



COVID-19: Accelerating the Use of Digital Agriculture





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Executive summary

1

Introduction

2

The impact of COVID-19 on the
agriculture sector in LMICs

3

The use of digital agriculture tools
during the pandemic

Digital advisory

Agri DFS

Agri E-Commerce

4

Key findings and recommendations

5

Appendix

Executive summary

INTRODUCTION AND METHODOLOGY

From the onset of the COVID-19 pandemic, digital agriculture tools have enabled smallholder farmers to continue receiving advisory, acquire much-needed financing, receive inputs for their farms and identify new markets for their products.

The GSMA AgriTech programme conducted primary research and a thorough review of existing data and literature to understand which digital agriculture use cases have seen increased uptake during the pandemic.

This report provides supply-side actors, such as agritech companies and mobile network operators (MNOs), with insights into the adoption of digital agriculture and how it can be accelerated in light of the challenges posed by the COVID-19 pandemic.

THE IMPACT OF COVID-19 ON THE AGRICULTURE SECTOR IN LMICS

Measures to combat the spread of COVID-19 are having a detrimental impact on farmers' lives in most low- and middle-income countries (LMICs).

Declining incomes and disruptions to the food supply are exacerbating extreme poverty and are challenging food security, forcing farmers to make tough choices.

The challenges female smallholders face, from access to technology to informal participation in value chains, have been exacerbated by the COVID-19 pandemic, risking a widening of the gender gap in LMICs.

In agricultural value chains, agribusinesses and cooperatives have seen their businesses disrupted by measures to combat the spread of COVID-19. Agritech companies are also facing tough operational challenges and a more complicated environment to raise financing.

THE USE OF DIGITAL AGRICULTURE TOOLS DURING THE PANDEMIC

Digital agriculture tools are transforming how food systems operate to become more agile and resilient to unforeseen events.

Digital advisory, agricultural digital financial services (Agri DFS) and agri e-commerce solutions have emerged as the three most sought-after digital tools by farmers during the pandemic.

Value chain actors that had already digitised their processes and operations and invested in critical infrastructure have found it easier to pivot and support smallholder farmers during the pandemic.

Executive summary

DIGITAL ADVISORY

Lockdowns and limits on in-person gatherings shifted advisory from in-person to online. Agritech companies, MNOs and agribusinesses added COVID-19 advisory to their existing tools to help farmers navigate challenging times.

KEY TRENDS

TREND #1

Rather than introducing new tools and applications, most agribusinesses and agritech companies added COVID-19 advisory to their existing digital tools.

TREND #2

Agritech companies that put users at the centre of their tool's (re)design during the pandemic tended to perform better.

AGRI DFS

Governments have played a key role in accelerating the adoption of digital financial services, including Agri DFS, for example by digitising agricultural subsidy schemes for inputs.

MNOs and governments are also helping to boost mobile money usage by waiving fees and raising transaction limits. Donors and agribusinesses are leveraging digital tools to distribute cash payments, input vouchers and extend loans.

KEY TRENDS

TREND #1

The pandemic has accelerated the adoption of mobile money among smallholder farmers.

TREND #2

Agritech companies are using data collected from smallholder farmers through digital agriculture solutions to introduce new credit products.

AGRI E-COMMERCE

E-commerce experienced a spike in demand in response to the COVID-19 pandemic. Much of the growth in agri e-commerce was powered by a dramatic rise in consumer demand, offsetting losses from the hospitality sector.

Agri e-commerce platforms focused on inputs saw growing demand as farmers struggled to access them.

KEY TRENDS

TREND #1

To stay afloat, many agri e-commerce companies added a B2C sales channel to their business to mitigate the collapse in demand from the hospitality segment.

TREND #2

Dozens, if not hundreds, of digital agriculture tools added market linkages in response to smallholder requests during 2020.

Executive summary

KEY FINDINGS

- COVID-19 has highlighted the need for resilient and efficient agricultural value chains.
- The pandemic has shown that digital agriculture tools have the ability to help smallholder farmers and agribusinesses overcome a variety of pain points, making them more resilient to future shocks.
- **The pandemic has helped accelerate the adoption of digital agriculture, but several obstacles need to be overcome to sustain adoption levels in the long term:**
 - Challenges related to **availability and access to technology** have been exacerbated by the pandemic.
 - There is a risk that the **digital divide between female and male farmers** will widen, if steps are not taken to address the problem.
 - **The risk of misinformation**, particularly in P2P communications that use social media platforms, has increased.
 - Mobile money has experienced increased adoption and transaction volumes, but the elimination of fees and lower transaction values means mobile money providers risk **a decline in mobile money profitability**.

RECOMMENDATIONS FOR AGRITECH COMPANIES

- **Engage with governments and donors leading digital agriculture projects worldwide.**
- **Seek partnerships with organisations that have complementary assets.**
- **Prioritise digital agriculture advisory tools** over third-party platforms like WhatsApp and Facebook Groups.

RECOMMENDATIONS FOR INVESTORS, DONORS AND MULTILATERAL ORGANISATIONS

- **Focus on opportunities with a strong value proposition** that offer end-to-end solutions and clear revenue models.
- **Support the development of the ecosystems** underlying the successful development of various tools.
- **Support initiatives that have specific strategies to address the challenges facing those most negatively impacted by the pandemic, notably women.**

