises an average of six people, typically has completed secondary education and has higher or vocational education. Family members support agricultural production and hired labor is obtained during labor-intensive stages such as land preparation, planting and harvesting.

Dekhan farms are often registered and owned by the SHF and a certificate of land ownership obtained, while some have small backyard land and work on rented land. Dehkan farms are a form of free enterprise, an independent business entity created by a family or an individual citizen producing agricultural products based on the use of the property. According to the State Committee for Land and Geodesy, at the end of 2018 there were 185,951 Dehkan farmers registered. Of these, 69,409 farms are in the Sughd region, 67,917 in the Khatlon region, 16,200 in the Gorno-Badakhshan Autonomous Region (GBAO) and 32,425 in the Districts of Republican Subordination.

The majority of the SHFs face challenges hampering the development of Dehkan farms including the low profitability of the agriculture sector, despite the fact that this sector contributes 20% of the national GDP and employs 61% of the population.[21] Lack of affordable financial tools, low penetration of innovative technologies, high production costs, and lack of access to markets and buyers who buy at margins that benefit the SHFs, all contribute to lower SHF productivity and income levels.

Low profitability and an inability to determine the price of produce causes financial planning challenges for smallholder farms and family Dehkan farms. Focus group discussions with farmers revealed that farmers lack the necessary knowledge for financial planning and farm management.

Farmers also stated that water and irrigation infrastructure poses another major challenge. The country has insufficient financing to clean and repair irrigation channels, and also lacks appropriate agro-technical approaches when using saline lands, violating irrigation regimes. According to the State Committee for Land Management and Geodesy over 50,000 ha of land from the total irrigated area is now in an unsatisfactory state. Dehkan farms are still suffering from rising groundwater levels, soil waterlogging and infertility which causes low productivity and diminishes the area of arable land.

Due to the absence of an agricultural insurance system, Dehkan farms have zero protection and bear the risks associated with climate hazards and emerging adverse weather conditions.

2.2.1 Women smallholder farmers in Tajikistan

Around 90% of agricultural households are small subsistence farmers and nearly 70% of Tajik smallholders are women.[22] Many households have at least one person who has migrated to work

[21] Tajikistan, IFAD

[22] Hirsh, B., *Tajikistan's Path to Prosperity Depends on Creating an Accessible, Equitable Market for Land*, 16 March 2018

outside of Tajikistan. The Khatlon region has a higher rate of male outmigration (39%) than the national average (36%). These high levels of male migration have led to a substantial increase in women's responsibilities in agriculture in addition to managing household tasks.

The role of Tajik women in agriculture falls under three categories: (i) agricultural wage or daily workers; (ii) women managing kitchen gardens; and (iii) Dehkan farmers. These roles overlap, especially the role of women as caretakers and small agricultural producers within their homes. Women's roles as wage or daily workers are often not recognized in official statistical reports. In 2018, 69% of women in Tajikistan were officially employed in the agriculture sector, compared to 41% of men.[23]

Persistent gender-based inequalities that keep women in lower status in society – with limited access to knowledge, resources, decision-making power and networks, and with lower pay than men – have direct impacts on the productivity of Dehkan and family farms and, as a result, on food security and agricultural development. Women are less likely to be registered as the owners of land even when men are absent in the Dehkan farms.

Where women do own land, the area of cultivated land in their Dehkan farms tends to be smaller than in farms owned by men. In most cases, work such as ploughing, harvesting and using traditional tools is performed by women, while the control and use of agricultural machinery is mostly done by men. The hard manual labor affects women's health and causes a number to suffer from hernias, chronic diseases, anemia and kidney diseases, contributing to maternal mortality. The majority of rural villages do not have kindergarten and daycare facilities, therefore women have to combine childcare and agriculture work during the agriculture season.

Female SHFs also have a smaller proportion of irrigated land (93% of land farmed by men is irrigated, compared to 83% of land farmed by women). Male-headed Dehkan farms have an average of 35.6 ha of irrigated land, while women-headed farms have 12.6 ha.[24] The representation of women in water users' associations (WUA) is also low. A WUA is a non-profit and self-governed, membership-based organization of water users created voluntarily for the collective use of water. It will include a system for servicing, providing irrigation water, coordination of activities, representation and protection of users' joint interests. USAID has been supporting the creation of WUAs since 2004.

The most vulnerable households are headed by divorced or widowed women. The absence of adult males presents difficulties with the management of their own agricultural activities, including limited access to higher-paid employment opportunities and less access to working-age adults at home who can contribute to the household budget. Of substantial concern is the large number of women who undertake agricultural work without receiving any wages at all. According to the 2012 Demographic and Health Survey, more than half (59%) of women who had worked in agriculture in the previous 12 months were not paid, while nearly a quarter (24%) were paid in cash and in-kind, 13% were paid exclusively in-kind, and less than 5% were paid in cash only. As a result women receive a lower social pension.[25]

Land certificates are often registered only in the name of the male head of households as a social practice. The fact that social taxes for Dehkan farms are calculated as a fixed monthly fee for each shareholder on the certificate is a further disincentive to register wives or daughters-in-law. Women and men also lack information about women's rights to land as members of collective farms, and women face larger economic and social constraints when willing to register land in their names.[26] Women face bureaucratic barriers in validating their land certificates and obtaining access to their land plots. Men and women have different understandings about women's access to land which is coupled with cultural bias around women's inability to manage farms properly. Women are not legally

[23] A study of women's role in irrigated agriculture in the lower Vaksh river basin, Tajikistan, Asian Development Bank 2020
[24] Smallholders and family farms in Tajikistan - Country study report, FAO 2019
[25] TajStat, Ministry of Health & Measure DHS / ICF International 2013, FAO, 2016
[26] Smallholders and family farms in Tajikistan - Country study report, FAO 2016

left out of land registration processes but although registration documents might be in their names, the land management is typically left to the men.

2.2.2 Youth smallholder farmers in Tajikistan

Labor migration is preferable to working in agriculture for men, especially young men. The majority of young people do not possess tangible assets of their own such as land, vehicles or savings that could facilitate their access to financial opportunities. Young people working in the agriculture sector work on family farms and mostly provide labor in small-scale agricultural production, processing, and trading activities. Low wages are also a motivation for new members of the labor force to leave home and migrate to Russia.

Young people's level of education and experience limit their ability to make decisions, hindering them from taking full advantage of economic opportunities. Opportunities are either provided by donors such as PEAK Dushanbe or require entrepreneurship, for which young people need skills, finance and connections. University education is not usually backed up by practical skills, experience and connections, which puts graduates at a disadvantage compared to the Soviet educational system, in which jobs were assigned upon completion of higher education. The lack of connection between educational institutions and the private sector and the inability to receive decent payment is a significant demotivating factor for youth to stay in the country, particularly in rural Tajikistan.

During focus group discussions farmers shared that while young girls remain in the rural areas to farm, young men have to migrate to the capital in search of formal employment. Compulsory two-year military service also has implications for youth and the motivation to migrate.

Youth development requires access to innovation, technology, capital and resources. Through these means youth can participate. However, these resources are often provided in short-term programs which are bound by donor funding and do not have national coverage.

2.2.3 Smallholder farmers with disabilities

Views on disability have evolved considerably in Tajikistan over the past two decades. Persons with disabilities have gone from being treated as objects of charity, medical services and welfare to citizens with equal rights. The exact number of persons with disabilities who live in poverty is not recorded, however empirical analysis suggests that most persons with disabilities in Tajikistan do not have opportunities for employment. It is assumed that unemployment rates among persons with disabilities are very high.[27]

Employment opportunities are limited to a number of disabled people's organizations that provide job placements for their members. For example, the Association of Blind People employs about 1,888 people with various levels of visual impairment.[28] Similarly, the National Union of Deaf People, among other activities, trains non-disabled sign-language teachers who, in turn, teach children at boarding schools for deaf and hearing-impaired children.

The only difference between persons with disabilities living in rural and urban areas is the level of self-employment, which is lower in rural areas. One reason for this may be that any feasible self-employment option in rural areas is constrained by a lack of resources such as inputs, vocational schools and training or specific items such as machinery designed for different levels of physical ability, as well as the lack of a supportive environment for livelihood opportunities.

Women with disabilities often face greater challenges in finding employment than men because of negative attitudes towards disabled women. The majority of women with disabilities rely on disability

[27] Situational analysis state of rehabilitation in Tajikistan, World Health Organization 2015

[28] Tj-disabilities-report-updated-compressed.pdf 2018

pensions and minor income via small self-help groups that promote canning, baking and other income-generating activities which are supported by donor funding.

There is a lack of comprehensive data on persons with disabilities disaggregated by type, age and gender. Many people with disabilities do not register as having a disability for a variety of reasons including a lack of information about the benefits and services available for persons with recognized disabilities. Due to the challenges noted above, many people with disabilities are negatively impacted in rural areas. Another obstacle is the lengthy and costly application process. Confirmation of disability needs to be approved at the district and regional level and a person with a disability has to travel to village - and district-level doctors to register their disability.

Substantial physical barriers and the lack of accessible transport restricts the movement of persons with disabilities and prevents them from accessing buildings. This has severe implications for their access to education, healthcare, the labor market, social security infrastructure and other essential services.

3. Digitalization of the economy

The digital sector in Tajikistan is in its infancy. This is due to the lack of access of entrepreneurs to broadband, which hinders the development of innovation. Less than 1% of existing businesses offer digital services. For the same reasons, and because it is difficult to obtain a license to produce audio-visual content, there is a negligible number of companies producing digital content and media products. The main constraint on digital transformation is the inflated price for quality internet access, as well as the lack of modern digital infrastructure for internet access, especially in rural areas. These factors impede digital innovation in the country - the introduction of digital technologies, solutions and services.[29]

Tajikistan's vision for digital economic transformation highlights the importance of the use of modern technologies in everyday life to achieve a country's developmental goals. The goals include: improving the standard of living; reaching the standard of living of middle-income countries as soon as possible; and significantly reducing poverty, as well as achieving a country's priority economic development goals, such as energy independence and food security.[30]

USAID's digital ecosystem framework comprises stakeholders, systems and an enabling environment working together to empower people and communities to use digital technology to access services, engage with each other and pursue economic opportunities. Building on this concept, USAID promotes development of e-commerce in Tajikistan and has, together with the Ministry of Economic Development and Trade and the Chamber of Commerce, established an e-commerce development council to promote the development of e-commerce in Tajikistan. The role of the council is to facilitate public-private dialogues to develop a more vibrant e-commerce ecosystem.

3.1 Digital accessibility

Extending digital accessibility is the process of making digital products (websites, mobile apps and other digital tools and technologies) accessible to everyone. It is about providing all users access to the same information, regardless of the impairments they may have or economic background they come from.[31]

Khatlon Province faces power outages during much of the winter. Most businesses are afforded only eight hours of electricity per day. Without reliable access to electricity, some agro-industries (such as poultry and milk processing, or storage facilities for perishable horticultural and livestock products) cannot operate year-round. Access to electricity is more reliable in the capital district, Dushanbe, and larger wholesale fresh fruit, dairy and meat producers are mostly located there.[32]

While mobile broadband coverage is high (90% 3G and 80% LTE), penetration is still low at 23%. One reason is the high price of mobile and fixed services.[33] As of 2019, only 22% of the population used internet services. This figure increased by 39% in 2020–2021. Only three out of 10 households have access to internet services.[34]
Telecommunication operators dominate the mobile market. There is wide mobile network availability which is divided into urban and rural areas. There are five major operators: Tcell, Babilon Mobile, MegaFon, ZET Mobile (registered as Tacom) and O Mobile. Tcell has the largest overall market share, followed by Babilon Mobile, Megafon, ZET Mobile and O Mobile. Operators have to continuously invest in infrastructure to cover more areas and provide better internet coverage. Many users have to use two or more operators because the quality of telecommunication and internet services from one operator is insufficient to cover social and business interactions - the speed and

[29] Concept of Digital Economy in Tajikistan, Government Decree 2019

[30] Concept of Digital Economy in Tajikistan,: Government Decree 2019

[31] Digital Accessibility 101, Engines, 3 April 2019

[32] Status of Digital Agriculture in 18 countries of Europe and Central Asia, International Telecommunication Union and FAO, 2020

[33] World Bank critical of Tajikistan's telecom sector, Telecomms, mobile and broadband statistics and analytics, 22 Jun 2020

[34] Digital 2021: Tajikistan, Simon Kemp, 12 February 2021

internet coverage is inconsistent, weak or even absent. Slow internet speed in rural areas is a constraint. The majority of rural people prefer messengers for sharing information because they use less data and are easy to use.

AGROINFORM.Tj is an information system that provides an integrated approach to information services for agribusiness representatives, from agricultural producers to processors, wholesalers and suppliers of agricultural production. This platform was established in 2011 and has up to 200,000 users worldwide of which only 6,000 active users come from Tajikistan.

Table 5: Accessibility impact of mobile network operators

Organization	% accessibility impact of mobile communication services in the GSM
Tcell	39.83
Babilon M	21.64
Megafon Tajikistan	24.12
LLC Tacom Zet mobile	14.42
O Mobile	0.01

3.2 Digital government

The 'Concept for the establishment of the electronic Government of the Republic of Tajikistan' (2012–202) was approved on 30 December 2011. Despite the growing number of internet users, e-government services still have not become a part of citizen life. The 'Program for the Further implementation of Electronic Government' has been introduced more recently to accelerate this extension. According to the Concept, the e-government implementation policy included three key stages:

- from 2012–2013, the introduction of a unified network of information technologies combining 48 ministries and departments of the Republic of Tajikistan;
- from 2013–2015, the improvement of legal, organizational and technical conditions for the establishment of electronic government, expansion of electronic information resources, creation of interdependent electronic government system;
- from 2015–2020, the automation of public services provision to populations and organizations. This will include the development of a government portal and e-government gateway, improving ICT knowledge, the implementation of transactional services, the implementation of telemedicine and projects to provide education remotely.

Most tasks in the first stage have been implemented but tasks from the second and third stages are not fully resolved. Factors constraining e-government development in Tajikistan include:[35]

- **Geographical location –** the availability of the internet in rural areas is still an issue. With limited access to the internet and low levels of digital literacy, physical customer service centers remain an important access point for public services for rural citizens.
- **Evaluation and monitoring –** there is a lack of cost benefit analysis and evaluation of ongoing e-government projects. Current evaluations take place at the request of the government by the Information Technical Center of the Administration of the President, and are internal.
- **Lack of a customer-oriented approach –** there is lack of interaction between citizens and enterprises which results in user preferences not being reflected in the structure and content of e-services.

[35] Cabar 2019, E-Government Tajikistan https://cabar.asia/en/e-government-in-tajikistan-myth-or-reality

- **Digital gap –** many people in rural Tajikistan have no access to computers and gadgets. Access to digital services and digital literacy levels therefore remain low.
- **Expensive, slow and poor quality internet –** the internet in Tajikistan is unaffordable to many and offers poor quality in rural areas.

Digitalization of the economy is set to impact and transform public sector services. Transition to a digital government (where government services can be accessed digitally), the digitalization of the social sphere (where social services such as child services can be accessed digitally), as well as key industries such as energy, health, the extractive industry, agriculture and the expansion of newer sectors in the country, such as financial technology (FinTech), will all have impact on the digital agriculture ecosystem.

Digitalization has the potential to accelerate the transformation towards a more sustainable and inclusive food system, even in rural areas. Lessons can be learned from neighboring countries such as Uzbekistan, where good progress has been made towards adopting digital technologies in agriculture including the use of precision agriculture, crop and livestock monitoring, and digital soil maps.

The goal of digitalization in the agricultural sector is to increase the contribution of the industry to the economy by increasing agricultural labor productivity and maximizing the profits of agribusinesses. The government seeks to achieve this goal by implementing several measures aimed at automating the traceability of agricultural products. Through the introduction of blockchain technologies, with the inclusion of all the organizations involved, the government plans to provide quantitative accounting and tracking of the entire lifecycle of agro-industrial products. Nearly two out of every three productive enterprises belong to the agro-industrial sector and its growth is a key government priority.

3.3 Digital transformation challenges in Tajikistan

Government agencies need to develop digital services that take into account user preferences by incorporating user-centered design practices to deliver digital products that can easily be adopted. Measures taken by the government to narrow the digital gap in Tajikistan have resulted in an increasing number of citizens who have improved their computer literacy and have better access to the internet. Nevertheless, a large number of citizens from rural regions and low-income families still do not have access to electronic services. In this regard, the digital gap is a critical bottleneck for digital government implementation.

The cost of internet access in Tajikistan is one of the highest in the world. Tajikistan, along with Turkmenistan, is often in the lowest position both in Central Asia and globally in terms of internet connectivity. The cost of broadband internet can reach USD 20 per month, while the cost of mobile internet can reach USD 30 per month.[36] A World Bank report, 'Digital Dividends', notes that only 17% of the population use the internet on any device in Tajikistan, compared to 28% in Kyrgyzstan, 44% in Uzbekistan and 55% in Kazakhstan. One reason for the high cost is that providers need to purchase an internet channel at a high cost from foreign partners and cannot sell it at a loss to the Tajik public. Finally, internet cost has increased by 5% as a result of a new excise tax.[37]

3.4 Culture

The majority of SHFs rely on historical knowledge acquired from cultural practices that have been handed down over generations. SHFs rarely adopt new farming methods unless they have been visually and practically demonstrated. This lack of trust is caused by financial losses and failures to reap promised results. Visual demonstrations when introducing new technologies, supported by the buy-in of local experts, is necessary in order to catalyze behavior change in SHFs.