1 Introduction

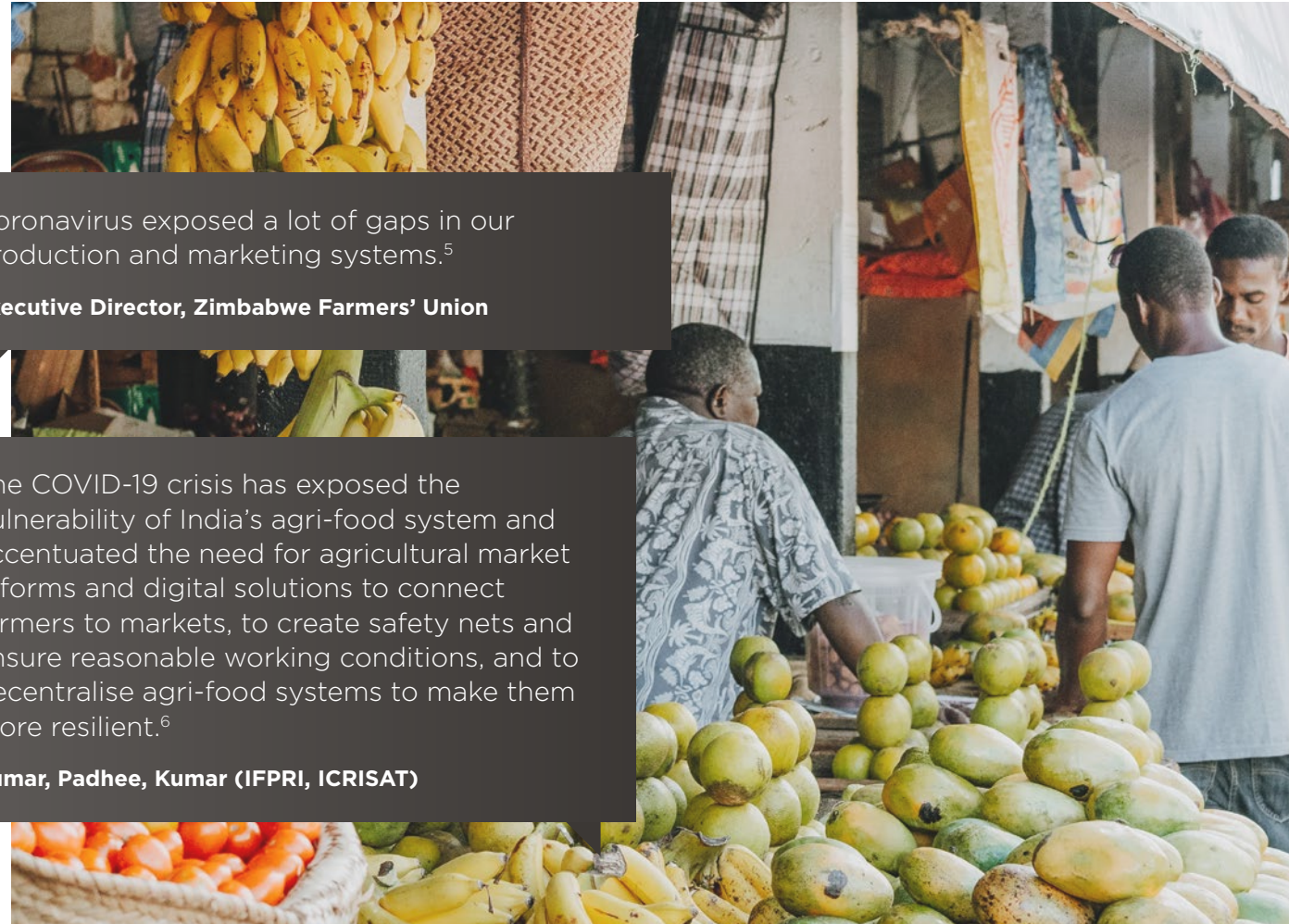


COVID-19 has exposed the vulnerabilities of agricultural and food systems, particularly in low- and middle-income countries (LMICs)

With a few notable exceptions (e.g. meat and seafood), global food production demonstrated resilience in 2020 despite the COVID-19 pandemic.¹ In Africa, strong harvests in 2019 coupled with fortuitous timing (inputs had been distributed and crops planted by the time COVID-19 hit the region) meant that production for the region's leading crops remained robust in 2020.²

Governments, for the most part, moved quickly to establish agriculture as an essential sector and endeavoured to keep agriculture products flowing both domestically and internationally. Nevertheless, measures imposed at the local level to combat the virus – lockdowns, restrictions on the movement of goods and people, social distancing, curfews and restrictions on large gatherings – exposed the tenuous nature of domestic food supply chains and how easily recent gains in income, nutrition and food security could be reversed.

As the pandemic rages on, the impacts on smallholder farmers in LMICs are intensifying. Up to 70 to 80 per cent of smallholders have reported in various surveys that they are worse off now than they were a year ago (see Figure 1, page 8). Although food prices are on the rise – the FAO Food Price Index reports seven straight months of price increases³ – paradoxically, the price smallholder farmers are able to secure is declining, which will likely have an impact on future production levels.⁴ Lower incomes, declining remittances, higher input costs and shifting demand are all putting pressure on smallholders that may, in turn, have long-term impacts on the agriculture sector.



Coronavirus exposed a lot of gaps in our production and marketing systems.⁵

Executive Director, Zimbabwe Farmers' Union

The COVID-19 crisis has exposed the vulnerability of India's agri-food system and accentuated the need for agricultural market reforms and digital solutions to connect farmers to markets, to create safety nets and ensure reasonable working conditions, and to decentralise agri-food systems to make them more resilient.⁶

Kumar, Padhee, Kumar (IFPRI, ICRISAT)

This report explores the use of digital agriculture solutions during the pandemic with a specific focus on use cases in LMICs

The analysis presented in this report builds on the extensive literature that has been published on the impact of the COVID-19 pandemic on the agriculture sector and rural communities in LMICs.

The recommendations provided in many of these reports focus on policy prescriptions for governments to minimise the negative impact of the pandemic on rural economies, the steps that donors and investors can take to minimise disruptions and the steps that must be taken to prevent a further widening of the gender gap.

This report looks at the impact of COVID-19 on the use of digital agriculture solutions, including:

- 1 What has driven the use of digital agriculture solutions by smallholder farmers and value chain actors during the pandemic, including agribusinesses and cooperatives.
- 2 The types of agriculture challenges that digital tools have been used to address, both new challenges and those exacerbated by measures to combat the spread of COVID-19.
- 3 The extent of the demand for specific digital agriculture solutions, such as digital advisory, agri DFS and agri e-commerce tools.
- 4 The opportunity to enhance digital agriculture solutions to respond to the needs of smallholder farmers and value chain actors that emerged during the pandemic.
- 5 The medium- and long-term impact of the pandemic on the adoption and use of digital agriculture solutions.
- 6 Specific recommendations for investors, donors and agritech companies to accelerate the adoption of digital agriculture solutions to mitigate the impact of future shocks on both global and local food supply chains.

Key audiences

The GSMA AgriTech programme prepared this report with an aim to provide supply-side actors, such as agritech companies and MNOs, as well as the investors and donors that support them, with insights into how the adoption of digital agriculture tools can be accelerated in light of the challenges posed by the COVID-19 pandemic. Other sector players, such as agribusinesses and farmer groups, can also benefit from the insights provided here.

Primary audience



Supply-side actors, such as **agritech companies** and **MNOs**, will gain insights into the new challenges facing demand-side actors, such as smallholders and agribusinesses, as well as those that have been exacerbated by the pandemic. The report offers examples of tools that have been deployed or adapted, as well as recommendations for future interventions.



Impact investors and donors will gain insights into the challenges faced by demand and supply-side actors during the COVID-19 pandemic. The report offers models for private and public sector collaboration and highlights examples of initiatives that have minimised the negative financial and socio-economic impact of the COVID-19 pandemic on rural populations.

Secondary audience



Demand-side actors, such as **agribusinesses, cooperatives** and **farmer groups**, will gain insights into how digital tools are being deployed or adapted in LMICs to address agriculture sector challenges that have been exacerbated by the pandemic.



Mobile money providers (MMPs) and **financial service providers (FSPs)** will gain insights into the challenges faced by agriculture sector actors during the pandemic and strategies they might employ to increase their participation in rural communities.



Institutional actors, such as **governments, multilateral agencies** and **NGOs**, will find useful information on using digital solutions to improve both the short-term and long-term objectives of their agriculture sector programmes.

About the research

Primary research



40+ semi-structured in-depth interviews

The GSMA AgriTech team conducted in-depth interviews with roughly 40 agriculture sector stakeholders, including agritech companies (e.g. OKO Finance, TaniHub, Twiga Foods), agribusinesses (e.g. Olam, ECOM, Cargill, AB InBev), farmer groups (e.g. Zimbabwe Farmers' Union), MNOs (e.g. Dialog, MTN), donors and investors (e.g. Mercy Corps, Acumen). The team targeted stakeholders driving the digital disruptions that have benefited smallholder farmers, especially those that have adopted adaptation strategies in response to COVID-19 measures. In-depth interviews were conducted between May 2020 and January 2021 with stakeholders operating in over a dozen countries, primarily in Africa, Asia and Latin America.

Secondary research



Reports, press articles, webinar presentations

The GSMA AgriTech team consulted over 100 reports, including internal GSMA reports and toolkits, as well as external reports, press releases, case studies, financial statements and other sources (see **Appendix**, page 65, for a selection of these resources). The team also considered opinions and information disseminated through virtual events sponsored by organisations such as ICTforAg, Mercy Corps, IDH, IFAD, USAID and CGIAR.



Databases, surveys, dashboards

The team accessed internal and external databases, including the GSMA AgriTech tracker of over 700 digital agriculture tools, and the dashboards of several multilateral organisations that track the impact of the COVID-19 pandemic around the world. The team reviewed the findings of roughly 15 surveys conducted with smallholder farmers, small businesses or agritech companies in various countries in Asia, Africa and Latin America. The **Appendix**, page 67, contains a full list of dashboards and surveys consulted.