[36] Tajikistan has expensive and slow Internet connection, Asia plus, 26 October 2021

[37] Electronic Government of Tajikistan. 20 Jan 2018

Although Tajikistan has a high SIM card penetration rate (105%), there are few economic opportunities that can be realized through mobile technology. Culture is a primary obstacle in digital adoption. Tajikistan's culture is conservative: moving forward requires adoption, flexibility and inclusion which are currently lacking. This hinders the adoption of new ideas and digital development despite some enabling policies being in place. Mobile phones are often used for communication with family and to share information, but their use is often limited to the head of the household (males) and excludes women. SHFs, and especially women, need to be trained to take advantage of technology which enables them to buy and sell goods digitally. Cultural changes starting from within the government are key to facilitate digitalization. Development of an information culture is an important element of effective e-government implementation.

4. Ecosystem assessment

This section includes an overview of the financial services partners and products that could drive financial inclusion in the sector. The section will also cover the demand for financial services as discussed by smallholders in the focus group discussions and provide an overview of smallholder attitudes towards formal financial service providers.

4.1 Financial services for Tajikistan smallholder farmers

Increasing the uptake of financial services, while protecting consumer rights and improving financial literacy, are key strategic goals for the government. The country aims to move towards a digital economy and increase financial inclusion (the access of useful and affordable financial products and services that meet the needs of customers) from 47% in 2017 to 65% over the next five years (from 2017).[38] As part of its digitalization efforts, the government is working towards establishing the FinTech industry, which is still in its infancy.

The cost of financial transactions is relatively high and interest rates on agriculture loans start from 24%, making access to formal financial services unfavorable to most people, especially SHFs living in rural areas. Interviewed farmers preferred investing in animals, land, machinery and seed rather than saving in formal financial instruments. They also preferred borrowing from friends and family while most women-led SHFs relied on remittances from family members in neighboring countries. Borrowing from friends and relatives does not imply interest rates and reduces the stress of repayment on time. Although the number of registered bank accounts is rising, Dekhan farmers keep bank accounts only to pay taxes because this is a governmental requirement.

In 2020, the total number of e-wallets of credit financial institutions amounted to 1.7 million accounts, having increased by almost 1.4 million from 2019. Although the interviewed SHFs were aware of mobile and e-wallets, they were yet to register for the service. 10.7 million transactions of non-cash payments totalling 543.1 million TJS were carried out through e-wallets and, compared to 2019, the number of payments increased by 8.8 million transactions, and the volume of payments by 440.8 million TJS in 2020.[39] E-wallets are used for purchases, shopping for food and other needs, transfer of funds from one to another, paying utilities etc. This trend has been promoted by most financial institutions by offering cash-backs. The transactions are also used to receive money transfers from abroad.

Figure 2 shows a breakdown of agricultural lenders in Tajikistan. Microfinance institutions offer a total of 15 agricultural financial products whereas commercial banks are only offering 12.

[38] IFC and Alif Bank to boost digital agriculture in Tajikistan, Kymbat Ybyshova IFC

[39] National Bank of Republic of Tajikistan: Brief macroeconomic review and activities of banking system of the Republic of Tajikistan for 2020, Market Screener, 12 February 2021

Agricultural Finance

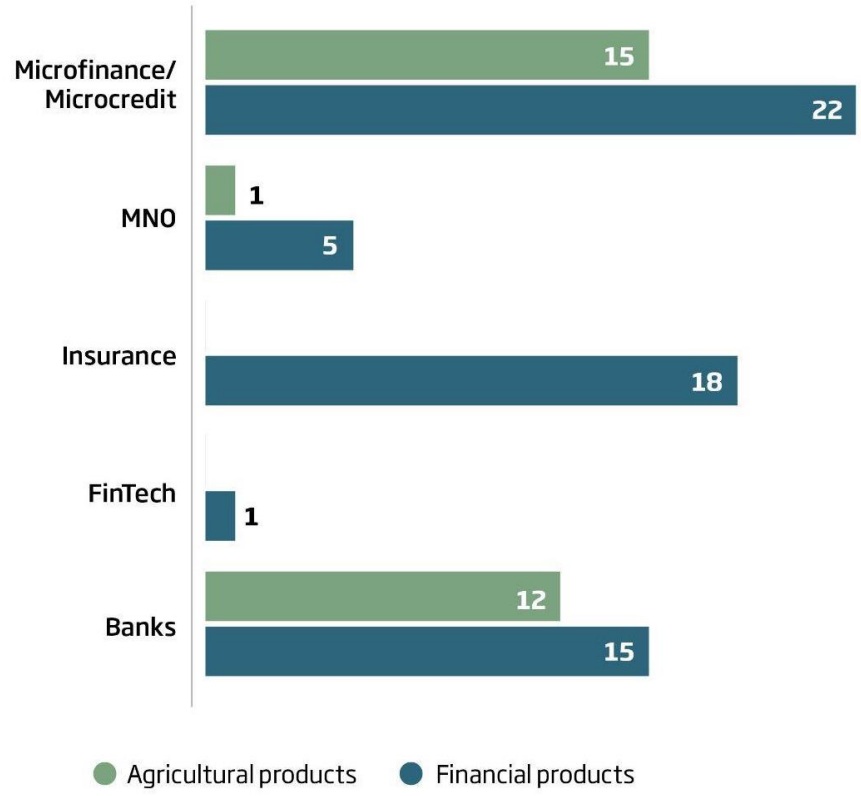


Figure 2: Provision of agricultural finance in Tajikistan[40]

The use of accounts is lower than the global average among Tajik women at 9.1% compared to 47.4% in the Eastern Europe and Central Asia (ECA) region and 23.9% in low-income countries. Only 4.2% of people use debit cards.[41]

Recent data indicates that almost 25% of adults in Tajikistan borrowed in the past year, however only 3.8% did so from formal financial institutions. This is even lower than the figure reported in the 2011 World Bank Global Findex data – that report showed that 4.8% of Tajikistan's adult population were formal borrowers, and the current statistics are also lower than in the peer groups of ECA and low-income countries (12.4% and 8.6% of borrowers from a formal financial institution respectively).[42]

Similarly, the use of formal savings is very low in Tajikistan – only 1.5% of adults saved at a formal financial institution – six times lower than in ECA countries. At the same time, there was a significant proportion of people saving informally in Tajikistan in 2019 – 43 % of adults. The low use of basic financial services may reflect the poor performance of financial institutions and the resulting distrust.

The use of electronic and mobile channels for deposits, withdrawals, bill payments and person-to-person payments is virtually non-existent. Only 1.5% of adults used debit cards to make payments online or over the counter and less than 1% used credit cards on the internet. Tajikistan has no agency banking services since mobile network operators are not allowed to engage in financial service provision without an additional licence which must be obtained from the National Bank of Tajikistan.[43]

[40] NIFAD, US$39 million investment to stimulate inclusive economic growth in Tajikistan, Jessica Thomas, 8 February 2018
[41] Mapping existing financial education initiatives - Tajikistan, OECD 2019
[42] Ibid.
[43] Mapping existing financial education initiatives - Tajikistan, OECD 2019

Electronic banking (e-banking) in Tajikistan is focused primarily on card and payment-terminal channels rather than on internet or mobile systems. The following types of e-banking services are available:

Table 6: E-banking services available in Tajikistan[44]

Type of e-banking payment	Payment description
Government to person G2P	Pension payments via plastic card accounts held by Amonatbank launched in January 2011. They also provide salary payments for government employees.
Person to person P2P	Available to internet banking clients at commercial banks. The majority of international remittances are transmitted on a cash basis using a money transfer organization. There is significant business interest from banks, money transfer organizations and payment service providers to offer these services electronically.
Customer to business C2B	Four options: 1. Payment service provider's payment terminals and dealer networks provide payment to utilities, mobile network operators and other businesses either via the terminal or agent use of a mobile app or web interface. 2. Internet banking services offered by commercial banks 3. Bill payments via ATMs 4. Card payments via point-of-sale (POS) networks at merchant points
Business to business B2B	Payment service provider networks available for B2B payments

4.1.1 Financial services infrastructure and distribution channels

The accessibility of banking services has improved (5% increase from 2019 to 2020), due to the development of bank branches, other banks' off-balance sheet operating units, MFIs across the country and the advent of mobile money.

As of December 31, 2020, 69 financial credit organisations were operational in Tajikistan including 18 banks, one Islamic bank, 18 microcredit deposit organisations, five microcredit organisations and 27 microcredit funds.

The spectrum of access covers physical and mobile points of service as well as interoperability of points of services. Financial access points are oversaturated with an average of just 22 access points serving 100,000 people. This often results in long queues despite the time it takes to travel to these points. On average, farmers pay two visits to the bank to obtain a loan and withdraw their cash.

[44] Tajikistan - Boosting Access and Development, Asian Development Bank 2013

E-banking could help expand financial services, particularly through the use of mobile financial services. However, several constraints need attention, including:

1. The lack of supporting regulations, which directly influences the market's ability to innovate.
2. The need to build digital literacy among consumers, merchants, financial institutions and NBT supervisory bodies.
3. Infrastructure constraints, including poor quality power supply, a limited network of ATMs and point-of-sale machines, and limited availability of mobile and internet access particularly in rural areas.
4. An NBT restriction on financial institutions preventing the operation of an agency outlet unless it is fully staffed by bank personnel.
5. A lack of robust systems in some microfinance institutions and utility companies, preventing the processing of electronic payments.
6. The slow uptake of electronic payments from merchants due to limited knowledge of the benefits of these payment options.[45]

USAID and the Aga Khan Foundation have partnered to advance the Central Asia Accelerate Prosperity initiative to deliver innovative solutions to expand financing and facilitate mentorship. Through this work the initiative is testing innovative gender-sensitive financial products, investment resources and tools to support small and growing businesses to secure investments, link to additional co-financing and follow-on financing and gain access to mentorship support that benefits women as employees, suppliers or clients offering market linkages. Two sub-grants in cooperation with the Aga Khan Foundation from USAID secured to promote enhanced integrated socioeconomic development in the cross-border districts of GBAO and Khatlon to catalyze inclusive economic growth, ensure basic livelihoods and enhance infrastructure and access to basic services with a focus on clean energy.[46]

4.1.2 Access to credit and savings

With an exemplary credit history, any farmer can obtain access to credit. Repeat customers can obtain loans in under two hours from their application submission as SHF credit-worthiness is easily assessed. However, new borrowers need to bring all required documentation and checks can take at least two bank visits. Additional requirements, including producing documentation on collateralized properties and finding guarantors, make the process of obtaining loans at Tajik banks challenging.

Loan service schemes require borrowers to repay debt in a structured way which does not provide the opportunity to reduce the amount of payments as the loan principal is returned. As a result, SHFs prefer to borrow from family and friends or rely on remittances from family members abroad. On the other hand, banks consider large commercial farmers creditworthy as they typically have a diligent loan-repayment behavior.[47]

Borrowers are under much pressure due to debt obligations. This reflects both repayment problems and social pressures including, but not limited to, informal loans and guarantees from friends, wider financial pressure in the community and the perceived impact of loans on the quality of life. Reduction in food expenditure and informal borrowings from friends and family appear to be the primary mechanisms to enable some measure of domestic budget management and sustain loan repayments. The quality of the loan portfolio (at institution and industry levels) is highly vulnerable to adverse trends in economic activity, price inflation and wage levels. Borrowers face an increasingly adverse impact of debt on their families and lifestyle which poses a structural behavioral risk to loan performance.

Income levels for female borrowers were consistently lower than those for males across both urban and rural locations. Average loan amounts reflect income differentials, although female borrowers

[45] Regional: Financial Sector Development in Central and West Asia - Tajikistan: Boosting Access and Development, 2019
[46] Regional: Accelerate prosperity - Tajikistan: https://tj.accelerateprosperity.org/ 2022
[47] FinAccess Statistics - Tajikistan, World Bank 2017

showed comparable access to higher-value loans. Female borrowers showed no indication of feeling excluded from the target client-base of the lending institutions.[48]

Women farmers also face limitations in terms of access to financial services. Microcredit and credit provided to the agricultural sector account for about half of all credit and microcredit in total, and around 30% of those beneficiaries from loans are women. The main reason for the gender imbalance is the ability to have collateral and meet bank requirements on solvency.

In 2014, 3% of borrowers in Tajikistan had loan arrears and 29% considered that their loan repayments were more than could be afforded – by 2016, these levels had increased to 15% of borrowers with loan arrears and 50% who acknowledged their repayment difficulties.

There was a strong negative movement in credit performance between 2014 and 2016 brought on largely by the sanctions imposed on Russia regarding the Crimea annexation. The deterioration in the 'own business' segment has been particularly severe and must be considered in conjunction with the higher levels of business failure. SHFs are included in the "own business" category.

Table 7: Credit performance[49]

	Loan arrears				Having difficulty making loan repayment			
	MFI		Bank		MFI		Bank	
	2014	2016	2014	2016	2014	2016	2014	2016
Regular work	3%	10%	4%	12%	34%	47%	30%	51%
Own business	3%	20%	3%	23%	24%	51%	23%	55%

4.1.3 Insurance

While Tajikistan is subject to many natural disasters including earthquakes, floods, landslides, droughts and extreme weather conditions, agriculture insurance is still underdeveloped. This assessment has shown that there is a need and likely demand for insurance in certain areas as farmers mentioned three key risks that they face – drought, water access issues and high temperatures. These are the main concerns for rain-fed crops, particularly in the Khatlon region, where cereals are produced in large cultivated areas without irrigation.

Farmers showed readiness to purchase micro-insurance despite not having details or knowing the costs of a potential crop insurance product. They emphasized that crop insurance would be worth contributing to if the cover matched the risks they experience and if there would be no consequent increase in loan interest rates. Farmers recognize perils and their impacts, and appear to welcome a risk transfer mechanism from the private sector.

Tajik farmers are familiar with insurance concepts but have had poor experiences with insurance products. Some farmers interviewed stated that insurance companies never compensate SHFs in the event of a loss and most SHFs felt that the insurers defrauded them.

[48] Tajikistan - Borrowing by individuals, FAO 2017

[49] Ibid.

As of 31 December 2020, there were 18 insurance organizations in Tajikistan, of which two are state-owned, 15 are private and one is a Mutual Insurance Support Center.[50]

Axco Insurance Services Ltd (Axco, 2019) reports that insurance coverage is mandatory for property used for agricultural enterprises (regardless of the form of ownership), but this requirement was not confirmed by the government. According to Axco, such insurance is offered on a compulsory basis, primarily to insure state-owned farms. It further reports that Tojiksugurta (Tajikinsurance) had a monopoly on this insurance until 2016, when private companies were given permission to offer compulsory classes of insurance. It is not clear whether any insurance protection exists for small subsistence farmers. There is significant scope for improvement in developing agricultural insurance to support smallholder farmers.[51]

4.1.4 Financial literacy

Financial literacy is low, particularly in rural areas. World Bank studies (a diagnostic study on consumer protection in financial services, and a survey report on the level of financial literacy in Tajikistan) recommended bringing Tajikistan's financial consumer protection regime closer to international good practice. One proposal was to assign responsibility to NBT to monitor and enforce consumer protection in financial services and to develop a national financial education strategy.

The National Development Strategy of Tajikistan up to 2030 (NDS 2030, Section 5.3) places emphasis on improvement in the protection of the rights of consumers of financial services. An important part of the policy measures related to the financial sector of the country specifies the need for the development and implementation of a state program on improving the population's financial literacy.[52]

The NBT continues to offer initiatives to improve financial literacy through various channels. These include the coordination of annual international financial literacy weeks, 'Money Week' focused on children and young people, the organization of workshops and training sessions for elementary school teachers, the placement of information and video materials on the official website of the NBT, and participation in TV and radio shows and exhibitions.[53]

The most vulnerable target groups are defined as priority groups for development and implementation of financial education initiatives. The opportunity to gain financial knowledge should be available for all citizens, but the rural population still lacks the fundamentals of financial literacy.

The NBT obliges financial institutions to develop and distribute information materials on key financial products and services, bearing in mind the properties and risks for the population. Financial institutions and their associations have been continuing their efforts to improve the financial literacy of consumers, mainly amongst schools and students.

Over the last 10 years, various international organizations in Tajikistan have implemented and conducted activities and training sessions to increase financial literacy. In the framework of the coordination council on improvement of the investment climate under the President, a donor committee has been established to coordinate a tailored and sequenced support package to fit national financial development strategies and work within financial inclusion coordination mechanisms such as the national platforms recommended in this framework.

A World Bank Group (WBG) survey report on the level of financial literacy in Tajikistan showed that only 26% of respondents believed that borrowed money could be productively invested; 83% said they did not use any financial services.

[50] National Bank of Republic of Tajikistan: Brief macroeconomic review and activities of banking system of the Republic of Tajikistan for 2020, Market Screener, 12 February 2021

[51] Disaster risk finance country note - Tajikistan, World Bank 2019

[52] Mapping existing financial education initiatives - Tajikistan, OECD 2019

[53] Financial inclusion, regulation, financial literacy and financial education in Tajikistan, ADB 2018

Perceptions On Use Of Credit

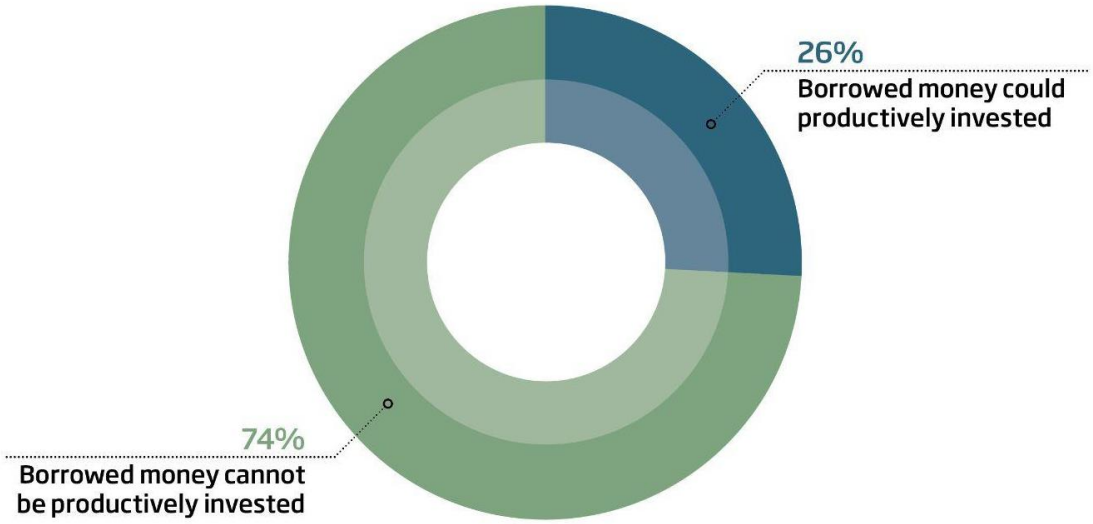


Figure 3: Perceptions on use of credit in Tajikistan

Use Of Financial Services

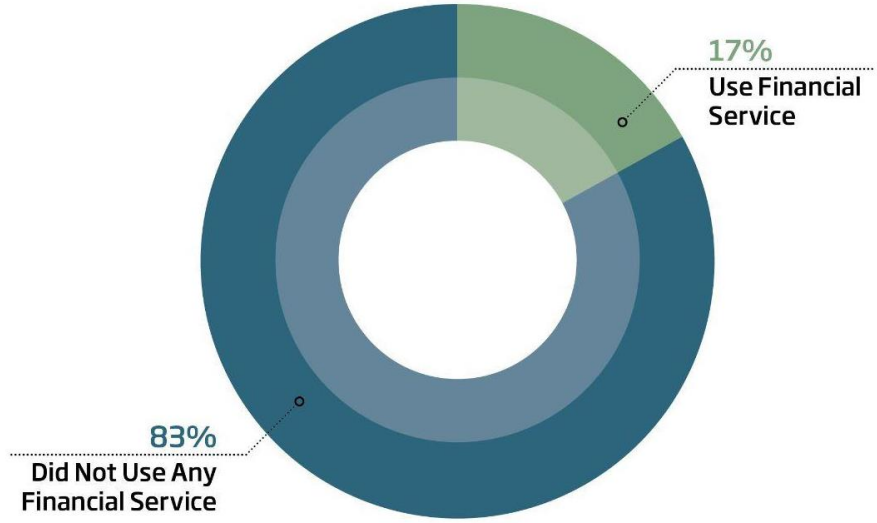


Figure 4: Use of financial services in Tajikistan

The most popular financial service, according to the study, are money transfers and remittances. Another key finding is that 50% of the population did not keep records on a family budget. Based on the results of the survey, WBG developed a financial literacy program with three banks and four MFIs. After a two-year program, an impact assessment survey was conducted to see the implication of the activities conducted. Some of the findings are set out below:

Small positive trends were observed in the following indicators:

- Budget management – 16% (2017) vs. 12% (2013)
- Accumulation of funds – 40% (2017) against 34% (2013)
- Use of loans – 25% (2017) against 24% (2013)
- Use of payment cards – 24% (2017) against 15% (2013).

The study showed that 64% of the polled population wants and is ready to receive financial knowledge.[54]

The World Bank conducted surveys which revealed that the preferred method of obtaining financial education for the population is mass media:

- Mass media – 27.1%
- Commercial banks – 23.1%
- Universities – 22.5%
- Government agencies – 12.8%
- Non-governmental or international organizations – 8.3%
- Independent financial consultants – 6.2%.[55]

Adopted in 2016 by the government, the National Development Strategy (NDS) of the Republic of Tajikistan for the Period Until 2030, provides for the development and implementation of the State Program for Increasing Financial Literacy of the Population. The NDS does not specify any targets with respect to financial literacy, but sets a number of targets that would require, among other things, increased levels of financial literacy and substantial financial education efforts.

The majority of SHFs do not practice proper record keeping of their family or farm budget. This impairs their ability to make price comparisons and calculate gross margins. Farmers need to be engaged more in the product development of tools that will help them understand their financial health and apply best financial practices that will see them de-risk their agribusinesses and better manage their cashflow.

4.2 Agriculture technology

4.2.1 Agriculture technology opportunities

The majority of interviewed farmers from structured value chains possessed smartphones and have access to service provider products, such as 'AGROINFORM.TJ' that allows farmers to check price information. AGROINFORM.TJ is an agricultural information marketing system that provides an integrated approach to information services for representatives of agribusiness. Farmers can access it via app or directly from the website. The platform also provides SMS packages on weather forecasts, market prices and agriculture advice on different crops. Smartphones are also used for accessing messaging apps such as Viber, Telegram, WhatsApp, and IMO groups to receive agricultural information. Google is generally used for weather prediction, while YouTube is used to learn about innovative technologies and methods. However, the primary purpose of the smartphones remains connecting to family members working abroad.

SHFs' smartphones are linked to the internet but the quality and coverage of the internet is poor, and it varies between regions as three different operators are used. The most popular internet carriers include Tcell, Megafon and Babilon. Messaging apps are also used to share information with agricultural consultants – agronomists are contacted to obtain advice and to share pictures in real time. Farmers interviewed stated that during the height of the pandemic, they would make videos of their produce to share with prospective buyers.

SHFs can receive agricultural information periodically and during the farming season, they are able to check the AGROINFORM.TJ website daily. Agricultural information includes new seed varieties, how they are grown, pest management advice, as well as insects and weather information. Information translated and available on the internet in Tajik is still low. Most farmers rely on information available in Russian and Uzbek.

The agriculture technology industry in Tajikistan is still in its infancy. Platforms such as Zypl plan to develop tools to help SHFs manage their yields. Forecasting the harvest, establishing an effective and

[54] Tajikistan-mapping-existing-financial-education-initiatives.pdf

[55] WBG/IFC financial literacy baseline survey 2014

affordable method of automating calculations of maize and other crops yields, identifying pests and editing images for classification of parasites can be further developed for use in animal husbandry and be marketed among farmers to be used widely.

Hosil.tj - the first online agricultural store in Tajikistan

The Hosil.tj online agriculture platform was launched in 2021 and is the first online delivery platform for agriculture inputs provided by Neksigol Navovar. Future development of this platform includes:

- Providing agriculture advice embedded with artificial intelligence for automation
- An online agriculture calculator, price comparisons for agriculture inputs
- Enlisting agricultural sales consultants to help SHFs sell their produce
- Linking farmers to a green agriculture resource library and smart agro-mobile application.

The average farmer basket on Hosil.tj is 800 TJS. The platform takes a 10% commission to cover the transport cost and margin to link to verified input suppliers. The product was launched in Quarter 3 of 2021. In 2022, the company plans to reach 7,500 farmers; 61 agro dealers across 54 districts have already been onboarded to the platform. There is a need to cover more rural areas as these agro dealer shops are situated in town centers. Through the platform, bank partners also offer credit facilities reflecting market rates for agri input purchases.

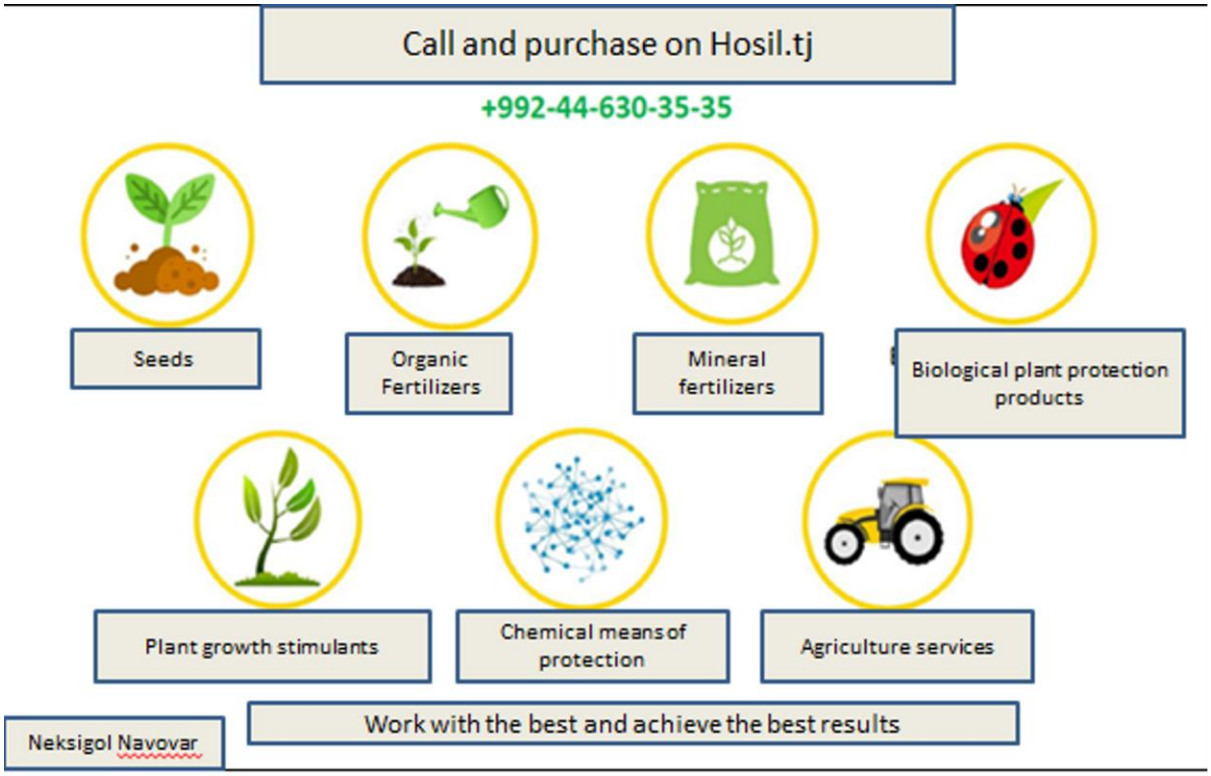


Figure 5: Online platform Hosil.tj to purchase agriculture inputs

The Association of Producers of Agricultural Products of Tajikistan

The Association of Producers of Agricultural Products of Tajikistan has developed an app for farmers which is now in the testing stage. The app will include educational materials, legal documents, news, services, agriculture extension service providers, training and a digital marketplace. The Association plans to disseminate it via the Academy of Science, the MOA and members of the Association by providing SIM cards and phones that already have the app downloaded. **The Association is seeking partnerships to aggregate farmers and bulk produce for the export markets.**

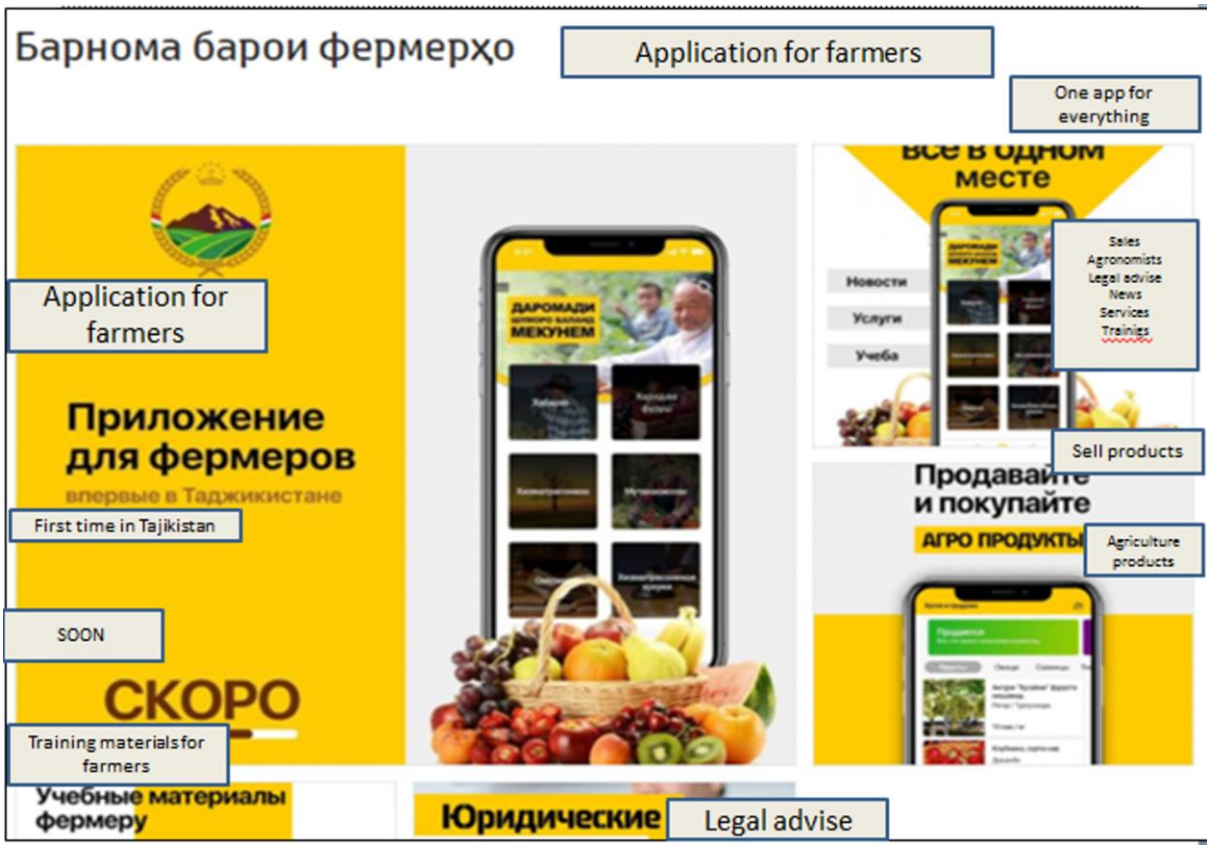


Figure 6: Mobile app for farmers developed by Tajikistan's Association of Producers of Agricultural Products

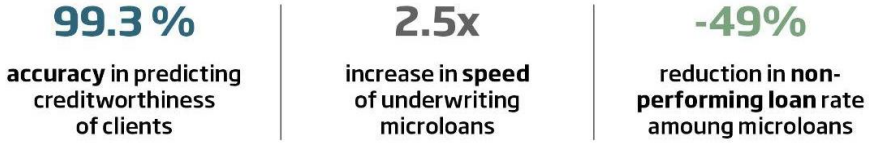
4.2.2 Emerging technology

Across digital solution providers, alternative data (AD) is becoming more relevant for smallholder finance with business models developing to leverage it. While this is a growing area of innovation, key questions around types of data most relevant for SHFs and cost effective strategies to support repayment discipline and collection need to be developed. However, application of AD in the smallholder context is in its infancy and, given the gaps in digitalized information on SHFs, a great deal of experimentation, creativity and investment will be needed to realize the potential of data on farmer inclusion.

Blockchain has been used extensively in neighboring countries including Kazakstan, Uzbekistan and Russia to trace produce all the way to farm level. For big export firms, blockchain has also been used to manage and track payments to exporters. Introduction of a traceability system will improve the quality standards of agricultural products, which will in turn increase the attractiveness and competitiveness of Tajik products in foreign markets.

Case study: Credit scoring software by Zypl.ai

A number of innovative technology opportunities are already available within the region and at a smaller scale in the country. A frontier technology being deployed is artificial intelligence (AI) apps to issue microloans. Credit-scoring software enables financial institutions to automate decision-making on micro-loans. The software has been built on a database of 820k+ loans worth USD 415m. Zypl.score has been deployed by Spitamen Bank, one of Tajikistan's largest banks, with >USD 2 million already issued to date. This product pilot has reduced the average time for a micro-loan decision to 10 minutes. Two more financial institutions – FINCA and Imon International – are in the process of deployment. AI applications for lending and loan management make companies effective, smarter and customer-oriented. The founders plan to deploy the service to Uzbekistan and Kazakhstan in 2022.



Case study: Digitalizing value chain information in Uzbekistan by agricultural linkages plus project

In Uzbekistan, USAID funded the development of an app for Uzbek farmers targeted at those with orchards and vineyards. The main objective of the project is to meet the high demand for horticultural value-chain information. The app is called 'Mobile Extension Value Added Application' (Meva App). USAID also introduced social media and later messaging apps in the Agricultural Value Chain (AVC) project, growing and sustaining engagement.