Endnotes

- 1 FAO (2020), Q&A COVID-19 Pandemic: Impact on Food and Agriculture, available at: <http://www.fao.org/2019-ncov/q-and-a/impact-on-food-and-agriculture/en/>; and IMF (2020), Food Markets During COVID-19, available at: <https://www.imf.org/en/Publications/SPROLLS/covid19-special-notes>
 - 2 McKinsey & Company (2020), Safeguarding Africa's food systems through and beyond the crisis, available at:
 - 3 FAO (2020), FAO Food Price Index, available at: <http://www.fao.org/worldfoodsituation/foodpricesindex/en/>
 - 4 Environmental and Resource Economics (2020), Impacts of the COVID-19 Pandemic on the Global Agricultural Markets, available at: <https://link.springer.com/article/10.1007/s10640-020-00473-6>
 - 5 Zimbabwe Farmers Union (ZFU) (2020), The impact and lessons learnt from Covid19 with ZFU Executive Director, available at: <http://www.zfu.org.zw/media/news/impact-and-lessons-learnt-covid19-zfu-executive-director>
 - 6 IFPRI and ICRISAT (2020), How Indian Agriculture Should Change after COVID-19, available at: <https://link.springer.com/article/10.1007/s12571-020-01063-6>
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2 The impact of COVID-19 on the agriculture sector in LMICs

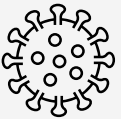


Measures to combat the spread of COVID-19 are having a detrimental impact on farmers' incomes in most LMICs

Governments worldwide have introduced a range of policies to stem the spread of COVID-19, from travel and movement restrictions to social distancing and public health measures, curfews and non-essential business closures. These measures have had a negative impact on farmers' incomes (see Figure 1). In Ghana, for example, 76 per cent of households with farm income saw their income decline in the last 12 months. In the Philippines, that ratio climbed to 80 per cent.⁷

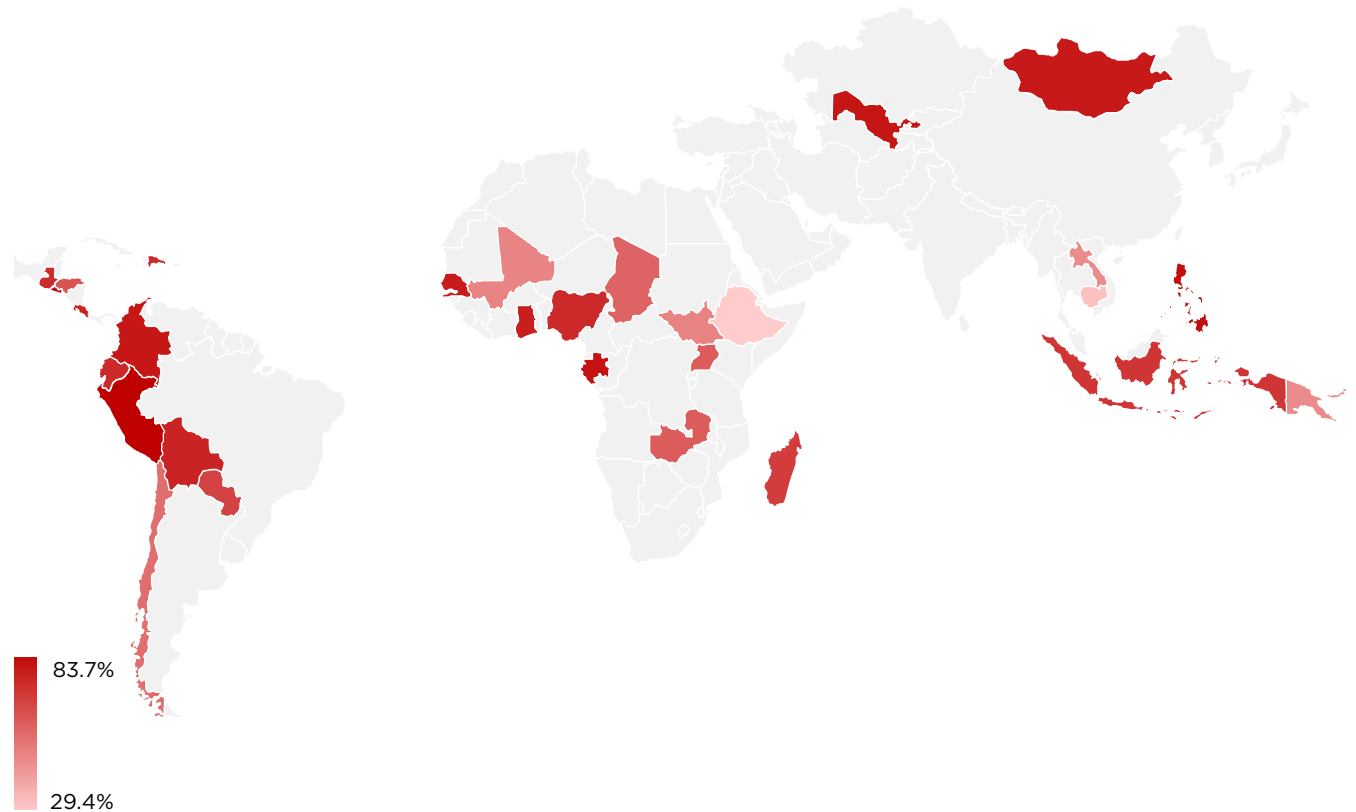


There are roughly 500 million smallholder farmer households worldwide, comprising around 50 per cent of the labour force in developing countries.⁸



The COVID-19 pandemic is having a detrimental impact on farmers' incomes. The World Bank reports that in many LMICs, up to 75 per cent or more of households with farm income are reporting a decline in that income in 2020. Compounding this is the drop in income from non-farm activities as a result of stay-at-home orders and travel restrictions, as well as a drop in remittances,⁹ which many smallholders depend on for day-to-day expenses.

Figure 1 **Percentage of households with farm income as a source of livelihood that have seen this income decline in the last 12 months, selected LMICs**



Source: World Bank (2020), COVID-19 High-Frequency Monitoring Dashboard.

Declining incomes and disruptions to the food supply are exacerbating extreme poverty and food security in LMICs

The World Bank expects extreme poverty levels to rise for the first time in 20 years, with the number of people living in extreme poverty set to increase by 150 million by 2021.¹⁰ The agriculture sector will be particularly hard hit; historically, 64 per cent of people living in extreme poverty work in the agriculture sector and primarily live in rural areas.¹¹

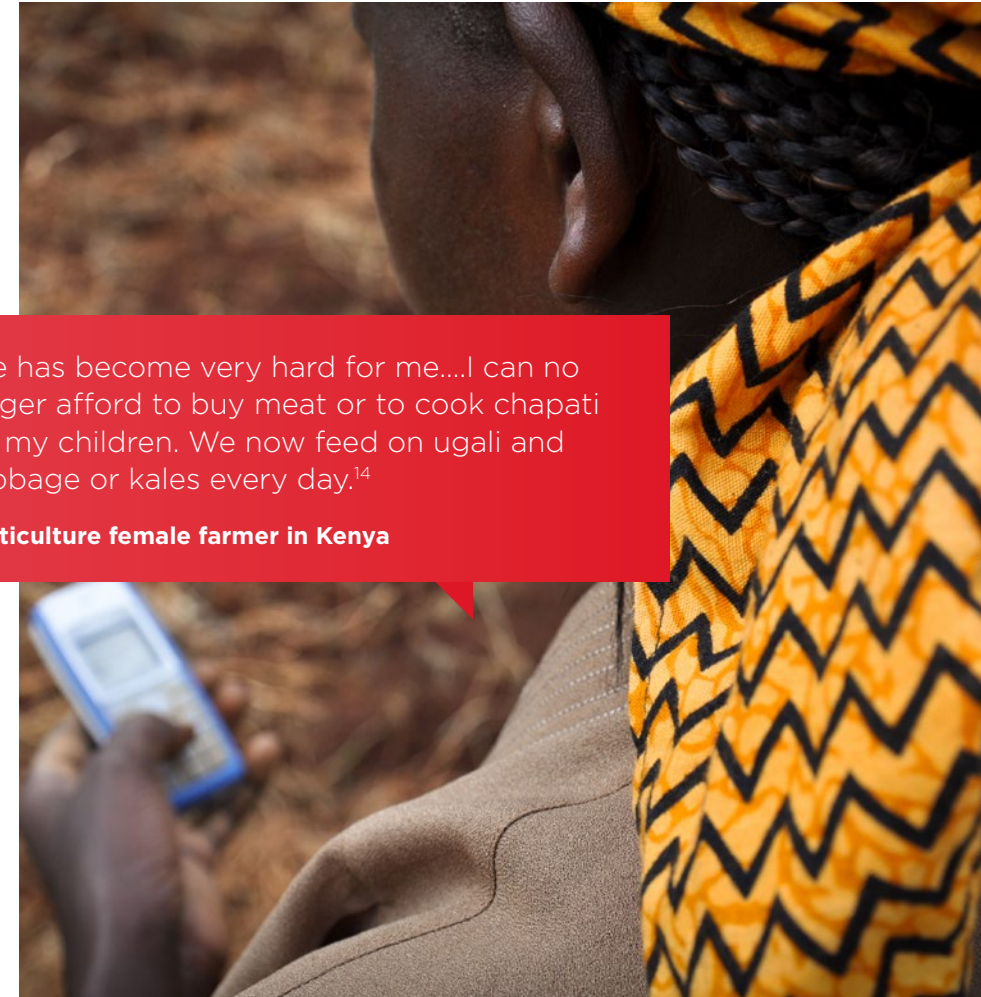
Declining incomes combined with disruptions to the food supply are also exacerbating on-the-ground conditions that impact food security, including armed conflict, natural disasters, pest infestations and climate change. Several of the surveys reviewed for this report found that some smallholder families in Africa, Latin America and Asia are starting to cut their calorie intake by reducing daily meals from three to two, or by shifting consumption (see Figure 2). The World Food Programme (WFP) estimates that the number of people who are acutely food insecure, or at risk of becoming so, increased by 137 million in 2020 – an 82 per cent increase over pre-COVID estimates.¹²