Case study: Using space technology (SpaceTech)

Using satellite imaging, Uzbekistan agencies are able to develop a national soil database as well as monitor crops in farms for yield management and national food security.
UNDP has provided support to a young scientist from Inha University in Tashkent, who developed a combination weather station-pheromone trap. This includes software that allows farmers to keep records and send out SMS alerts about the spread of plant diseases and pests. The system's main advantages are affordability, accuracy (based on the localization of algorithms used for prediction) and the availability of an Uzbek interface.[56]

For digitalization, there is a need to establish an early warning system that operates via SMS. Farmers will be warned to collect their harvest before extreme weather events affect their crop yields. The primary benefit of this type of digitalization is to provide a tailored service. However, this requires having a disaggregated database of all farmers based on gender, region and crop. There is a need to synchronize existing databases within ministries and agencies to establish baselines for critical demographics of farmers.

[56] Status of Digital Agriculture in 18 countries of Europe and Central Asia, International Telecommunication Union & FAO 2020

4.2.3 Farmer capability, digital literacy and access to technology

Research by Consultative Group to Assist the Poor (CGAP) indicates that farmer training and ongoing information provision are among the most critical components in increasing the adoption of digital technology amongst farmers.[57] Currently, ecosystem players lack effective, financially viable tools and models to meet this need. Capacity building is required in three main areas to leverage and build on existing farmer capabilities: digital literacy, financial literacy, and farm management and market access skills. Smallholders are typically risk-averse and less experienced with technology and require significant training. Strong multi-stakeholder partnerships are often critical to success.

A range of constraints hinder SHFs from taking up digital products and these can be divided into the following categories:

Table 8: Constraints to the use of digital services

Financial literacy	SHFs are not fully aware of the implications of using the different financial products
	SHFs are not fully aware of financial products that are available to them
	SHFs do not trust formal financial institutions
	SHFs do not manage their domestic budgets or agribusiness budgets
Digital literacy	SHFs are not fully aware of all the digital agricultural products that are available
	SHFs have concerns over the cost of such products
	SHFs have major concerns over data privacy
Farm management	SHFs struggle to implement correct agronomic practices
	SFHs struggle to find localized content that will help them farm better
Market linkages	SHFs are disaggregated and therefore struggle to lock on better prices for produce
	SHFs are unable to engage long-term buyers

According to the Global System for Mobile Communication (GSMA) Connected Women and Digital Inclusion team's research, women have more confidence-related barriers to using mobile phones than men. Studies exploring women's use of digital technology have found that women rely heavily on their social circles, including family and friends, to discover new apps and services. Family members have also been found actively to discourage women from learning through the use of information and communication technology (ICT) due to negative perceptions of women using the internet.[58]

International and local stakeholders such as the World Bank, the International Fund for Agricultural Development (IFAD), FAO, GoT and several financial institutions including NBT are currently offering

[57] Serving Smallholder Farmers - Recent Developments in Digital Finance, Focus Note 94, June 2014

[58] Accelerating Digital Literacy: Empowering women to use the mobile internet, 2015

a range of approaches to support capability building to various players across value chains. The ecosystem of capability-building players is fast evolving, which holds considerable possibilities for collaboration.

4.2.3 Regulatory framework

Food security and access to quality nutrition is defined as one of four strategic priorities of the country within NDS 2030, and is highlighted in the new agricultural policy.[59] The policy document proposes stimulating agriculture's contribution to GDP and agricultural innovation by 19.5% and 18% respectively by 2030.

To support agricultural producers, the government revised its Tax Code and introduced a unified tax system for producers of agricultural products in 2005. The Tax Code simplified farmers' taxation by either (i) eliminating or (ii) unifying several taxes, such as land tax, property tax, income tax, road user tax, on agricultural workers and agricultural value-added tax for agricultural workers. The Tax Code was further revised in 2013 to overcome barriers for agricultural producers – this included reviewing farm machinery tax, unifying taxes for members of Dekhan farms and waiving income tax for members of Dekhan farms who pay unified tax on income received from agricultural activities.[60]

Currently, the main documents aimed at accelerating the development of a national e-agriculture strategy are NDS 2030 (approved in 2016, the strategy has agriculture-, fishery- and forestry-related components) and the Concept of Digital Economy in the Republic of Tajikistan (adopted in December 2019).

There is significant potential for and considerable interest in fully digitalizing Tajikistan's ICT sector; from new firms in this sector to applications of e-government, cashless payments and smart city solutions. For this to work, addressing existing constraints in sector regulations and the business environment would have to continue as a policy priority. For example, the degree to which the changing regulatory environment and the lack of a level playing field in the market, partially reflecting the market position held by the state-owned telecom company, could have contributed to the worsening sector performance.[61]

By removing entry barriers and implementing a modern regulatory framework, Tajikistan would be able to attract more private investment, thereby creating a virtuous cycle as newly established, profitable private enterprises would co-finance the deployment of broadband infrastructure and the increase of network capacity, including last-mile investments.

Tajikistan already understands the benefits that can be derived from an encouraging regulatory environment and a transparent licensing regime. During the period 2000–2015, the country's ICT sector was one of the fastest growing sectors, having contributed to socioeconomic development and, indirectly, the state budget revenues. It has been possible, with transparent licensing procedures, low licensing fees and low penetration rates to translate this into an ability to attract reputable international operators.

4.3 Investment and donor landscape

Tajikistan faces a range of humanitarian and development challenges, many of which stem from the struggles of an agrarian-based economy which needs to cater to the needs of a fast-growing population. A heavy dependence on agriculture makes Tajikistan highly susceptible to the impacts of climate change.[62] It has been estimated that a 1% increase of official development assistance led to a 1.6% rise in GDP per capita and a 0.48% decrease in poverty levels in Tajikistan.[63]

[59] Government of Tajikistan Digitalization Concept 2016

[60] Government of Tajikistan 2012

[61] World Bank, Digital Transformation as central COVID-19 response policy, 14 October 2020

[62] Ibid.

[63] Abduvaliev, M. & R. Bustillo, Patterns of Official Development Assistance in Tajikistan: effects on growth and poverty reduction, *Revista Brasileira de Política Internacional*, 10 June 2020

For more than a decade, USAID has supported Tajikistan's agriculture-led economic growth and improved nutrition outcomes in Khatlon. The following results have been recorded:

1. USAID, in partnership with local entrepreneurs, have established 20 new agricultural businesses including cold-storage, canning, drying, juicing, and animal feed processing facilities, leveraging USD 1.5 million in private sector investment.
2. USAID has helped 741 women secure land tenure rights and increased awareness and legal literacy in land use rights and land reform for 5,554 women farmers.
3. USAID food security assistance during the COVID-19 pandemic reached almost half a million Tajiks, of whom more than 82% were women entrepreneurs, farmers, pregnant women, and mothers of young children.
4. USAID has provided 178,748 children under five and 67,203 pregnant women with clinical and community-based health and nutrition interventions. It has catalyzed agriculture-led growth and the availability of nutritious foods on the local market by promoting increased production of nutritious crops such as broccoli, kale, bok choy, sweet potatoes, cherry tomatoes, and protein-rich mung beans.

Feed the Future Tajikistan Agriculture and Land Governance (ALG) Activity moves beyond these previous investments to catalyze growth by enabling the local private sector to develop and expand market opportunities by working with government and civil society. The ALG program drives systemic reforms in the enabling environment for agriculture that allow smallholders (and private sector firms) to invest and upgrade land through improved land governance. ALG also ensures that issues regarding women, youth, and vulnerable groups in remote areas in Khatlon are mainstreamed. These groups are integrating into market-led opportunities in processing, value addition and livelihood diversification, whilst deepening their resilience through nutrition-sensitive crop adoption and behavior change. Combined, these efforts will enable Tajikistan to reduce its over-reliance on remittances from neighboring Russia.

Another active donor present in Tajikistan is the World Bank with 32 active programs, four of them in the agriculture sector totalling $125 million in borrowings and grants between 2014 and 2021. One such program is the Second Public Employment for Sustainable Agriculture and Water Management Project (PAMP II) supporting the government in improving water resource management at the local, basin, and national levels. The US$57.9 million for the project, financed by the International Development Association (IDA) and the Global Agriculture and Food Security Program, covered 17 of the most food insecure districts in Tajikistan. Approximately 1.4 million people living in these districts have benefited from improved irrigation services and better water management. The World Bank Agriculture Commercialization project launched a modern yield forecasting system in three districts of the country to develop the capacity of national organizations to effectively analyze and use data obtained from 19 parameters.[64]

Other notable donor projects in Tajikistan that promote use of elements of digital service include:

1. The IFAD-funded project Livestock and Pasture Development Project-II (LPDP-II) where digital mapping of pasture has been introduced.
2. The Strengthening Institutions and Capacity of the Ministry of Agriculture and State Veterinary Inspection Service for Policy Formulation Project, which piloted weather stations to share crop disease models and early warnings with smallholders. This program is supported by FAO.
3. European Bank for Reconstruction and Development with the Green Economy Financing Facility (GEFF) project established an online technology selector to help farmers and private sector players to select necessary technology. The initiative is supported by an online podcast in the local language informing farmers about the benefits of green technology.
4. The EU-funded TRIGGER II (Towards Rural Inclusive Growth and Economic Resilience) implemented by GIZ, strengthening the economic resilience of micro, small and medium-sized enterprises (MSMEs) including SHFs in Tajikistan-Startup Promotion to provide access to innovative start-ups and work with them to stimulate the start-up ecosystem.

[64] World Bank, World Bank in Tajikistan, 2021

In 2021, the government decided to increase external debt and ask for loans from external creditors. This was decided despite the fact that external debt stands at $3.2 billion (36.9% of GDP) - equal to $294 per capita. The government noted that without such loans, the implementation of projects for development of certain sectors of the Tajik economy is impossible.[65]

The country's internal debt rose sharply five years ago, from $217.5 million in 2015 to $565.5 million in 2016, when a number of the country's strategic banks were on the verge of bankruptcy. The government decided to issue treasury bills ito address the insolvency of Agroinvestbank and Tajiksodirot bank.

Over the past 12 years, the Export-Import Bank of China (Eximbank) remains theTajikistan's largest creditor. The primary sectors in which it invests are construction, infrastructure, energy, mining and textiles.

To avoid duplication of effort, a donor repository of activities and programs needs to be developed and maintained by an independent party. Visibility of a donor repository will ensure that funding and resources are allocated efficiently in the agriculture sector.

[65] Tajikistan: Agency for Technical Cooperation and Development (ACTED) 2020

5. Recommendations

Although there are several high-priority agriculture digitalization bottlenecks that USAID programs could address, presented below are recommendations that are immediately feasible and worth consideration, as well as short and longer term recommendations which, between them, meet the following criteria:

1. Immediate interventions that could accelerate the shift in agriculture ecosystem digitalization.
2. Significant technical and financial resources have been expended by other stakeholders and the additional effort from USAID would potentially accelerate the impact of digital technology adoption and utilization to materialize productivity gains.
3. Interventions that would build on the successes driven by the various Feed the Future program activities.
4. Digitalization that would improve the participation and productivity of youth, women and people with disabilities.
5. Digitalization developments that would improve mechanisms for unlocking access to finance, particularly value chain financing and crowd funding.

Recommendations are structured **first**, to describe the bottleneck and the recommendations; **second**, to describe the link to the Feed the Future Program objectives; **third**, to describe the program intervention and proposed activities; **fourth**, to include potential partners; and **fifth**, to discuss expected results.

Finally, recommendations have been provided on digitalization for the attention of the MOA.

5.1 Access to finance

USAID Tajikistan should focus support to SHFs on the provision of digital financial products that fit their needs (long-term, soft loans and/or grant programs). The thematic bottlenecks that affect SHFs include limited access to soft credit, affordable insurance and saving products:

- **Access to soft credit:** Farmers need long-term soft loans and currently borrow from informal channels. Interest rates from formal institutions are high which deters SHFs from using bank services. Farmers interviewed revealed that long-term soft loans with lower interest rates of 6–10% annually would help them invest in technologies and infrastructure (cold storage, packaging, small logistical trucks, new seedlings, inputs). The lack of transparency in the cost of borrowing also affects SHFs' perception of and trust in formal institutions. The loan products currently on the market do not address the seasonality of smallholders' production and income cycles. Limited financial literacy leads to poor financial decisions and over-indebtedness.
- **Access to affordable insurance:** Farmers lack trust in insurance firms' mandate to compensate them upon an actualized risk. Minor disturbances in cash flows and small shocks force families to forgo or postpone spending on monthly insurance payments, leaving them vulnerable to more disruptive events.
- **Access to savings products:** The proximity of financial service access points is important for SHFs operating in rural areas. Due to this lack of access and little or no interaction between SHFs and financial services providers, there is a misconception that banks are neither safe nor reliable places to save money. Some 91% of low income households invest in land, livestock, seeds and machinery instead of saving in formal instruments.

Relevant examples from Feed the Future initiatives in other countries

- Learnings can be derived from the Feed the Future Rural Finance Initiative in Colombia which promotes rural economic development by increasing MSMEs' access to financial services. It provides technical assistance to financial institutions like banks and addresses barriers to financial service access, including the lack of information and high service costs.
- A Feed the Future program in Mali sought to identify existing or potential partnerships between financial services, the livestock sector and insurance brokers. The partnerships are the basis for designing and piloting insurance products that widen access to finance for

producers in the livestock sector and address key risks and constraints for producers and insurance providers.
- In Kenya, the government is scaling a novel livestock insurance program for pastoralists, which was piloted by Feed the Future.
- MyAgro, a Feed the Future grantee, has developed a successful mobile layaway solution that allows SHFs in Mali and Senegal to save money incrementally via their mobile phones for investment in farm inputs. Although no robust impact evidence yet exists, MyAgro has reached 34,000 customers and claims to have increased yields by 50–100% and annual net farmer incomes by USD 145.

Proposed USAID interventions

USAID should play a coordination role to bring together partners that have a track record of extending digital financial inclusion such as Eskhata Bank, Imon International, Humo, First Microfinance Bank, Alifbank and other financial institutions. The bundling of digital financial products (savings, credit, insurance and transactions) will have a broader impact for a large, more diverse set of beneficiaries.

USAID should encourage its implementing partners to support the use of human-centered design in the development of digital products. In collaboration with financial institutions, USAID should push for human-centered design to be a critical part of the development of digital products where the unique needs of SHFs are addressed and challenges mitigated. If human-centered design is utilized, then there is a greater likelihood of both the seasonality (and resulting unpredictability) of agribusinesses and marginalization of women, youth and farmers with disabilities being effectively addressed in future programs.

USAID should advocate preferential interest rates on loans for agribusinesses and smallholders. Guaranteeing bank loans issued to SHFs against first loss provides an incentive for banks to partner with USAID and develop more agri-finance products. This blended finance approach, coupled with the provision of technical assistance to loan recipients, could provide much needed financial and agronomy resources to SHFs.

USAID can encourage implementing partners to disseminate impactful digital financial literacy materials contextualized for the SHF in collaboration with civil society organizations and multilateral institutions partners. This can be done as part of an existing or future program. USAID can either replicate materials from existing programs in similar contexts, or collaborate with partners that are already undertaking digital financial literacy initiatives in the country, and combine the content with existing financial products offered by the banks.

USAID should advocate policy reforms that allow mobile and agency banking services to start up, operate and scale at low cost. Provision of affordable services and their wide promotion via campaigns to smallholders can inform more potential users to benefit from such digital financial services. More than 50% of the population lack access to formal financial services. Tajikistan's mobile money agents can expand their operations, in terms of financial inclusion, by facilitating cash in/cash out services to improve accessibility to financial services.

Potential partners

- NBT to provide financial literacy training and content.
- Alif Bank, Eskhata Bank, Imon International, Humo, First Microfinance Bank to provide agricultural savings and credit products.
- World Bank and IFAD to provide financial literacy and women's financial empowerment by coordinating training, roundtables and/or financial literacy activities targeting smallholders.
- Neksigol group to provide access to credit for farm inputs.
- Tcell, Babilon, Beeline, Megafon to provide information dissemination via SMS or SIM toolkit and access to internet services.

Expected results

- More than 50,000 farmers access formal financial services and financial literacy education within the first year as a result of the intervention.
- Banks and other financial institutions develop financial products that address SHFs' unique needs and are easily accessed and used.
- "Crowding-in" of private sector partners to enhance financial inclusion within the country. A number of new entrants to the market should be facilitated by USAID.

5.2 Innovation Hub

USAID Tajikistan should promote the establishment of an Innovation hub for agriculture technology to accelerate start-up innovation and sustainable business model development, with the objective of scaling the adoption of digital technologies in the agriculture sector.

A critical bottleneck for Tajikistan's economy is its reliance on remittances from labor migrants living outside the country which has resulted in a 'brain-drain' of some of Tajikistan's best talent. Despite this, Tajikistan is witnessing the growth of a grassroots high-tech start-up culture. Seventy percent of the population is below the age of 30, and technology is changing the mindset of the country's younger generation. Social media, online education, international travel and global awareness are increasing the younger generation's interest in innovation and technology.

Although new products and services have revolutionized industries or even led to the emergence and growth of new sectors, in neighboring countries, the start-up ecosystem is still in its infancy in Tajikistan. To accelerate its growth, USAID should promote the establishment of a hub which will develop, create, curate, start-up and ultimately scale new businesses in the digital agriculture sector. There is a need for technical assistance and the provision of small loans or grants to catalyze growth of early stage businesses.