Figure 2 **Share of farmers interviewed using coping strategies in response to the pandemic, and leading food-based coping strategies, by country¹³**

| Country (share of farmers using coping strategies) | Relying on less preferred or cheaper food | Reducing the size or number of meals | Using savings | Borrowing food or cash |
|--|---|--------------------------------------|---------------|------------------------|
| Kenya (80%) | ● | | ● | |
| Uganda (80%) | ● | | ● | |
| Zimbabwe (70%) | ● | ● | | ● |

Life has become very hard for me....I can no longer afford to buy meat or to cook chapati for my children. We now feed on ugali and cabbage or kales every day.¹⁴

Horticulture female farmer in Kenya



During the COVID-19 pandemic, smallholder farmers have been negatively impacted at every stage of the agricultural cycle

Figure 3 Impact of COVID-19 on farmers at various stages of the agricultural cycle



Access to finance, inputs and markets are among key challenges faced by smallholder farmers

Impact measurement company 60_decibels has been tracking smallholder farmers in Kenya throughout the COVID-19 pandemic. In the early months of the pandemic, smallholder farmers were mainly concerned about the availability and high cost of inputs. By September 2020, however, these concerns were overtaken by worries about financing and access to cash.¹⁵

Figure 4 **Main challenges smallholder farmers anticipate facing as a result of COVID-19, Kenya (July to December 2020)**

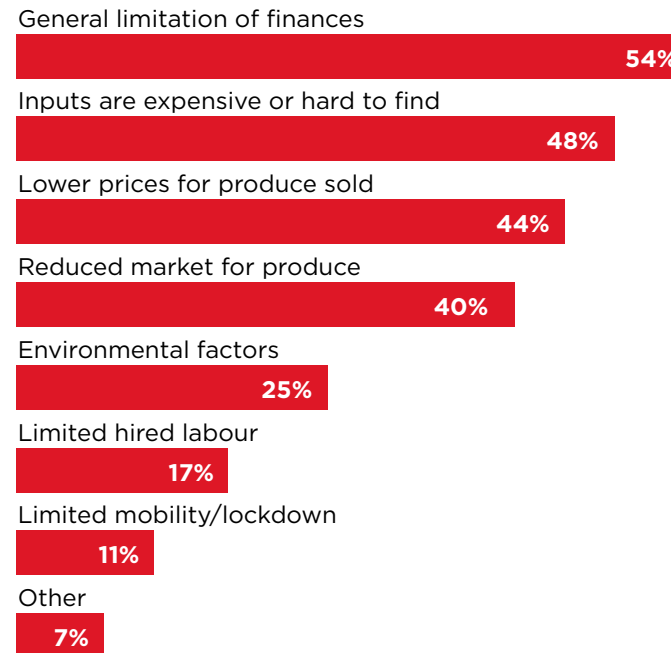
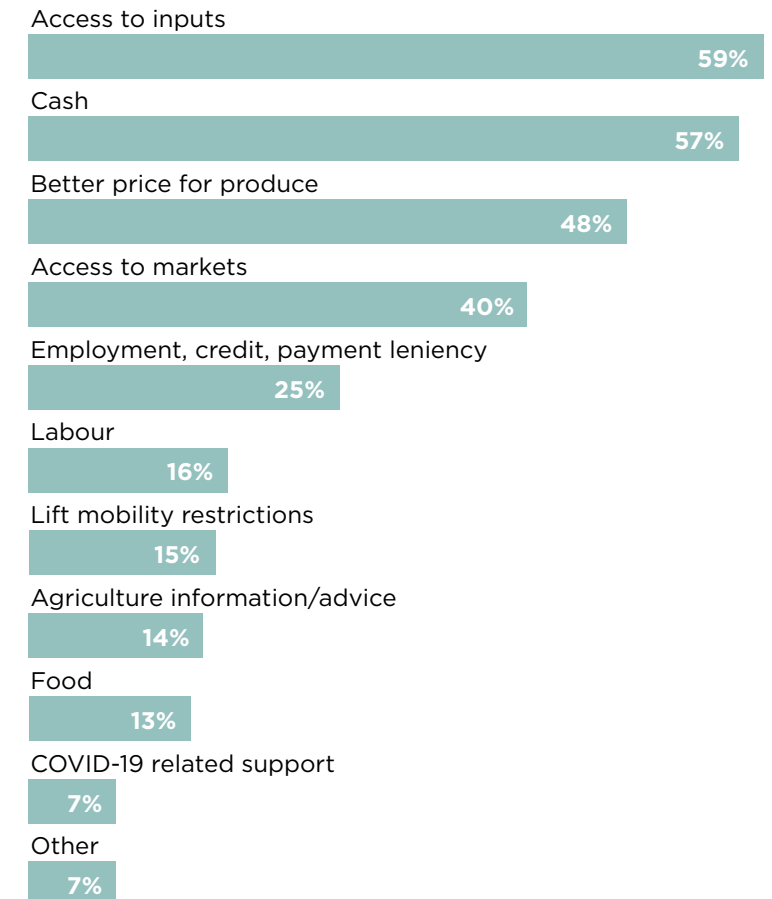


Figure 5 **Agricultural products, services and information that would be most useful to overcome COVID-19-related challenges, Kenya (July to December 2020)**

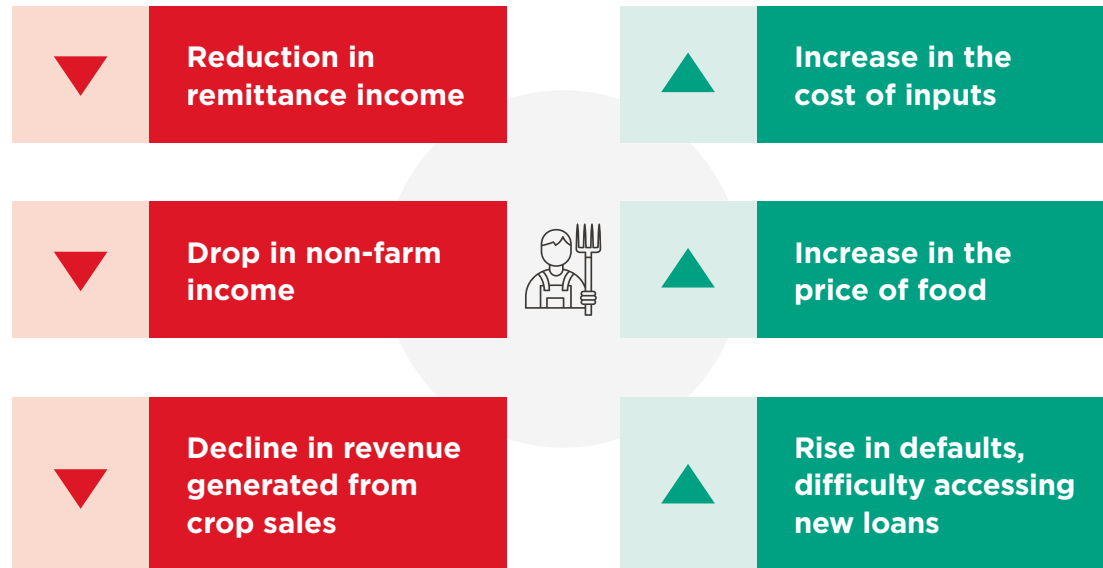


Source: 60_decibels Agriculture Dashboard

Lower incomes and higher prices are forcing smallholder farmers to make tough choices

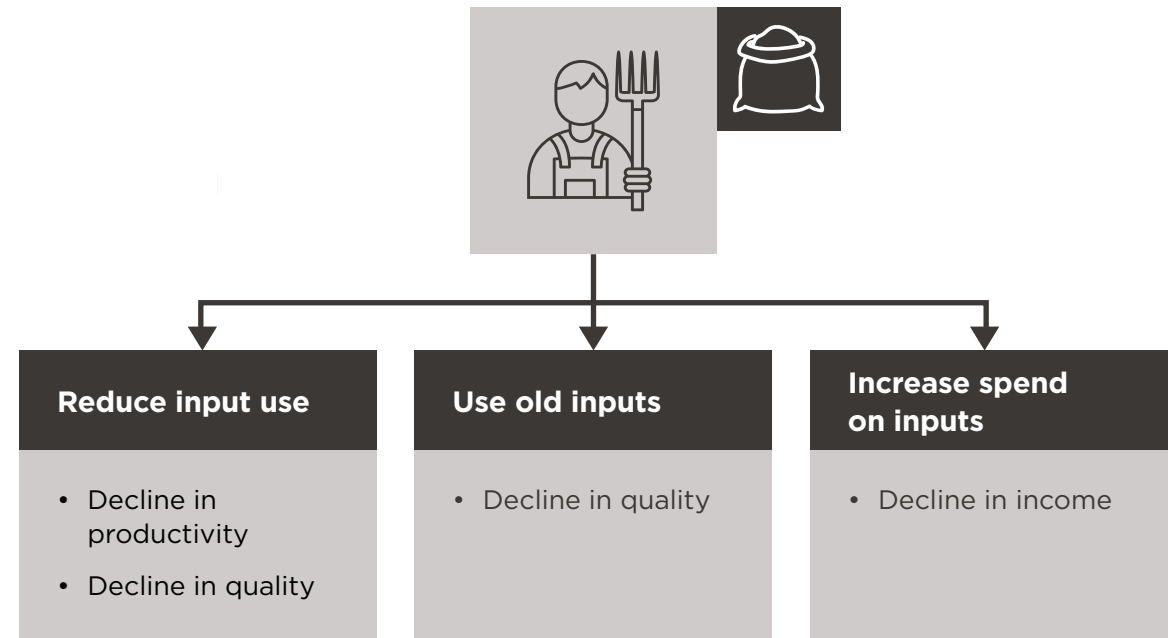
Farmer incomes are coming under greater strain just as the costs of inputs, food and other expenses are rising (see Figure 6).¹⁶ This is translating into higher default rates as farmers find it increasingly difficult to sell enough crop to repay their loans. The loss of income is also pushing farmers to make difficult decisions about input purchases, how much land to farm and

Figure 6 Trends impacting smallholder farmer incomes and expenses during the COVID-19 pandemic



what types of crops to plant (see Figure 7). All these decisions could have a detrimental impact on future production volumes and crop quality. A few of the agribusinesses interviewed for this study stated that some smallholders were thinking of switching production from cash crops to subsistence crops to ensure they could feed their families as food prices rise.

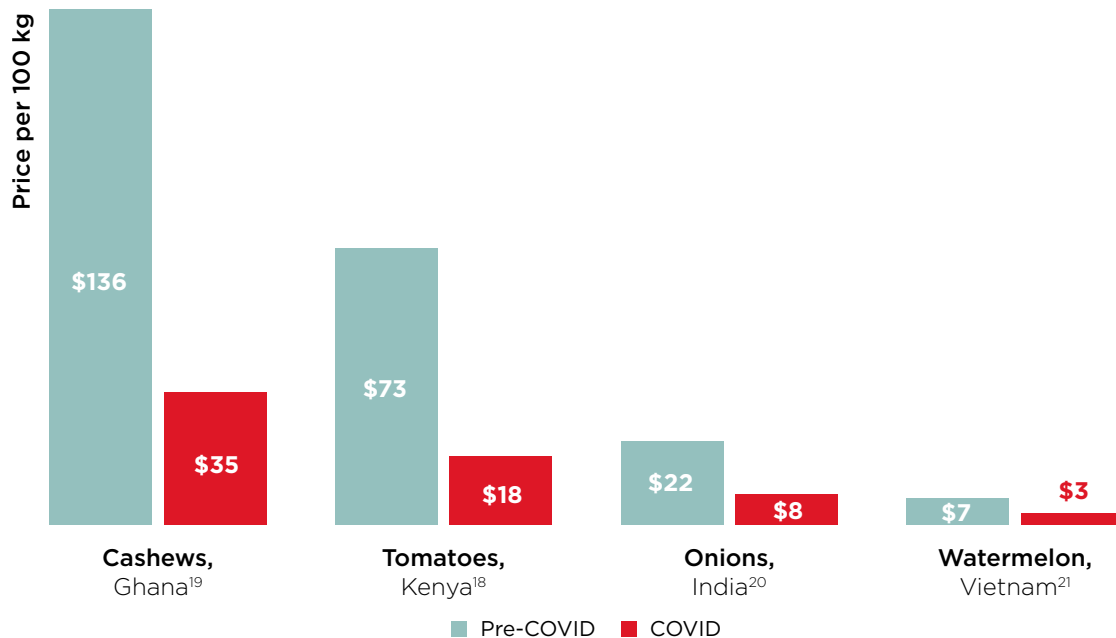
Figure 7 The types of choices farmers are facing about input use during the COVID-19 pandemic



With markets closed, smallholder farmers have often been forced to sell their crop at rock-bottom prices

In many LMICs, the closure of markets in the early days of the pandemic caused significant disruption. Unable to find buyers for their crops, many smallholder farmers were forced to sell at below-cost prices or to destroy their crops. This is particularly true of smallholder farmers growing perishable crops like fresh produce or flowers, as well as those working in livestock and seafood (see Figure 8).

Figure 8 **Examples of price drops in various value chains**



Note: Prices in this chart are anecdotal, as reported by individual farmers to local media rather than official market prices.