Relevant examples from Feed the Future initiatives in other countries

- The Feed the Future innovation labs draw on the expertise of top U.S. universities and developing country research institutions to tackle some of the world's challenges in agriculture and food security.
- Led by U.S. universities, these innovation labs are central to advancing novel solutions that support goals to reduce global hunger, poverty and undernutrition.
- Private sector partnerships established by the labs help build healthy business environments, strong, well-functioning and connected market systems while fostering economic growth.
- The innovation labs work in 12 countries across Africa and South America, including Bangladesh, Ethiopia, Ghana, Guatemala, Honduras, Kenya, Mali, Nepal, Niger, Nigeria, Senegal and Uganda.
- By bringing partners together to invest in agriculture, resilience and nutrition, the labs have developed and deployed more than 1,000 innovations that have impacted more than 23 million people and generated more than USD 15 billion in agricultural sales.

Lessons and expertise can also be extracted from innovation labs elsewhere. This would support leapfrogging of some product development processes and adoption of industry best practices from the onset of product and service development.

Proposed USAID interventions

In collaboration with existing innovation hubs, such as the TRIGGER II 'Startup Promotion' and **Techno Hub, USAID should test the service offering of supported start-ups for the inclusion of SHFs and women.** A USAID 'approval' or 'certification' can be given to start-ups that support these objectives with the required caveats that regard associated risks. Second, USAID should lobby for the services of existing innovation hubs to be extended to the Khatlon Feed the Future zone. USAID can tailor these hubs to include a proportion of start-ups enrolled focusing on agriculture. USAID can then

support start-ups that demonstrate scalability and sustainability with small loans by working with local banks and providing technical support through its existing programs.

USAID Tajikistan can also invigorate the start-up ecosystem by hosting hackathons. Hackathons will bring together technology innovators, government agencies, academic institutions and other donor agencies which work to solve a challenge within the digital agriculture sector. USAID can play a coordinating role by working with the stakeholders and the private sector, which can offer a 'prize' for winners ranging from funding to incubation of viable solutions generated from the hackathon. It will be important to make applications for a place on the hackathon inclusive, with the competition taking place in both rural and urban areas, and with a special focus on attracting female entrepreneurs and individuals with experience in farming.

USAID Tajikistan should coordinate the design of a technology challenge fund to increase innovation in digital agriculture. This will require financial support from the private sector and most likely a contribution from government and/or donor agencies. The objective of the fund would be to support project innovations that specifically address the digital divide between (i) urban and rural; (ii) male and female; and (iii) medium-scale and SHFs in order to solve the issue of digital inclusion within the digital agriculture ecosystem. An example of the type of project to be supported is an initiative that seeks to create a digital platform to aggregate SHFs under specific value chains. The fund will stimulate innovation within the sector whilst government/donor and/or private sector co-financing will ensure that projects remain sustainable beyond the first tranche of funds awarded to successful applicants.

Potential partners

- Ministry of Innovation and Technology (TechnoHub) and GIZ: TRIGGER II Startup Promotion to provide access to innovative start-ups and work with them to stimulate the start-up ecosystem.
- Alif Academy: prepares the IT experts and informs about the hackathons and encourages submissions of innovations in the agriculture sector.
- zypl.ai (an AI fFnTech lab building AI products and educating talent, transforming youth potential into human capital in Tajikistan): informs about the hackathons and encourages submissions of innovations in the agriculture sector.
- Tajik Technological University: draws the attention of youth in the university to participate in technology development for improvements in the agriculture sector.

Expected results

- More than three innovations developed and deployed as a result of the hackathons, challenge fund and innovation hubs within the first three years.
- 1,000 youth engaged and find employment in Khatlon Feed the Future impact zone.
- Support given to the establishment of more agriculture technology start-ups.
- More farmers are reached with digital products.

5.3 Digital capacity building

USAID should expand its existing and planned digital capacity building programs to focus on delivering results for SHFs, young women and the MOA and Committee for Food Security. Any materials generated by the programs should remain in a centralized e-library beyond the lifetime of the program and be updated regularly with new industry best practices and information.

Set out below are specific bottlenecks within this recommendation area:

Capacity building for SHF: farmers lack knowledge on farm management and the requirements of export markets. Farmers need to build knowledge about Tajikistan's primary export markets (as well as certification, standards, export costs and actors) and how both to access those markets and to tailor production to their requirements, whilst also expanding their current markets.

Capacity building for women: women are underpaid and attain less senior roles relative to men in the agriculture sector in Tajikistan. This is due to limited opportunities to study and obtain recognized professional qualifications. The Tajik Agrarian University provided 291 scholarships in the last five years, of which only 57 were awarded to women. This is symptomatic of a wider problem in Tajikistan's agricultural education sector: only 7.2% of women have an agriculture education, despite more than 69% of women being engaged in the sector. A number of targeted, simple interventions could push women toward better paid, formal agricultural occupations in agronomy, gardening, veterinary sectors or melioration engineering, according to a social assessment from Tajik Agrarian University. Higher education levels among men allows them to become socially and geographically mobile, with many of them leaving for neighboring Russia for better employment prospects, whilst uneducated women remain in rural Tajikistan to work in the fields. Women's labor in the field is taken for granted and mostly unpaid. For example, the absence of day-care in the majority of rural jamoat (the third-level administrative division, similar to communes or municipalities) and villages pushes women to combine childcare and agriculture activity.

Capacity building for the MOA: in 2012, the MOA began undertaking agriculture reforms that were expected to be completed in 2020. Since the expected reform results were not met, an indefinite extension period was granted. In order to achieve expected results, there is a need to capacitate the MOA and ensure digital is mainstreamed across its programs, policies and various agencies. This will enable the Ministry to plan, implement, monitor and evaluate the impact of the reforms more effectively as well as learn from best practices to deliver quality e-extension services that benefit SHFs.

Capacity building for Committee for Food Security: the Committee for Food Security is a new organization established by order # 595 on 29 December 2017 and has worked to date to align with international acts and regulations. However, this work has been underfunded and there is a need to capacitate the initiative to ensure Tajik agricultural products meet international requirements for export to other markets outside Commonwealth of Independent States (CIS) markets. The Committee has focused on internationally accredited laboratories, provision of soil analysis to farmers and other services that will enable smallholders to have easy access to export their produce.

Relevant examples from Feed the Future initiatives in other countries

- In Tajikistan, USAID is developing more productive agriculture systems that improve nutrition, strengthen local institutions and private sector partners, and improve the agricultural environment, particularly in land governance.
- In Uzbekistan, USAID supports the production and dissemination of diverse and rich capacity building digital content in local languages.
- Building on previous achievements, USAID provides digital capacity building programs for SHFs to promote women's economic empowerment, support digital transformation of the MOA to provide better e-extension services, integrate the Technology Division's digital inclusion practice to expand connectivity and digital access by providing technical assistance, driving inclusive policy and infrastructure development, and creating tools and model performance indicators to facilitate investment into new connectivity business models and support Tajikistan on its journey to self-reliance.

Proposed USAID interventions

USAID should design a comprehensive digital capacity building program for SHFs that covers farm management (animal and crop production, climate-smart agriculture, pest and disease control, post-harvest management and record keeping). Using digital channels to supplement in-person training will ensure scalability. Linking the program's content to quality agri-inputs will help SHFs access export markets and improve productivity. The content can also easily be 'shared' with other SHFs if it is digitized.

USAID should lobby private sector entities such as local processors and producers, Chamber of Commerce regional branches, National Association of Small and Medium Businesses of the Republic of Tajikistan, and the National Association of Milk Producers to provide scholarships

to study agriculture in the Tajik Agrarian University, targeted toward young women from rural areas. Empowering young women with recognized qualifications and using them as change agents in rural communities will help drive agricultural transformation at a local level - whilst young men tend to migrate, educated skilled women tend to remain in the country even when given more and better education. To ensure that more women attend training and field demonstration days, USAID should lobby for daycare child support to be provided to students on the scholarships who are also mothers.

USAID should build on its existing institutional strengthening initiatives by providing targeted support to the MOA on e-extension service provision and the Committee for Food security on laboratory accreditation. The addition of a comprehensive capacity building program aimed at the Ministry and its departments in districts to improve their e-extension service provision to SHFs on all levels (jamoat, district, regional) will improve digital adoption rates in rural areas and amongst farming communities. The same should be provided to the Committee for Food Security on a long-term basis to achieve accreditation of laboratories that provide oversight to export markets and supervision over agriculture inputs.

Potential partners

- MOA and an e-extension service provider to be enabled to provide e-extension services.
- Committee for Food Security to be supported to reach international accreditation for laboratories according to International Standards.
- Tajik Agrarian University to provide agronomic training and certification for selected women farmers.
- Chamber of Commerce and Agency for Export to link farmers with the export markets.
- Committee for Women and Youth to provide women and youth empowerment.
- Committee for Food Security to facilitate exchange of best agronomic practices among SHFs.

Expected results

- 100,000 farmers educated in farm management nationwide, with the key focus on the Feed the Future Khatlon region impact zone. To reach this number, the network of farmers from other rural areas can be linked to digital groups via messengers and mobile apps.
- 1,000 young women with degree certification in agriculture and agribusiness from the Tajik Agrarian University.
- Improved income and productivity of SHFs by 10%.
- Increased food security and improved food nutrition.
- Increase potential for export with accredited laboratories within the country.

5.4 Market linkage

USAID should facilitate market access between SHFs and both local and international markets through the creation of digital and physical platforms. SHFs face the following challenges linked to market access:

- Unfavorable market prices.
- Lack of access to long-term buyers.
- The need for produce bulking to access formal markets and boost negotiating power.
- Poor understanding of the product quality and safety standards required to enter formal markets.
- Women farmers still struggle to get a place in the market to sell their products and are sometimes not paid for what they produce.
- Poor logistics and high cost of transportation to markets.

Relevant examples from Feed the Future initiatives in other countries

- In Uganda, Feed the Future Innovation Lab for Assets and Market Access used highly scalable technologies to develop a suite of tools and methods that measure the shallowness in African food markets and offer solutions to deepen markets. The three prongs of the study

work simultaneously to alter intermediaries, information and contracting options available in food markets.

- First, the research team worked with AgriNet, the major private-sector supply chain company in Uganda, to implement a randomized expansion of their commission agents model across 15 districts. Second, it worked with Innovations for Poverty Action, a major international research nonprofit, to implement a high-frequency market price survey using innovative SMS-based tools developed specifically for the project. Third, it collaborated with Kudu, a digital food trading platform developed by computer scientists at Makerere University. This allowed farmer groups to sell directly to major buyers with market contracts that are optimal for both sides.

Proposed USAID interventions

USAID should disseminate learnings from the Feed the Future program in similar contexts to major supply chain actors in Khatlon Feed the Future zone in grain, dairy, poultry or orchard fruits value chains. These include Cooperative Nufuzi Vakhsh, LLC Zarifa 2013, OJSC Osie+, OJSC Shiri Bokhtar, Cooperative Tijorati Sorbon, Grain company LLC, LLC Farovon, and LLC Inter Market. The objective of this is to expand their supply chains by using existing models that have worked well.

USAID should convene different technology providers for a workshop to discuss incentives for them to collaborate, and explore ways to design a digital solution for market linkages such as a digital marketplace. These include Neksigol Group, Zypl.ai, Pixel team of Professionals, AlifAcademy, Fantom Foundation (blockchain based IT solutions) and the Association of Tajik Producers. The digital marketplace for agriculture will connect national producers and buyers with both internal and external markets, and will enable them to interact, negotiate, and buy/sell produce. By digitalizing the solution, women, youth and farmers with disabilities will have a fair chance of participating in the marketplace.

USAID should lobby for the development of a digital tool/app to incorporate price comparison services for agricultural produce. The MOA is well placed to provide this, as are private agribusinesses, although they lack the funding to do so. USAID could either fund the development itself, through an existing or planned program, or coordinate a sector-wide approach which pools funds from different actors. The price comparison service will utilize data from AGROINFORM.TJ to monitor prices in real-time. Alongside the digital solution, the service will need low-tech marketing via TV, radio and other informal means of communication in order to reach rural areas in Tajikistan.

Potential partners

- AGROINFORM.TJ to aggregate market prices.
- A logistics provider to link farmers and buyers to affordable transport and warehousing services.
- A technology solution provider to develop the technology that will facilitate a digital marketplace.
- The Chamber of Commerce to link the SHF to local and external markets via their tools, platform and networks and online portal such as Tajikproduce.com.

Expected results

- More women, youth and farmers with disabilities participating in the market platform.
- Access to more buyers from outside the farmer's community.
- More farmers selling their produce at fair prices.
- High quality produce exported and sold at markets.

5.5 Data protection and digital literacy

USAID should support policy formulation for data protection by funding assessments of existing policies and providing guidance on how to better safeguard the data rights of Tajikistan's rural farming communities. USAID should also advocate the expansion of digital

literacy tools to enhance the inclusion of SHFs in the Feed the Future impact zones. Focus group discussion revealed that SHFs do not fully trust the Tajikistan banking system due primarily to the closure of two major banks, Agroinvestbank and Tojiksodirotbank. Over 50% of the banking population was affected and, as a result, more vulnerable groups and the traditionally 'unbanked' have reverted to relying on informal financial services for credit, investment and savings.

The focus group discussions revealed SHFs need to:

- Understand the cost of credit and managing over-indebtedness.
- Understand insurance indemnity.
- Understanding cost of transactions.
- Understand proper record keeping.

Set out below are specific bottlenecks within this recommendation area:

Digital transformation in rural areas is accompanied by a growing digital divide due to limited digital literacy. The rapid digital transformation of Tajikistan is aimed at improving the various sectors of the economy including agriculture. However, COVID-19 exposed the limitations of the agricultural supply chain in Tajikistan and highlighted to policy makers the importance of digital transformation and innovations in agricultural systems. SHFs operating in rural Tajikistan may be restricted from exploring opportunities, whereas access to a digital marketing platform could increase the volume of trade for their agricultural commodities. Sufficient digital literacy is required to use and unlock the potential of digital agriculture and financial services platforms. However, many of the interventions targeted at linking rural farmers to markets via digital platforms fail to include digital literacy components and beneficiaries are often not well equipped to evaluate the suitability of digital platforms and interventions.

Weak data protection policies mean that farmers are reluctant to share their information for fear of misuse by government agencies. Farmers interviewed during the research process believed that information on their yields, crop selection and land area, which is all gathered digitally, will be used to increase their tax obligations. Farmers are unaware of the formal whistleblowing channels for victims of data infringement (data sharing without consent to a third party that causes financial or other loss) as there is no mechanism or law in place to protect data privacy in the country.

Relevant examples from Feed the Future initiatives in other countries

- In Nigeria, the Feed the Future All In project launched a randomized controlled trial that builds digital literacy among rural farming households as a means of improving their access to output markets. The study is assessing the relationship between digital literacy and market access and exploring how digital literacy can spur the demand for digital marketing platforms in rural areas.
- To enable value chain actors to learn how to use digital tools for capacity building, Feed the Future Bangladesh taught them the digital literacy skills needed to access tools in various formats, as well as specific instructions on using tools produced by Feed the Future partners.
- In Ethiopia, Feed the Future trained 64,000 people in agriculture, business, marketing and financial literacy.
- In Malawi, the Feed the Future Malawi Integrating Nutrition with Value Chains coordinates with FHI 360 and Opportunity International Bank of Malawi to develop/modify financial literacy programs. The Feed the Future value chain competitiveness team included the gender team in this activity to ensure the needs of both women and men are identified and addressed. Feed the Future conducts financial literacy training programs among smallholders and association leaders, paying attention to challenges of illiteracy, particularly for women.

Proposed USAID interventions

USAID should consult with entities such as the World Bank, NBT and the NDS Unit of the Government of Tajikistan to inform future financial and digital literacy program design. USAID should ensure that these address the unique needs of SHFs, highlighting women, youth and people with disabilities, and that human/farmer-centred design is used. The same should be done with CGAP

and the ICT Council to encourage SHFs to adopt technology to increase their productivity and income. USAID can lobby for (i) digital training to be supplemented with internet vouchers in order to encourage the use of digital tools; and (ii) the use of influencers to generate interest and encourage the use of digital tools - for women, who rely mostly on their social circles for information and advice, an influencer strategy can be highly impactful.

Support to the MOA and Ministry of Industry and New Technologies to build policies on data protection that will safeguard users. The policies should (i) enshrine the roles and obligations of the regulator and the private sector; (ii) include provision for the needs of SHFs; and (iii) encourage centralized, integrated data sharing for new and existing digital solutions.

Potential partners

- WBG, NBT, IFAD, ICT Council and CGAP to provide financial literacy training.
- Agriculture technology providers to provide digital training on their technology products.
- Banks and financial institutions working with farmers transfer financial literacy to SHF.

Expected results

- Well-functioning policy system that benefits smallholders and protects their privacy.
- 10, 000 farmers with improved knowledge on their data protection rights.
- 10, 000 farmers have improved digital and financial skills.
- New collaborations and partnerships that drive digital and financial literacy.
- SHFs increase uptake of digital technologies and financial products by 10%.