I used to sell two sacks of passion fruit each week at 300,000 shillings [approximately \$82] a bag. Now, due to the suspension of transport systems, closure of markets, and closing of borders, I can only get 50,000 shillings [approximately \$14] a bag.¹⁷

Farmer in Southern Uganda

I can't see myself breaking even this year. We have an abundance of produce and now we have no or very little market.¹⁸

Farmer in Kirinyaga County, Kenya

Potato farmers in Colombia are losing millions as the price of potatoes plunges during the COVID-19 pandemic

CASE STUDY



Location: Colombia

Value chain: Potatoes

Farmers impacted: ~100,000

Pre-pandemic challenges: Low productivity by global standards and a six-fold increase in potato imports from Europe between 2009 and 2019²²

Post-pandemic challenges: 30 per cent drop in demand due to restaurant, hotel and school closures, and rising transport costs²³

Price drop: Up to 85 per cent drop in potato prices (to \$2.30 or 8,000 pesos per sack)²⁴

Impact: With prices falling below production costs in some cases, farmers resorted to selling their potatoes on the side of the highway. To repay debts, some farmers sold farm assets (e.g. livestock) or took on other work (e.g. mining).²⁵ Colombia's Federation of Potato Farmers (FEDEPAPA) estimates that potato farmers are losing a combined \$28 million per month as a result of having to sell potatoes below cost.²⁶



The cost of production is 32,000 pesos (\$9.00), including the transport to the buying centres, and today they are only paying 8,000 pesos (\$2.30). This isn't profitable for anyone.²⁷

Farmer in Colombia

The severity of the impact of COVID-19 on smallholders depends on several factors, including their location and the value chain in which they operate

Smallholder farmers in some countries have been more affected than others by the COVID-19 pandemic. Stricter response measures in Latin America have meant that farmers have, in general, been more negatively impacted than their counterparts in Africa and Asia.²⁸ Smallholders working in certain value chains have also experienced greater drops in income than others.

Smallholder farmers producing perishable crops, such as fresh produce, flowers and dairy, were more severely affected given the lack of storage facilities and transportation delays. Although demand for more premium value chains, such as fresh produce and meat, increased in the early weeks of lockdown due to hoarding, demand declined as the pandemic spread. Demand from the hospitality sector collapsed, and middle- to low-income households shifted their consumption away from more expensive perishable products to lower-cost staples.²⁹



Flowers

Considered a luxury crop, the demand for flowers collapsed in Q2 2020 when restrictions on large gatherings like weddings were imposed.³⁰ In the early months, revenues were down 60 to 70 per cent when up to 80 per cent of orders were cancelled. As restrictions were lifted and orders resumed, flower growers faced a doubling in air cargo rates.³¹



Fresh produce

There have been many cases of farmers destroying their crops or feeding crops to animals in Asia, Africa and Latin America.³⁴ McKinsey estimates that Africa alone experienced a drop of \$500 million to \$2 billion in fruit, vegetable and nut exports in 2020.³⁵ In India, a World Bank survey found that prices for fresh produce fell 48 per cent between March and July 2020.³⁶



Meat and dairy

The meat sector was negatively impacted by closures at livestock markets. In the Horn of Africa, families depending on livestock for their livelihoods lost 20 to 40 per cent of their income between March and May 2020.³² Pakistan, the third largest milk-producing country in the world, saw dairy prices fall 15 per cent in the early days of the pandemic.³³



Seafood

Disruptions along the supply chain, as well as a collapse in demand from the service sector (mainly restaurants and cruises), translated into a dramatic drop in seafood prices. Bangladesh shrimp exporters reported the cancellation of hundreds of orders and price drops of 15 to 20 per cent.³⁷

IFPRI research finds that tomato farmers in India have faced numerous challenges at every stage of the agricultural cycle

CASE STUDY



Location: 100 villages in districts of Karnal, Kurukshetra, Panipat and Yamuna Nagar in the state of Haryana, India

Value chain: Tomatoes

Survey respondents: 492

Methodology: Phone-based

Timeline: March to June 2020

Survey sponsors: CGIAR, 3ie



75.4% of tomato farmers interviewed in Haryana, India reported a disruption to their operations as a result of the COVID-19 pandemic.



Incomes were **50%** lower than expected due to increased costs and plummeting prices.



LAND PREPARATION



CULTIVATION



STORAGE



46.3% of farmers struggled to access inputs, leading to lower average per acre yields: 77.4 quintals/acre versus 85.8 quintals/acre for those who could access inputs

31.2% of farmers spent more on labour while 14.1% spent more on machinery due to travel and labour restrictions

66% decline in prices to INR 400 (\$5.50)/quintal due to oversupply at the local level. Travel restrictions limited the ability of traders to transport tomatoes from the farmgate to regional centers. As a result, farmers were forced to look for buyers locally.

The challenges female smallholders face have been exacerbated by the COVID-19 pandemic, risking a widening of the gender gap in LMICs

The challenges female smallholders face when trying to access services, credit and markets are well documented.³⁸ Over the last few decades, agribusinesses, cooperatives, investors, and especially donors, have made significant efforts to bridge the opportunity gap that exists between male and female smallholder farmers in many emerging markets. These efforts have included helping women create digital identities, secure land tenure, formalise their participation in the agriculture sector and gain equal access to advisory and financial services, among others.

Women have been disproportionately affected by government measures to combat COVID-19.³⁹ According to UN Women, less than one in five social protection measures enacted by governments around the world are gender sensitive,⁴⁰ suggesting that if proactive measures are not taken, the gains made by female smallholder farmers over the last decade are at risk of being reversed.

Figure 9 Factors exacerbating the impact of the COVID-19 pandemic for women in agriculture

Women play a greater role in childcare and housework, both of which have increased with school closures and stay-at-home measures. Women are also at greater risk of domestic violence.

81% increase in childcare and household responsibilities and **37%** increase in violence against women during the pandemic.⁴¹

Lower phone ownership and internet use has meant women have not benefited as much from the shift in agriculture extension support from in person to digital.

In LMICs, **165 million** fewer women than men own a mobile while **300 million** fewer women than men access mobile internet.⁴³

The informal nature of many women's work in agriculture means that women are less likely to benefit from social protection measures.

Up to **60%** decline in income for women working in the informal sector (up to 80% in Africa and Latin America). Women's employment is **19%** more at risk than men's.⁴²

Lower digital literacy means that women use a narrower range of digital services than men.

Of the 33 million farmers in Africa using digital tools, only **25%** are women.⁴⁴

Agribusinesses and cooperatives have seen their businesses disrupted by measures to combat the spread of COVID-19

Agricultural organisations that procure crops from smallholder farmers engage in a variety of activities when sourcing commodities, from farmer acquisition and input distribution to capacity building, certification, traceability and

payments.⁴⁵ At virtually all these points of interaction in the agricultural last mile,⁴⁶ government measures to combat the COVID-19 pandemic in LMICs are disrupting day-to-day operations and increasing costs.

Farmer recruitment



- Restrictions on travel and large gatherings have put new farmer acquisition efforts on hold.
- Agribusinesses that rely on seasonal farmers from neighbouring states or countries have had an especially hard time sourcing labour. In the early days of the pandemic, some farms in Colombia could source only 20 farmers for every 100 needed to harvest the coffee.⁴⁷

Capacity building



- Restrictions on travel and large gatherings have led to a reduction in both the size and frequency of in-person extension.
- Root Capital found that 63 per cent of their 134 agribusiness clients had reduced or suspended technical assistance to farmers.⁴⁸

Programme management



- Some agribusinesses have found it more difficult to carry out farm sustainability and certification audits. Some farmers have dropped out of these programmes altogether, forcing international standards bodies to extend the validity period of their certifications.⁴⁹
- Some social impact projects, including climate mitigation, gender equity and youth programming, have been suspended or delayed.⁵⁰

Crop purchasing



- Restrictions on travel and large gatherings, as well as curfews, have made it difficult and more expensive for smallholders to reach buying centres. As a result, several agribusinesses, most of which are exempt from movement restrictions, are traveling to rural areas to source commodities, increasing their costs.

Payment



- For many agribusinesses, restrictions on travel and large gatherings have complicated cash payments to farmers.
- Some agribusinesses, such as AB InBev, are helping farmers transition to digital payments by subsidising cash-out or other mobile money-related transaction fees.⁵¹

Agri tech companies are facing tough operational challenges and a more complicated environment to raise financing

The measures enacted to combat the spread of COVID-19 have disrupted operations for many agritech companies. Nevertheless, the ability of agritech companies and fintech companies to solve the challenges exacerbated by the pandemic has translated into above-average growth in 2020. This is particularly true of agri e-commerce companies that have successfully leveraged their platforms to provide market linkages between buyers and sellers when traditional linkages have broken down.

Sales / farmer acquisition



- Most agritech and fintech companies rely on in-person gatherings with farmer groups to acquire new users. Safaricom's DigiFarm, for instance, estimates that two-thirds of their users were acquired through personal contact.⁵² Restrictions on travel and large gatherings and curfews affected these companies' ability to on-board new farmers. Some, like OKO Finance, a provider of digitally enabled agricultural index insurance, shifted their farmer acquisition efforts to call centres, although they have acknowledged that call centres have been less effective.⁵³ Others, like last-mile digital solution provider Virtual City of Kenya, developed the ability to deploy their software solutions remotely rather than in person.⁵⁴
- For OKO Finance, new user growth rates evolved from "hockey stick" to "linear" when lockdowns went into effect.⁵⁵

Operations



- To abide by social distancing and other COVID-19-related health requirements, agritech companies shifted their work forces to home office set ups. For companies like AgroStar in India, this meant delivering desktops to employees' homes, setting up VPNs and paying for employee internet access.⁵⁶
- Many agritech companies, particularly agri e-commerce companies, assume value chain functions otherwise taken on by agribusinesses or other parties, such as farmer extension support, logistics and storage. They have therefore been affected by many of the same challenges outlined in Section 2.2. Unlike agribusinesses, however, some agritech companies were not able to receive the essential service designation that exempts them from transportation and curfew restrictions.
- In some cases, most notably B2C-focused agri e-commerce, there was an almost overnight surge in demand that required agritech companies to scale up operations quickly. This was a challenge under lockdown and other COVID-19-related restrictions.

Financing



- Several of the agritech companies interviewed for this study noted that the financing environment has become tougher in the wake of the COVID-19 pandemic. Many investors have taken a "wait-and-see" approach or prioritised the financing needs of their portfolio companies over those of new companies.
- AgFunder reports that funding in the first six months of 2020 was roughly on par with the same period during 2019. However, they did observe a rise in funding for specific agritech categories, including e-commerce (e-grocery), logistics, supply chains and traceability, while other categories (farm management and IoT/sensors) experienced a decline.⁵⁷

Agriculture sector stakeholders have adopted several measures to minimise the disruption and damage caused by the pandemic

In the initial weeks and months of the pandemic, governments, donors, NGOs, agribusinesses and other agriculture sector actors focused on the immediate needs of farmers and others working in the agriculture ecosystem. This meant distributing personal protective equipment (PPE), installing washing stations, sharing health guidelines, providing monetary stipends and distributing food baskets.⁵⁸ Governments throughout the world moved quickly to declare

agriculture an essential service, lifting travel and other restrictions for the production and transport of agricultural products (see Section 3.2).⁵⁹ Although globally food production levels have not been materially impacted and global food prices have remained relatively stable (with a few notable exceptions), disruptions to domestic supply chains have been significant and exacerbated by currency fluctuations.

Governments



Governments were quick to designate agriculture an “essential” sector and lifted travel and export restrictions. They also moved to reopen markets closed during the initial lockdowns.⁶⁰ Governments have been purchasing surplus harvests from farmers for distribution in areas struggling with food security.⁶¹ In many countries, such as Kenya, governments have granted tax credits, debt relief and stimulus packages to low-income households and small and medium-sized enterprises (SMEs).⁶²

Multilateral agencies, donors and NGOs



Multilateral agencies, donors and NGOs have played an active role in pushing governments to minimise disruptions to global and domestic food chains.⁶³ Several donors and NGOs have set up emergency financing or accelerated the delivery of committed funds to mitigate the impact.⁶⁴ IFAD, for example, established the Rural Poor Stimulus Facility, which aims to raise \$200 million that will, in part, provide inputs and financing to smallholder farmers in LMICs.⁶⁵

Agribusinesses



Agribusinesses globally have adopted measures to support employees and smallholder farmers. This includes sending medical personnel to rural areas, sourcing PPE, providing inputs and distributing food baskets. Olam has made in-kind donations valued at \$7 million (masks, ventilators, tests, inputs, food)⁶⁶ while Cargill committed \$35 million.⁶⁷

Rwanda’s Sorwathe provided farmers with stipends equal to two months of half pay in the early months of the pandemic. More recently, Sorwathe has provided farmers with food baskets.⁶⁸

Investors



Investors have made emergency funding available to their portfolio companies. Acumen has invested \$132 million to 136 enterprises across 15 countries.⁶⁹ Root Capital has helped 20 of their agribusiness portfolio companies with debt relief or debt restructuring. They have also helped their portfolio companies identify and apply for government tax relief measures.⁷⁰

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3 The use of digital agriculture tools during the pandemic



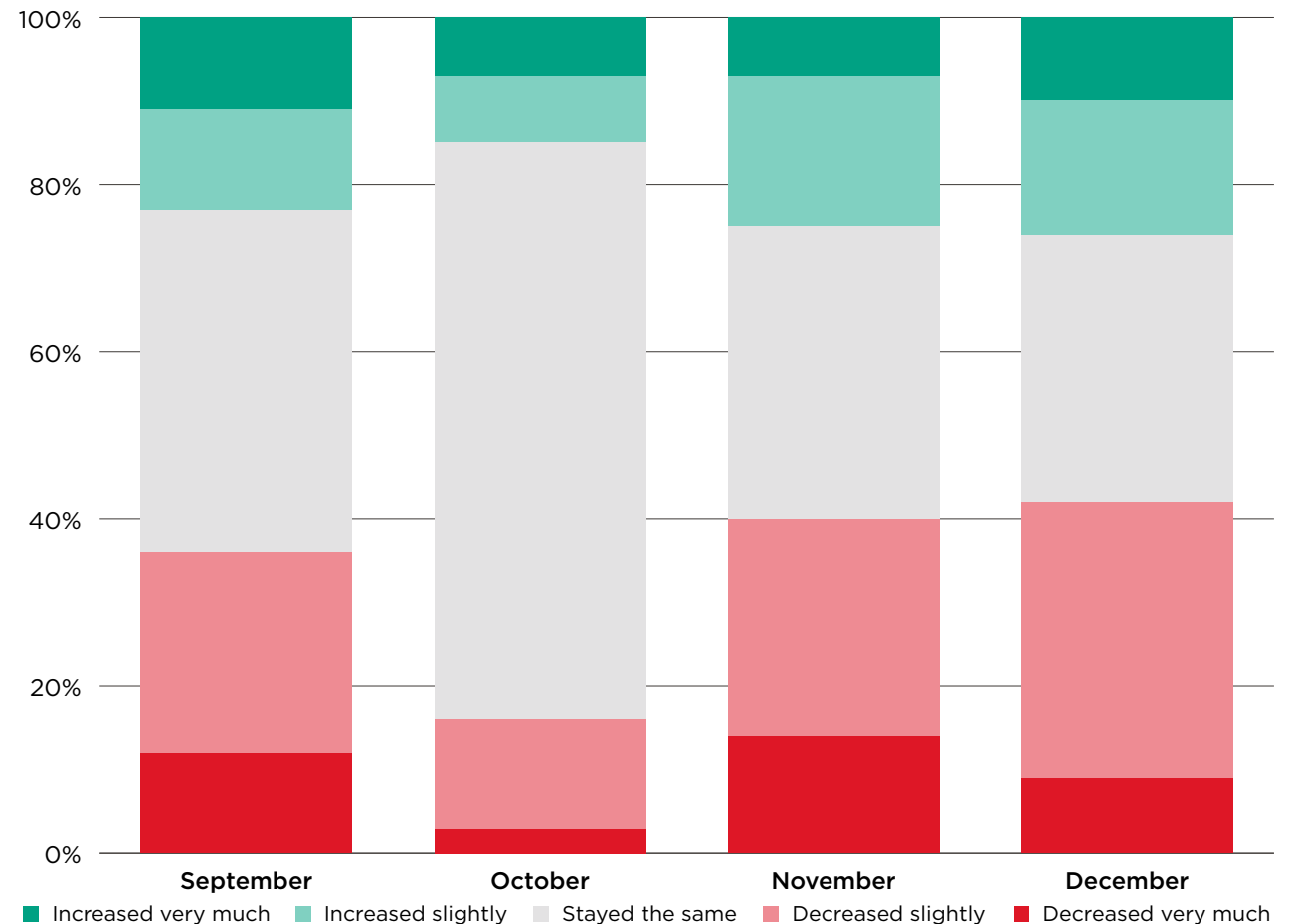
Digital agriculture tools are transforming how food systems operate to become more agile and resilient to unforeseen events

A recent study by the Fletcher School found that “economic resilience” during COVID is often a reflection of the level of digitisation in a country.⁷¹ This is also true of resilience in agriculture. Digital tools are particularly well suited to the challenges faced by different actors along the agricultural supply chain because:⁷²

- They do not require in-person contact to be deployed;
- They rely largely on mobile networks, which cover up to 95 per cent or more of the population in many LMICs;⁷³
- They can be deployed quickly, within days or weeks in some cases;
- They are easily adaptable and, in some cases, can be customised;
- They are data-driven; and
- They support two-way communication (unlike radio, television or print media).