5.6 SHFs digital aggregation

USAID should advocate the development of commercially oriented digital aggregation platforms by engaging with existing producer groups. With links already established in strategic areas within the country including 12 districts in Khatlon Province and relationships with groups that are already established, USAID can lobby for digital aggregation. Digital aggregation will increase knowledge sharing (improved farming practices), access to finance, access to markets (including logistics and warehousing), and access to quality inputs. The primary bottleneck in smallholder digital aggregation is:

Simple regrouping of small-scale farmers is insufficient and does not automatically lead to aggregation. Specifically, aggregation should not focus on the number of individuals or farmers who have been brought together but should rather concentrate on the amount and quality of resources pooled (knowledge, finances, produce, land, inputs). It is expected that for aggregation to take effect, aggregators who are in charge of bringing farmers together must possess financial capacity, market networks and product knowledge; while the aggregates - the farmers - must have the technical capacity to produce the specified quantity of quality produce.

Producer Groups and commodity clusters provide vital underpinning to SHFs. Producer groups and commodity clusters serve as an organizational mechanism for mobilizing farmers' collective self-help action aimed at improving their own economic and social situation and that of their communities.

NGOs and other service providers organize farmers as common interest groups or self-help groups to deliver information and training. For example, the National Agricultural Training Center organized farmers into production groups for specific activities (e.g. beef fattening, poultry breeding and vegetable production).

Farmer aggregation has been found to result in the following benefits:

- Access to markets.
- Access to finance.
- Access to inputs.
- Logistics and warehousing.
- Higher bargaining power towards setting the price of SHFs' produce.

- Dissemination of information and access to technology.

Relevant examples from Feed the Future initiatives in other countries

- In Uzbekistan, USAID has put in place field schools established by AgLinks, a Feed the Future grantee, to facilitate technical group training.
- In Uganda, Feed the Future has made additional investment of market development facility resources that will go towards building capacity of farmer groups/women's groups to engage effectively with other market actors. The same facility has also put in place group-based lending – village savings and loan associations (VSLAs) or savings and credit cooperative organizations (SACCOs) – working with financial service providers to set targets for incrementally increasing the number of female and youth borrowers and their share of the total value of loans.
- Uganda's Feed the Future Commodity Production and Market Activity includes grouping SHFs who can then gain access to quality inputs at lower costs. With increased production and better post-harvest practices, farmers can then group their produce for export.

Proposed USAID interventions

USAID should lobby producer groups to integrate digital and physical platforms (thematic fairs, exhibitions inviting potential buyers processors) to link farmer groups and buyers. Use of contract farming as a catalyst to achieve functional digital groups will lead to improvement in farming practices, input quality, post-harvest practices and produce-bulking. Access to group financing can also be more easily facilitated. USAID should also promote the use of digital tools amongst producer groups that provide necessary services to SHFs in the Feed the Future impact zone. Adoption of digital tools is still low amongst Tajikistan's rural farming communities. Whilst some digital tools are available, there is limited interoperability between them and this is another deterrent to farmer uptake. Bundling of services is critical to ensuring optimal usage - USAID can coordinate cross-service discussions between digital providers with the aim of achieving a concerted provision of services to producer groups. To achieve this, several partnerships with providers need to be put in place: service providers offering financial services, inputs, market linkages, warehousing, transport and logistics services need to be consulted and strengthened to be in a position to aggregate their offerings.

Potential partners

- E-extension service provider to provide e-extension services to aggregated SHFs.
- Alif Bank, Eskhata Bank, Imon International, Humo and other financial institutions to provide financial service to aggregated SHFs.
- Large buyers / export market to buy produce from SHFs.
- Irrigation partner (solar powered) to provide affordable irrigation services.
- Verified input providers to provide access to quality agricultural inputs.
- World Food Program to offer farming contracts to SHFs.

Expected results

- Wellfunctioning farmer groups.
- Nationwide crowding-in by SHFs to join the program.
- Establishment of a vibrant agricultural ecosystem that puts farmers at the center.
- Improved income and productivity of SHFs.
- Increased food security and improved food nutrition within the country.

Recommendations for the MOA

Strengthen coordination of the donor community in achieving agricultural digitalization by defining its e-agriculture strategy. The strategy should provide a framework for identifying and developing sustainable, digital services solutions in agriculture.

Organize a structured, digital database of donor-implemented projects in the country with an agriculture sector focus. The digital database on the website of the MOA in the 'cooperation' section will require donors to register all ongoing projects, providing a brief description, project target area and regular updates on results and achievements. Projects in the regions should also have a contact section that allows local SHFs to learn more about how they can benefit. The Ministry can make this information publicly available. The database will allow for better sectoral and donor coordination and knowledge sharing and will offer potential private investors the opportunity to scale or replicate successful models based on results.

Build an integrated database and market intelligence tool. Together with other ministries including the Ministry of Economic Development and Trade; the Agency of Export; the Agency of Statistics; the Committee for Food security, and the Committee for Land and Geodesy, share data that would be pertinent in (i) a needs assessment of SHFs; (ii) an assessment of Tajikistan's agricultural export potential; and (iii) providing a link between Tajik farmers and export markets. The integrated database can also help with farmers' decision making - information regarding the establishment of existing and planned new logistical centers can provide critical information to farmers seeking to purchase or rent new plots and can help to provide targeted extension services (weather, input management, linking to markets, quality management). This would be an important tool for planning and forecasting based on real data.

6. Conclusion

In summary, findings support a bundling approach for digital services tailored to SHFs. Given the highly fractured and diverse nature of agricultural value chains, which each involve myriad actors (including input suppliers, buyers, mobile network operators, financial institutions, retail distribution, farmer groups and government) no single player can solve this challenge alone.

This ecosystem assessment shows that there is clear potential for increased productivity and income for SHFs across Tajikistan. There is an opportunity for digital platforms to bring together stakeholders to deliver value to farmers in a sustainable and cost-effective way.

The assessment focused on identifying pain points for SHFs and opportunities to address these challenges by the stakeholders. There is currently a mismatch between farmer needs and solutions (both digital and non-digital) that are available for use by SHFs. The initial focus in this assessment was to understand these needs and propose ways to meet them. Key unmet needs include bridging the gap between informal and formal savings; affordable access to credit and insurance; access to markets; and addressing the digital connectivity gap. There are clearly also social and attitudinal barriers for farmers, particularly women, which need to be addressed during product design to ensure uptake. Improved capacity building and other digital services for farmers, given weak extension support, low quality of inputs, poor farming practices and insufficient market linkages, can augment both the access to and impact of digital services.

We have identified opportunities to address these gaps which are not value-chain specific, because all Tajikistan farm households engage in more than one value chain.

USAID Tajikistan can learn from its pioneering Feed the Future programs and actively engage SHFs through the design and pilot phase and in a meaningful way throughout the entire product development.

Building trust and changing farmers' behavior are significant challenges, given the constraints and challenges that they have faced over time. Recent trends to incorporate farmer-centered design into product development has yielded promising results in developing more holistic solutions for farmers and Dekhan farms, while also leveraging learning and innovation from other sectors.

Critical drivers of the innovation needed to transform services for SHFs are technology companies focused on solving the challenging problems faced in agriculture, including access to markets, information, improved inputs, financial services and other key services including mechanization and irrigation. Tajikistan's start-up and technology ecosystem is still in its infancy. This ecosystem needs to be invigorated to encourage aspiring innovators to engage. The market lacks successful business models and commercial impact proof points to drive the scale needed to overcome Tajikistan's complex environment. In order to address this challenge, the recommendation is that USAID provides specific support for technology firms innovating in agriculture, including supporting technology incubators and accelerators with technical support, hosting hackathons where innovators solve a specific programming challenge, and rolling out a technology challenge fund.

Considering the overall ecosystem development, the range of stakeholders including donors, NGOs, investors, buyers, government institutions, financial institutions, technology companies and academic institutions will be vital to the development of digital services for SHFs. The following table lists the critical questions that market actors should be thinking about as they engage with SHFs.

Table 9: Considerations for ecosystem stakeholders

Donors & NGOs	1. Are there any specific value chains donors can invest in to accelerate digital transformation in agriculture? 2. How can donors invest effectively across different value chains and agricultural activities to avoid over-investment in the same activities and value chains? 3. How can donors invest better in start-ups to fill the gap that's missing in angel investment and seed capital? 4. Given limited internet penetration, what structures can donors use that allow SHFs to gain access to digitally-enabled tools?
Investors	5. What commercially viable models are ripe for investment? 6. How can start-ups be stimulated to quantify the trade-off between profitability and farmer productivity? 7. What investment structures can be put in place to drive scalability and commercial sustainability beyond seed investment?
Buyers	8. More than 90% of SHFs operate in unstructured value chains. How can buyers access these unstructured chains? 9. Can buyers invest in transport and logistics such as warehousing to stabilize availability of produce during seasons of low production? 10. How best can buyers facilitate bulking of farm produce and consequently enable farmers to sell at favourable prices?
Government institutions	11. How can the government encourage mobile carriers and internet providers to lower their cost of access to internet services? 12. How can the government encourage more use of formal financial services by reducing associated taxes and lending rates? 13. How can the government stimulate the digital financial sector by promoting agency banking services to improve access to formal financial services?
Financial institutions	14. Are there high-risk high-reward value chains that can easily access credit services? 15. How can farmer-centered design be implemented for the development of appropriate financial products for SHFs? 16. What trade-offs exist between commercial sustainability and increase in farmer profitability?
Technology companies	17. How can farmer-centered design be implemented the development of suitable digital products for SHFs? 18. What commercial proof-points can be shown to garner more investment in agriculture technology and crowd-in more investors?

We can draw on certain insights to predict where digital agri-solutions may be headed in the short to medium-term (3-5 years):

- Digital agriculture products will evolve and scale. Links to existing digital services will drive the first waves of scalable solutions to transform the way SHFs manage their farms and access markets.
- From the market perspective there is a need to develop all the recommendations mentioned above in parallel to create a holistic, sustainable working mechanism that will have a pull effect to improve the digital agriculture ecosystem. As for SHF priorities, the most important are access to finance and linkages to local and international markets to ensure there is a pool of international buyers who are ready to build long-term partnerships.
- Crowding-in of stakeholders in the agriculture sector through bundling of services will encourage more market actors to participate in the sector.

- The business environment is not welcoming in comparison to other post-Soviet countries. Despite this, local investors are finding ways to innovate and come up with solutions, albeit less so for the agriculture sector. Loans are still expensive for the private sector to invest in innovations in the agriculture sector, so the majority of investors prefer to invest in less risky sectors such as trade, construction and real estate. Stimulation of agriculture technology and the start-up ecosystem will be driven by the government and the donor community and will encourage more innovation within the sector.

Within this evolving environment, increasing Dekhan farm utility and improving the scale of digital solutions should remain the goal. The recommendation is that USAID Tajikistan share its learnings with market actors in order to support the shift towards digital agriculture inclusion.

Annexes

Summary of Donor Activity

Donor Activity

Overview

- Using poverty estimates in Tajikistan, it has been estimated that a 1% increase of Official Development Assistance led to a 1.6% rise in GDP per capita and a 0.48% decrease in poverty levels in Tajikistan.[66]
- Donor countries provide aid to Tajikistan through embassies, agencies for cooperation and development, banks, and other government agencies in multilateral and bilateral channels. As of 2016, the largest donor country to Tajikistan was China, contributing 38.9% of all official development assistance.[67]
- One of the most active donor present in Tajikistan is the World Bank with 21 programs running in 2020/2021. 2 One such program is the Second Public Employment for Sustainable Agriculture and Water Management Project (PAMP II) supporting the Government of Tajikistan in improving water resource management at the local, basin, and national levels. The US$57.9 million for the project, financed by the International Development Association (IDA) and the Global Agriculture and Food Security Program, covered 17 of the most food insecure districts in Tajikistan. Approximately 1.4 million people living in these districts have benefited from improved irrigation services and better water management.[68]
- Examples of donors that have implemented digital programs include;
    1. The IFAD funded project LPDP II Livestock and Pasture development Project-II (LPDP-II) has introduced digital mapping of pasture land (2015-2021)
    2. The “Strengthening Institutions and Capacity of the Ministry of Agriculture and State Veterinary Inspection Service for Policy Formulation” project has piloted the roll out of weather stations which are sharing crop diseases models and early warnings to smallholder farmers with the objective of increasing average crop yields. The project is supported and funded by the Food and Agriculture Organization of the United Nations (2016-present).
    3. The European bank For Reconstruction and Development with their Green Economy Financing Facility (GEFF) established an online technology selector with an inventory of digital solutions to pro farmers and private sector players. The initiative is supported by an online podcast in local languages which details exactly how and why to utilise the tools.
    4. World Bank Agriculture Commercialization project launched a technology enabled yield forecasting system in three districts of the country to develop the capacity of national organizations to effectively analyze and use data obtained from 19 parameters (2014-2022)

[66] Patterns of Official Development Assistance in Tajikistan: effects on growth and poverty reduction, Mubinzhon Abduvaliev, Ri-cardo Bustillo, Revista Brasileira de Política Internacional 10 June 2020
[67] Patterns of Official Development Assistance in Tajikistan: effects on growth and poverty reduction, Mubinzhon Abduvaliev, Ri-cardo Bustillo, Revista Brasileira de Política Internacional 10 June 2020
[68] World Bank in Tajikistan, World Bank, 2021

Appendix

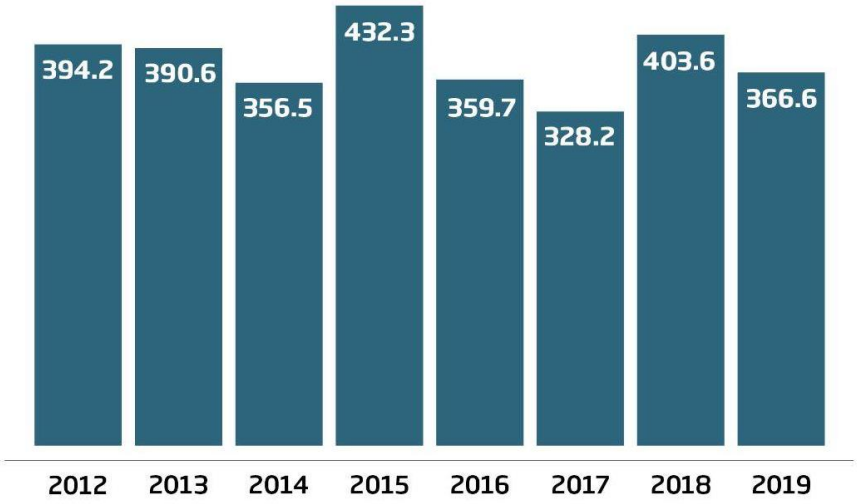


Figure 1: Tajikistan Foreign Aid measure: USD million; Source: World Bank

The chart depicts the summation of foreign aid and official development assistance to Tajikistan received between 2012 – 2019. Between 1992 and 2019, the average total value for foreign aid and official development assistance to Tajikistan was USD224.52 million with a minimum of USD11.84 million in 1992 and a maximum of USD432.25 million in 2015. The latest available value from 2019 is USD366.56 million.[69]

[69] Tajikistan: Foreign aid measure, The Global Economy 2020

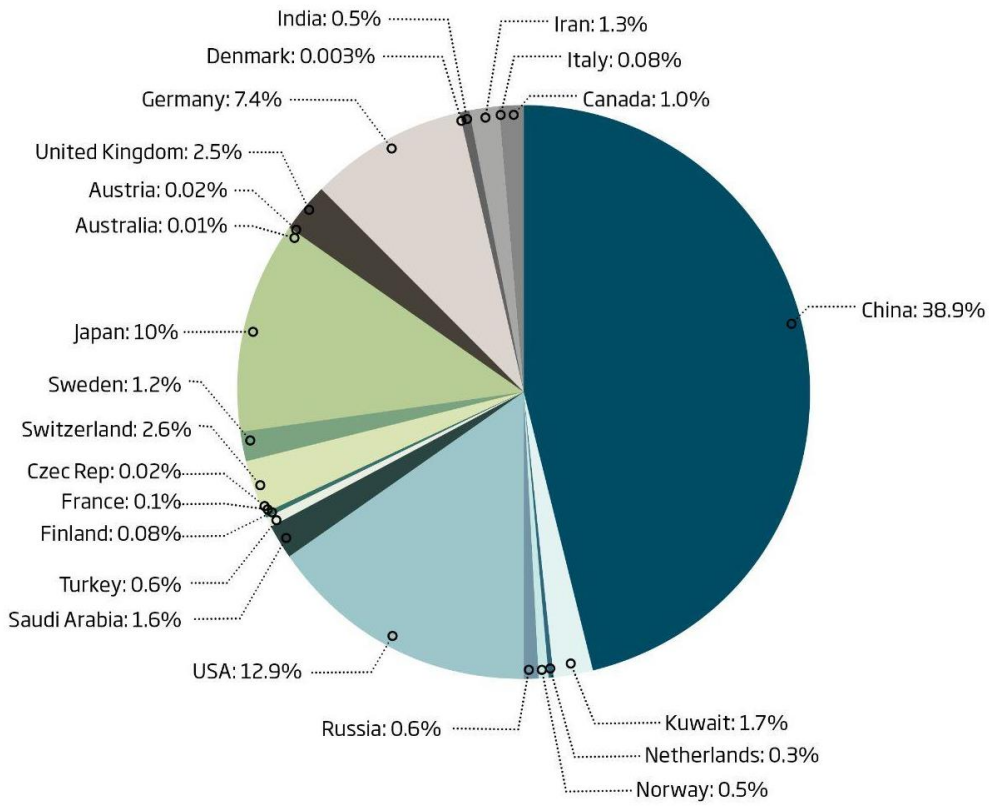


Figure 2: The volume of bilateral aid by donor countries to Tajikistan in 2016

Aid flowing from China sharply increased between 2007 and 2015. The total development assistance provided by China amounted to US$ 1.959.761 million in the last ten years.[70]

[70] Patterns of Official Development Assistance in Tajikistan: effects on growth and poverty reduction, Mubinzhon Abduvaliev, Ricardo Bustillo, Revista Brasileira de Política Internacional 10 June 2020

Stakeholder Mapping

1. Value Chain Mapping

Overview

Agricultural productivity in Tajikistan is very low, with farming being responsible for only 20% of the GDP despite employing 61% of the population. Around 90% of agricultural households are small subsistence farmers and nearly 70% of Tajik smallholder farmers are women.[71]

- Tajikistan agriculture is split between two distinct farming systems (i) the uplands - where potato, wheat farming, horticulture and livestock farming takes place and (ii) the lowlands – where cotton is farmed in irrigated areas. These two farming systems are differentiated by geography and topography.
- Only 28% of Tajikistan is arable land. Of this land 21% is cultivated and another 76% is left for pasture. The country relies heavily on irrigation and nearly 70% of arable land is irrigated.[72]
- Due to climatic conditions agriculture in Tajikistan is subsequently dependent on irrigation, which is in some regions highly energy intensive due to the high lift pumping schemes.[73]
- Total grain production in 2020 (harvest of the first and second seasons) is estimated at 1.3 million tons. Wheat production, the main product food supply in the country, is estimated approximately at the level of 845,500 tons. Barley harvest and oats are rated below average due to the reduction of crops. Production of potatoes, another main crop, is estimated at 916,000 tons.[74]
- Prices for agriculture inputs have increased, leading to decreased supply of some inputs such as seed potatoes. The EU and JICA responded with funding to bring seed potatoes to the country for distribution to smallholders.[75]
- Covid-19 negatively affected Tajikistan food exports by 79%.[76]
- Tajikistan is considered one of the most vulnerable countries to climate change in Central Asia. The agricultural sector is severely affected, resulting in water stress and high losses from disasters and low productivity. In this regard, advisories, alerts, and robust early warning systems are essential for farmers and rural dwellers to prepare for, and adapt to, changes in the climate.[77]

[71] Tajikistan's Path to Prosperity Depends on Creating an Accessible, Equitable Market for Land, Berkeley Hirsh, 16 March 2018
[72] The Economic Effects of Land Reforms in Tajikistan, Zvi Lerman and David Sedik, October 2008
[73] Family Farming Knowledge Platform: Tajikistan,Food and Agriculture Organization of the United Nations

[74] Special Report: 2020 FAO/WFP Crop and Food Security Assessment Mission (CFSAM) to the Republic of Tajikistan (18 March 2021), Relief Web,18 March 2021
[75] FAO, EU provide 60 tonnes of potato seeds to Tajik farmers, FAO regional Office for Europe and Central Asia, 8 May 2020
[76] Impact of COVID-19 on the food supply chain, Serpil Aday and Mehmet Seckin Aday, 24 August 2021
[77] Advanced weather data benefit Tajik smallholder farmers, Food and Agriculture Organization of the United Nations, 20 April 2021

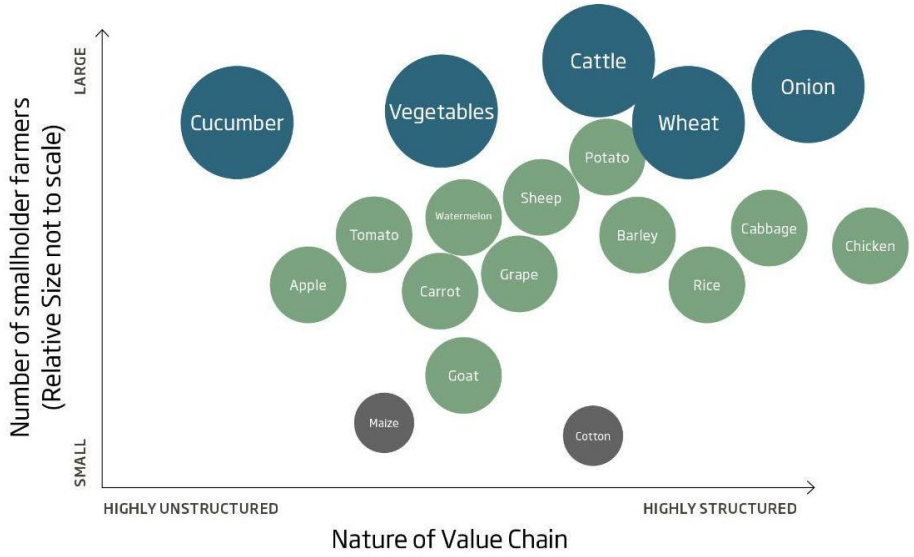


Figure 1: Value chain mapping [78] [79]

The primary food crops are wheat, barley, maize, potatoes, and rice. There are more than 800,000 hectares (2 million acres) of arable land in Tajikistan, which is equivalent to just 6 percent of the country's land mass.[80] Number of smallholder farms in the value chains are classified from Large (many smallholder farms) to Small (few smallholder farms).

[78] Agriculture in Tajikistan, Wikipedia, 2019

[79] Global Information and Early Warning System: Tajikistan, Food and Agriculture Organization of the United Nations, 24 May 2021

[80] Tajikistan Agriculture, Nations Encyclopaedia

2. Financial Services

Overview

As of December 31, 2020, 69 credit financial organizations are operating in Tajikistan including 18 banks, one Islamic bank, 18 microcredit deposit organizations, five microcredit organizations and 27 microcredit funds.[81]

- 12 banks provide agriculture loans and 15 Micro Credit organizations have agriculture products. Loans for agriculture have seasonal character, for mechanization and equipment and for inputs.[82]
- As of December 31, 2020, the number of ATMs and electronic terminals in the Republic amounted to 1,281 and 5,710 units respectively, and compared to the same date in 2019, the number of ATMs increased by 403 units, and the number of electronic terminals by 362 units.[83]
- The total number of e-wallets of credit financial institutions amounted to 1.7 million units, having increased by almost 1.4 million units (4.9 times) over the same period in 2019. 10.7 million transactions of non-cash payments in the amount of 543.1 million somoni were carried out through electronic wallets, and compared to 2019, the number of payments increased by 8.8 million units (5.7 times), and the volume of payments by 440.8 million somoni (5.3 times).[84]
- As of December 31, 2020, the number of insurance organizations in the insurance market of the Republic of Tajikistan totalled 18, of which two were state insurance organizations, 15 were non-state insurance organizations and one Mutual Insurance Support Center. 13
- Two major banks in Tajikistan, Agroinvestbank and Tojiksodirotbank both once considered too big to fail, have been liquidated at the orders of the authorities. Deposits of 23,700 Agroinvestbank accountholders and 3,500 Tojiksodirotbank customers will be paid back out of the state's Savings Insurance Fund.[85]
- The Coronavirus loan scheme was made available to smallholders. However, concerns were raised over the farmers' eligibility criteria as most farmers failed to meet these criteria.[86]

[81] Brief macroeconomic review and activities of banking system of the Republic of Tajikistan for 2020, National Bank of Tajikistan, 12 February 2021

[82] Agriculture in Tajikistan: Difficult with loans, can't do without them, Central Asian Bureau of Analytical Reporting

[83] National Bank of Republic of Tajikistan : Brief macroeconomic review and activities of banking system of the Republic of Tajikistan for 2020, Market Screener, 12 February 2021

[84] National Bank of Republic of Tajikistan : Brief macroeconomic review and activities of banking system of the Republic of Tajikistan for 2020, Market Screener, 12 February 2021

[85] Tajikistan: Long-struggling banks finally liquidated, Eurasianet Kamila Ibragimova May 24, 2021

[86] Coronavirus loan scheme: What farmers need to know, Andrew Meredit, Farmers Weekly, 22 April 2020

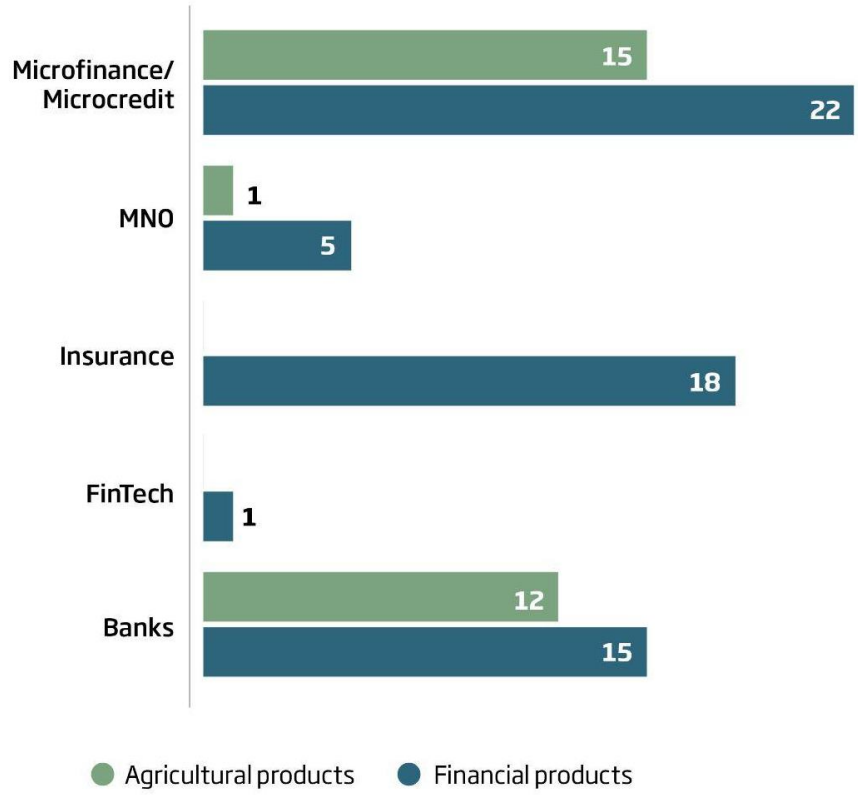


Figure 2: Provision of Agricultural Finance [87]

Figure 2 shows a breakdown of Agricultural lenders in Tajikistan with Microfinance leading with 15 agricultural financial products followed by banks which have 12 agricultural financial products.

[87] IFAD US$39 million investment to stimulate inclusive economic growth in Tajikistan, Jessica Thomas, 8 February 2018

3. Agriculture Technology (AgriTech)

Overview

Agriculture Technology (AgriTech), also referred to as digital agriculture, refers to tools that digitally collect, store, analyze, and share electronic data and/or information along the agricultural value chain. This is the application of technology in agriculture with the aim of improving yield, efficiency and profitability for farmers and agriculture-based organizations. Digital agriculture impacts the entire agri-food value chain — before, during, and after on-farm production.[88]

- Agricultural advisory services are critical to the successful dissemination and adoption of new agricultural technologies. “Technology” implies not only physical products but also new agronomic practices and techniques.[89]
- Suppliers of agricultural technology in Tajikistan, such as input suppliers and animal feed manufacturers, operate in a laissez faire regulatory environment in which the bureaucratic burden of formal registration and licensing is fairly low, but there is very limited formal enforcement of the regulatory regime.
- Tajikistan is a signatory of the Patent Cooperation Treaty, a member of the World Intellectual Property Organization and the International Union for the Protection of New Varieties of Plants (UPOV). UPOV's mission is to provide and promote an effective system of plant variety protection, with the aim of encouraging the development of new varieties of plants, for the benefit of society. UPOV provides technology assistance in the development of new plant varieties.[90]
- Women’s use of new technologies is lower compared to men as is their access to productive resources and information. Households headed by women are less likely to own their assets. Instead they share available equipment with each other or rent.[91]
- Two main players in the agriculture technology sector include Cooperative “Sarob” which primarily focuses on farmer advisory services and digital agriculture by the Neksigol group which has an array of 18 agricultural technology products designed for dif-ferent value chains.[92]
- Significant efforts have been made to digitize the export market. Whilst the establishment of the Tajikistan Agriculture Commercialization Project, a joint project supported by the World Bank and the International Finance Corporation (IFC) 22 was developed, little progress has been made to digitize processes and agricultural practices at the smallholder level.
- The key limitations of agricultural technology endeavours are that they are developed in a sporadic manner with limited scale, are not linked to institutional systems, and do not constitute viable methods to ‘scale up’ and ‘scale out’.[93]

[88] Tajikistan embraces digital agriculture, Asia-Plus10, December 2020

[89] Agricultural Technology Commercialization Assessment, USAID, June 2014

[90] Status in relation to the international union for the protection of new varieties of plants (upov), 3 November 2021

[91] Status of Digital Agriculture in 18 countries of Europe and Central Asia, International Telecommunication Union and Food and Agriculture Organization, 2020

[92] Agriculture Information Platform launched in Tajikistan, Asia-plus, 3 November 2020

[93] Digital Solutions to Improve Agricultural Value Chains, Asian Development Bank, December 2019

4. Farmer Aggregation

Overview

Producer Groups (PGs) and commodity clusters provide vital underpinning to the smallholder farmer (SHF). Producer groups and commodity clusters served as an organizational mechanism for mobilizing farmers' collective self-help action aimed at improving their own economic and social situation and that of their communities.[94]

- By end of 2017, 81 producer groups in total had been established under both GREAT and TRIGGER projects (Growth in the Rural Economy and Agriculture: Tajikistan (GREAT, 2013–16) and Towards Rural Inclusive Growth and Economic Resilience (TRIGGER, 2016–18) targeting 1,496 small holder farmers, including 29 percent women.[95]
- There is no existing legal framework to promote and govern farmers' collectives, like producer groups and commodity clusters, in the country. These two groupings serve as informal, self-organized farmers' groups under the umbrella of Community Based Organizations (CBOs). In the absence of a formal legal framework, these institutions will find it hard to perform as group-based business enterprises.[96]
- A range of associations and groups exist in the agricultural space, from formal groups of Dekhan farms such as the National Association of Dekhan Farms (NADF), to common interest or self-help groups. These serve as vehicles to deliver extension and training, and in some cases credit. Female participation in these different types of associations is generally low.[97]
- NGOs and other services providers also organize farmers as common interest groups or self-help groups to deliver information and training. For example, the National Agricultural Training Center (NATC) organized farmers into production groups for specific activities (e.g. beef fattening, poultry breeding, and vegetable production).[98]

[94] Producer groups and commodity clusters: building blocks for smallholder farmers' resilience and empowerment in khatlon region, Tajikistan, Oxfam

[95] Producer groups and commodity clusters: building blocks for smallholder farmers' resilience and empowerment in khatlon region, Tajikistan, Oxfam

[96] Producer groups and commodity clusters: building blocks for smallholder farmers' resilience and empowerment in khatlon region, Tajikistan, Oxfam

[97] Asian farmers Association for sustainable rural Development, National Association of Dekhan farms,2021

[98] Agricultural Technology Commercialization Assessment, USAID, June 2014

5. Digital Accessibility

Overview

Digital accessibility is the process of making digital products (websites, mobile apps and other digital tools and technologies) accessible to everyone. It is about providing all users access to the same information, regardless of the impairments they may have or economic background they come from.[99]

- Khatlon province faces power outages during much of the winter. Most businesses are afforded only eight hours of electricity per day. Without reliable access to electricity, some agro-industries (such as poultry and milk processing, or storage facilities for perishable horticultural and livestock products) cannot viably operate year-round in Khatlon. Access to electricity is more reliable in the capital district, Dushanbe, and currently larger wholesale fresh fruit, dairy and meat producers are mostly located there.[100]
- While mobile broadband coverage is high (90% 3G and 80% LTE), penetration is still low at 22.83%. One reason may be the high price of mobile and fixed services.[101]
- Telecommunication operators make up the mobile market. There is significant telephone network availability which is divided into urban and rural areas.[102]
- As at 2019, only 22% of the population uses internet services. This figure increased by 39% in 2020-2021. Internet penetration as at January 2021 stood at 34.9%. This is represented by only three out of 10 households having access to internet services.[103] [104] The level of digital skills is high where Tajikistan is ranked at 4.6 on a scale of 7 on the digital skills scale, according to the World Economic Forum.[105]

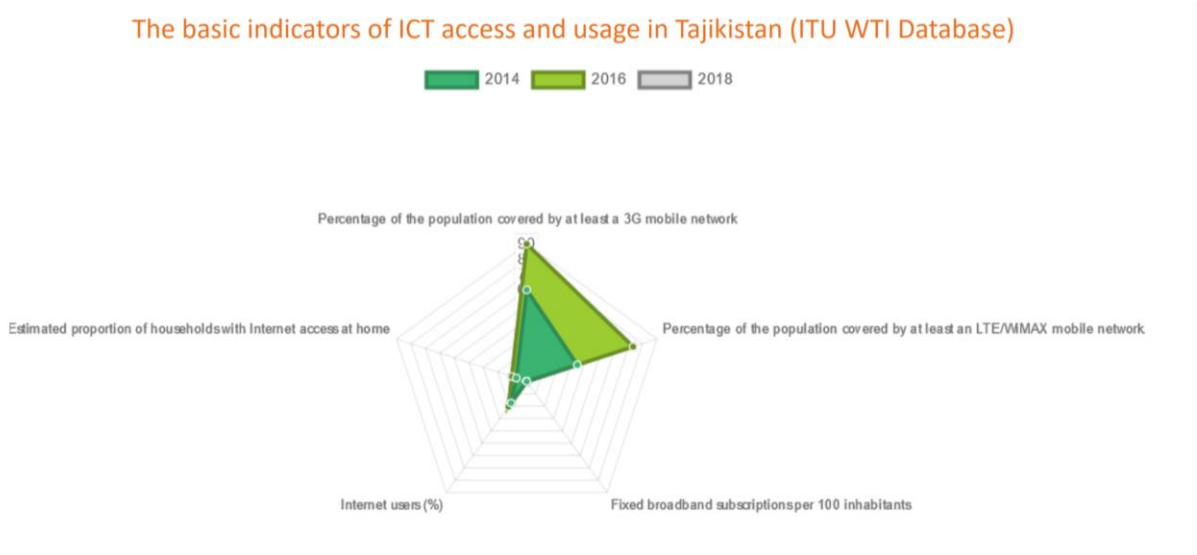


Figure 3: ICT Access and Usage in Tajikistan [106]

[99] Digital Accessibility 101, Engines, 03 April 2019
[100] Status of Digital Agriculture in 18 countries of Europe and Central Asia, International Telecommunication Union and Food and Agriculture Organization, 2020
[101] Status of Digital Agriculture in 18 countries of Europe and Central Asia, International Telecommunication Union and Food and Agriculture Organization, 2020
[102] Status of Digital Agriculture in 18 countries of Europe and Central Asia, International Telecommunication Union and Food and Agriculture Organization, 2020
[103] World Bank critical of Tajikistan's telecom sector, Telecomms, mobile and broadband statistics and analytics, 22 Jun 2020
[104] Digital 2021: Tajikistan, Simon Kemp, 12 February 2021
[105] Status of Digital Agriculture in 18 countries of Europe and Central Asia, International Telecommunication Union and Food and Agriculture Organization, 2020
[106] Status of Digital Agriculture in 18 countries of Europe and Central Asia, International Telecommunication Union and Food and Agriculture Or-ganization, 2020

As at 2018, Twenty percent of the population was using the Internet, a minimal change from nineteen percent recorded in 2016 (see Figure 3). In 2021, almost three out of every ten households have access to the internet.[107]

[107] Status of Digital Agriculture in 18 countries of Europe and Central Asia, International Telecommunication Union and Food and Agriculture Or-ganization, 2020

6. Government Agencies & Policies

Overview

Agriculture plays a crucial role in the economic growth of Tajikistan and in ensuring food security. Food security and access to quality nutrition is defined as one of four strategic priorities of the country within the National Development Strategy (NDS), and is highlighted in the new agricultural policy (Government of Tajikistan 2016).

- To support agricultural producers, the government revised its Tax Code and introduced a unified tax system for producers of agricultural products in 2005, which simplified farmers' taxation by either eliminating or unifying several taxes such as land tax, property tax, income tax on agricultural workers, road user tax, and agricultural value-added tax (IMF 2005). The Tax Code was further revised in 2013 to eliminate barriers for agricultural producers (Government of Tajikistan 2012).[108]
- Currently, the main documents aimed at accelerating the development of a national e-agriculture strategy are the National Development Strategy of the Republic of Tajikistan for the period to 2030 (approved in 2016, the strategy has agriculture, fishery and forestry related components) and the Concept of Digital Economy in the Republic of Tajikistan (adopted in December 2019).[109]
- Introduction of a traceability system will improve the quality standards of agricultural products, which will increase the attractiveness and competitiveness of products in foreign markets.[110]
- The National Development Strategy (NDS) for 2016–2030 is the main strategic document outlining Tajikistan's wider, long-term development priorities (Government of Tajikistan 2016). The policy document postulates to stimulate Agriculture GDP and agricultural innovation by 19.5% and 18% respectively by 2030.[111]

[108] Climate change effects on Agriculture and Food Security in Tajikistan, Parviz Khakimov et al, 2020
[109] The future of food and agriculture: Trends and challenges, Food and Agriculture Organization of the United Nations, 2017
[110] The future of food and agriculture: Trends and challenges, Food and Agriculture Organization of the United Nations, 2017
[111] Climate change effects on Agriculture and Food Security in Tajikistan, Parviz Khakimov et al, 2020

7. Innovation Support Service

Overview

Agricultural innovation can be derived through collaboration with several support services in the agriculture sector. These support actors include, education and research institutions, extension service providers, agro-dealers, input manufacturers and processors, warehousing and accelerators, incubators and co-working spaces.

- High technology parks or technology co-working spaces enable interaction of groups of academic and research institutions and groups of industries and financial institutions to work together to evolve new technologies evolving from inventions.[112]
- The Ministry of Industry and New Technologies of Tajikistan (MoINT) plans to set up the Digitalization Council for the launch of the first High-Tech Park in the country. The creation of the High-Tech Park would be a part of the ministry's work aimed at introducing new technologies, including those providing access of rural population to a high-speed Internet.[113]
- JICA supports the StartupStan Ecosystem Summit which brings together over 100 start-ups as well as investors, government, NGOs and other stakeholders.[114]
- The Food and Agriculture Organization of the United Nations (FAO) and European Union are strong supporters of the country to ensure timely weather information for farmers. In 2019, FAO, with support of the European Union, installed three automated weather stations, each in a different region (Tursunzoda, Konibodom, and J. Balkhi) characterized by intensive production of grapes, apricots, and cotton. The weather stations support the Agrometeorology Department in gathering important climate data from each region and producing advanced agrometeorological information for the local producers on weather changes, plant diseases, and yield forecasts, all of which help them mitigate the impact of climate change.[115]

[112] Tajikistan intends to create a High-Tech Park, Asia-plus, 12 March 2021

[113] JICA Supported Startupstan Ecosystem Summit in Dushanbe, Japan International Cooperation Agency, 15 November 2018

[114] Agricultural Technology Commercialization Assessment, USAID, June 2014

[115] Advanced weather data benefit Tajik smallholder farmers, Food and Agriculture Organization of the United Nations, 20 April 2021

8. Investment Landscape

Overview

Pressing issues in Tajikistan include the need to rebuild infrastructure, improve the environment for doing business and attract foreign investment.[116]

- Foreign direct investment to Tajikistan decreased by 47%. In 2020, the country's economy received foreign investments totalling $ 428 million.[117]
- High taxes, a challenging investment climate, and failure to provide equal conditions for all market participants are factors that restrain the inflow of foreign investors to Tajikistan.
- In 2020, the ease of doing business index score for Tajikistan was 61.27. This index score increased from 51.84 in 2016 to 61.27 score in 2020 growing at an average annual rate of 4.33%.[118]
- Tajikistan currently does not have a Mentorship or Business Angel Network.[119]
- Imon International, Tajikistan's most prominent microlender, was built over two decades to help women entrepreneurs. Its local founders were pressured by the country's National Bank to sell to a foreign investor against their will.[120]

[116] Status of Digital Agriculture in 18 countries of Europe and Central Asia, International Telecommunication Union and Food and Agriculture Or-ganization, 2020

[117] Foreign capital inflow to Tajikistan in 2020 decreases by 47%, Tajikistan Newsline, 3 September 2021

[118] Tajikistan: Ease of doing business Index, Trading Economics, 2021

[119] Tajikistan: Launching a startup promotion project, PEM Consult, 29 November 2019

[120] EBRD joins foreign investor in hostile takeover of Tajikistan's leading microfinance institution pushing out founders Ilya Lozovsky, 25 June 2021

9. Appendix List

Appendix 1: Value Chain Mapping List 2019

Value Chain	Agricultural Production (Thousand Tons)	Number of smallholders in Value Chain (small, medium or large number)	Nature of Value Chain (Highly unstructured, relatively structured, structured, highly structured)
Potato	964	Medium	Relatively structured
Wheat	778	Large	Structured
Onion	680	Large	Highly structured
Watermelon	641	Medium	Relatively structured
Tomato	443	Medium	Relatively structured
Carrot	356	Medium	Relatively structured
Vegetable	308	Large	Structured
Cotton	300	Small	Structured
Grape	241	Medium	Structured
Apple	238	Medium	Relatively structured
Maize	237	Small	Relatively structured
Cucumber	211	Large	Relatively structured
Cabbage	116	Medium	Structured
Barley	108	Medium	Relatively structured
Rice	90	Medium	Relatively structured
Chicken	30.6	Medium	Highly structured
Cattle	15	Large	Relatively structured
Sheep	5	Medium	Relatively structured
Goats	1.5	Small	Relatively structured

Table 1: Value chain mapping[121]

The primary food crops are wheat, barley, maize, potatoes, and rice. There are more than 800,000 hectares (2 million acres) of arable land in Tajikistan, which is equivalent to just 6 percent of the country's land mass.[122] Number of smallholder farms in the value chains are classified from Large (many smallholder farms) to Small (few smallholder farms).

[121] Agriculture in Tajikistan, Wikipedia, 2019

[122] Global Information and Early Warning System: Tajikistan, Food and Agriculture Organization of the United Nations, 24 May 2021

Appendix 2: Financial Services Stakeholder List

Organization Name	Category	Has Agriculture Products? (Y/N)	Website
OJSC “Orienbank”	Banks	Y	www.orienbank.com
SSB of RT “Amonatbank”	Banks	Y	www.amonatbonk.tj
OJSC “Eskhata bank”	Banks	Y	www.eskhata.com
OJSC "Tawhidbank"	Banks	Y	www.tawhidbank.tj
CJSC "The First MicroFinanceBank"	Banks	Y	www.fmfb.com.tj
CJSC “Bonki rushdi Tojikiston"	Banks	N	www.brt.t
“Tijorat” Bank Brunch IRI in Dushanbe	Banks	N	www.tejaratbank.tj
CJSC “Halyk Bank Tajikistan"	Banks	N	www.halykbank.tj
CJSC “ Kafolatbank”	Banks	Y	-
CJSC Bank “Arvand”	Banks	Y	www.arvand.tj
CJSC "Spitamen Bank"	Banks	Y	www.spitamenbank.com; www.spitamen.com
CJSC "International Bank of Tajikistan"	Banks	Y	www.ibt.tj
OJSC "Commerce Bank of Tajikistan"	Banks	Y	www.cbt.tj
OJSC “Alif Bank”	Banks	N	www.alif.tj
SUEIEBT "Sanoatsodirotbonk"	Banks	Y	-
CJS MDO “Imon International”	Micro Credit Deposit Organizations	Y	info@imon.tj
LLC MDO “Humo”	Micro Credit Deposit Organizations	Y	www.humo.tj
LLC MDO “FINKA”	Micro Credit Deposit Organizations	Y	www.finca.tj
LLC MDO “MATIN”	Micro Credit Deposit Organizations	Y	www.matin.tj
LLC MDO “Fazo S”	Micro Credit Deposit Organizations	Y	www.fazo-s.tj

LLC MDO “Dushanbe City”	Micro Credit Deposit Organizations	N	-
CJSC MDO “Hamrov”	Micro Credit Deposit Organizations	Y	-
LLC MDO “Zudamal”	Micro Credit Deposit Organizations	Y	-
LLC MDO “Argun”	Micro Credit Deposit Organizations	Y	www.argun.tj
LLC MDO “Tezinfoz”	Micro Credit Deposit Organizations	Y	-
LLC MDO “Azizi Moliya”	Micro Credit Deposit Organizations	Y	-
LLC MDO “Tamvil”	Micro Credit Deposit Organizations	N	www.tamvil.tj
LLC MDO “Somon-Tijorat”	Micro Credit Deposit Organizations	N	-
LLC MDO “Sarvat M”	Micro Credit Deposit Organizations	N	www.sarvat-m.com
LLC MDO “Rushdi Oriyon”	Micro Credit Deposit Organizations	N	-
CJS MDO “Ardo-capital”	Micro Credit Deposit Organizations	N	www.ardocapital.tj
LLC MDO “Vasl”	Micro Credit Deposit Organizations	N	www.mdovasl.tj
LLC MDO “Payvand Guruh”	Micro Credit Deposit Organizations	Y	-
LLC MCO “OXSUS”	Micro-Loan Organiza-tions	Y	www.oxus.tj
LLC MCO “Furuz”	Micro Credit Deposit Organizations	Y	-
LLC MCO “Mehnatobod”	Micro Credit Deposit Organizations	Y	www.furuz.tj
LLC MCO “Rushdi Kukhiston”	Micro Credit Deposit Organizations	Y	-

Appendix 3: Farmer Aggregation Stakeholder List

Organization Name	Category	Website
Association of producers of Agriculture products of Tajikistan	Association	https://apat.tj/ru/
Tajik Veterinary Association	Association	-
Association of Dehkan Farms and Production Cooperative	Association	soqdianafruits@mail.ru

Appendix 4: Accessibility Stakeholder List

Organization Name	Category	% ACCESSIBILITY IMPACT of mobile communication services in the GSM
TCELL	MNO	39.83
Babilon M	MNO	21.64
Megafon Tajikistan	MNO	24.12
LLC TACOM Zet mobile	MNO	14.42
O Mobile	MNO	0.01

Organization Name	Category	% ACCESSIBILITY IMPACT of mobile Internet services
TCELL	MNO	37.9
Babilon M	MNO	23.2
Megafon Tajikistan	MNO	26.61
LLC TACOM Zet mobile	MNO	12.29
O Mobile	MNO	0

Appendix 5: Government Agencies and Policies

Government Policies	Agricultural Relevance
Decree of the Government of the Republic of Tajikistan "On the establishment of the Expert Coordination Council for managing the implementation of the Innovative Development Program of the Republic of Tajikistan for 2011-2020"	YES
Decree of the Government of the Republic of Tajikistan "On approval of the Innovative Development Program of the Republic of Tajikistan for 2011-2020"	YES
Decree of the Government of the Republic of Tajikistan "On the determination of the authorized state body in the field of innovation"	YES
Resolution of the Government of the Republic of Tajikistan "On the Procedure for State Registration, Organization and Conduct of Expertise and Competitions of Innovative Projects"	YES
Resolution of the Government of the Republic of Tajikistan "On the Concept of innovative development of the agro-industrial complex of the Republic of Tajikistan"	YES
Decree of the Government of the Republic of Tajikistan "On the Procedure for Collecting and Posting Information in the Sphere of Innovation and Intellectual Property Objects on the Joint Internet Portal of the Program for Innovative Development of the Republic of Tajikistan for 2011-2020 and the Program for the Development of Human Potential and Intellectual Property for the Period until 2020"	YES
Decree of the Government of the Republic of Tajikistan "On the Strategy of innovative development of the Republic of Tajikistan for the period until 2020"	YES
Decree of the Government of the Republic of Tajikistan "On the allocation of small grants to attract students to the development of innovative projects, discoveries and inventions in the Republic of Tajikistan"	YES
Decree of the Government of the Republic of Tajikistan "On the Program for the Development of Human Potential and Intellectual Property for the Period up to 2020"	YES
Decree of the Government of the Republic of Tajikistan "On the establishment of the State Scientific Institution" Center for Innovative Development of Science and New Technologies "under the Academy of Sciences of the Republic of Tajikistan"	YES
Decree of the Government of the Republic of Tajikistan "On approval of the Regulation of the Expert Coordination Council for managing the implementation of the Innovative Development Program of the Republic of Tajikistan for 2011-2020"	YES

Appendix 6: Support Services Stakeholder List

Organization	Category	Has Agriculture Focus? (Y/N)	Website
Tajik Agrarian University	Academic Institutions	Y	https://www.tajagroun.tj/
The State Institution "Business Incubator of Tajikistan"	Academic Institutions	Y	https://bizincubator.tj/heads
National Innovation portal	Academic Institutions	N	http://innovation.tj/tj/news/khabarho-oid-ba-inovatsiya-dar-dohili-kishvar/812-gu-biznes-inkubator-tadzhikistan
Academy of Agricultural Sciences of the Republic of Tajikistan	Academic Institutions	Y	https://www.taas.tj/en/

Appendix 7: Investment Landscape

Name	Category	Number of Investments	Investee
Jefferson Capital	Venture Capital Fund	1	Alif Bank

List of Key Informants

#	Key Informants
1	Asian Development Bank
2	Aga Khan Development Network (AKDN) – Tajikistan
3	Alifbank
4	Association of Khatlon Entrepreneurs
5	Association of Producers of Agriculture Products of Tajikistan
6	Chamber of Commerce
7	Committee for Food Security
8	Committee for Environmental Protection
9	Committee for Women and Family Affairs
10	European Bank for Reconstrucion and Development – EBRD
11	Eskhata Agriculture
12	Eskhata Bank
13	Export Agency
14	Farmer Focus Group - Jaihun - Lemon Value Chain
15	Farmer Focus Group - Sughd J. Rasulov
16	Feed the Future Agriculture and Land Governance (ALG)
17	GIZ
18	Helvetas
19	IMON International
20	Ministry of Agriculture
21	Ministry of Finance
22	Neksigol
23	Neksigol Navovar
24	Community-based Agriculture Support Project - Project Management Unit (CASP PMU)

25 Sarob

26 State Committee on Land Management and Geodesy

27 Tajik Academy of Science

28 Tajik Agrarian University (TAU)

29 Tcell

30 USAID Tajikistan

31 World Food Programme (WFP)

32 World Bank