By most accounts, digital usage among smallholder farmers has increased during the pandemic. In the absence of in-person gatherings, farmers and other ecosystem players have turned to social media platforms, such as WhatsApp, Facebook Groups and even Twitter, for agronomic advice and to access markets for their crops.⁷⁴ They have also been using more digital tools and more often (see Figure 10).

Figure 10 **Change in digital usage by Kenyan smallholder farmers since the start of the pandemic, September to December 2020⁷⁵**

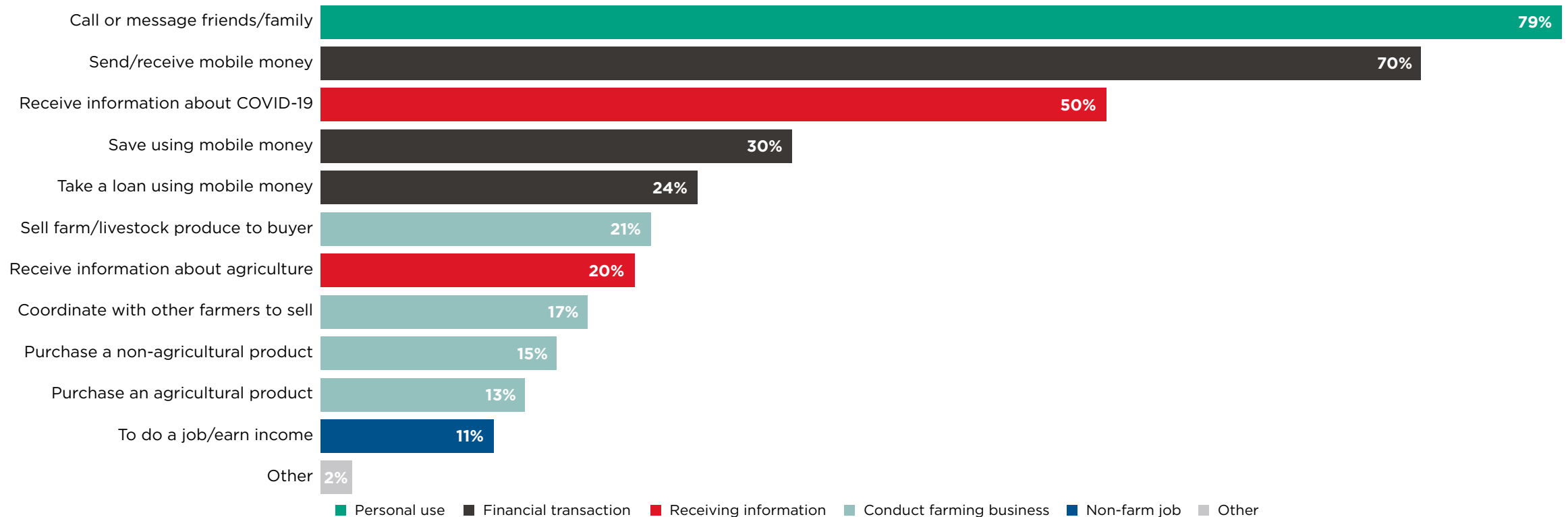


Source: 60_decibels Agriculture Dashboard N=1,954

COVID-19 is accelerating both use and adoption of digital financial services in LMICs

A 60_decibels survey in Kenya found that while many digital services have seen an uptick in use during the pandemic, it is the increased use of mobile financial services (mobile money, mobile savings, mobile borrowing) that has perhaps been most impressive (see Figure 11).

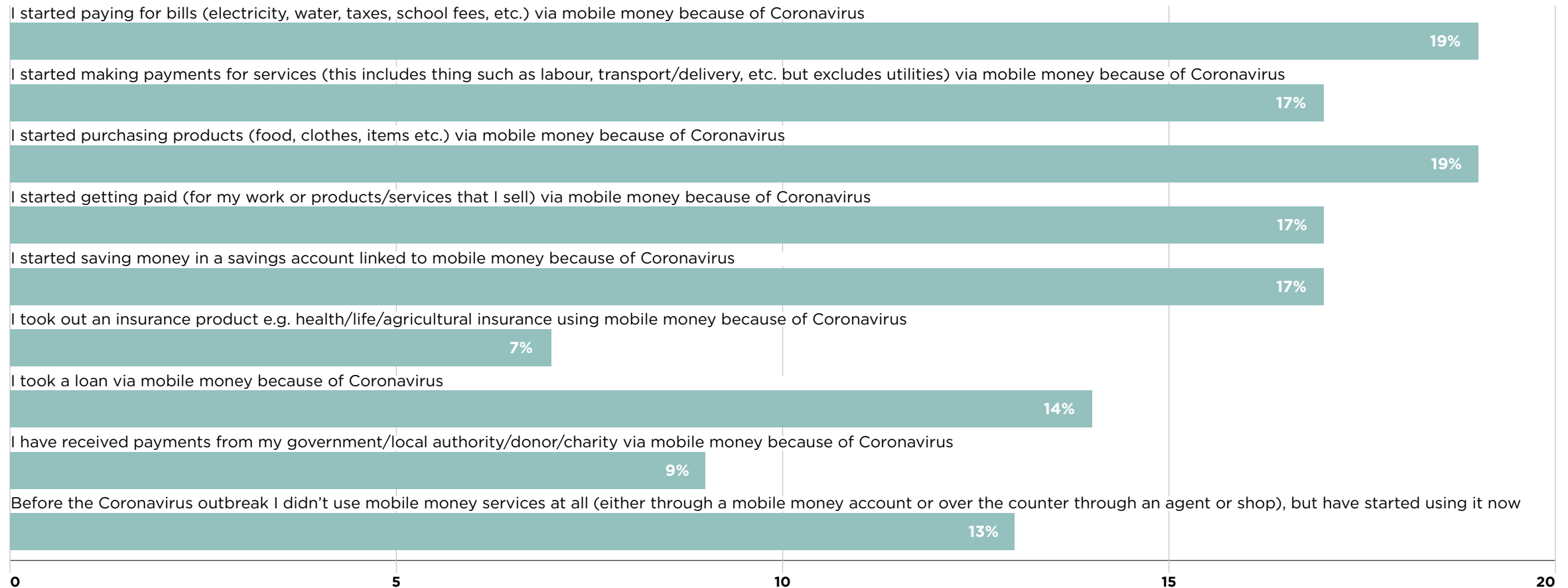
Figure 11 **Percentage of farmers who have increased their digital activities since the pandemic, Kenya, December 2020⁷⁶**



Mobile money use cases such as merchant payments and person-to-business (P2B) payments have experienced greater growth

The GSMA Mobile Money team's end user research in several LMICs confirms the rise in adoption of digital financial services products among rural populations (see Figure 12).

Figure 12 **Impact of the COVID-19 pandemic on the adoption of mobile financial services, rural respondents only**

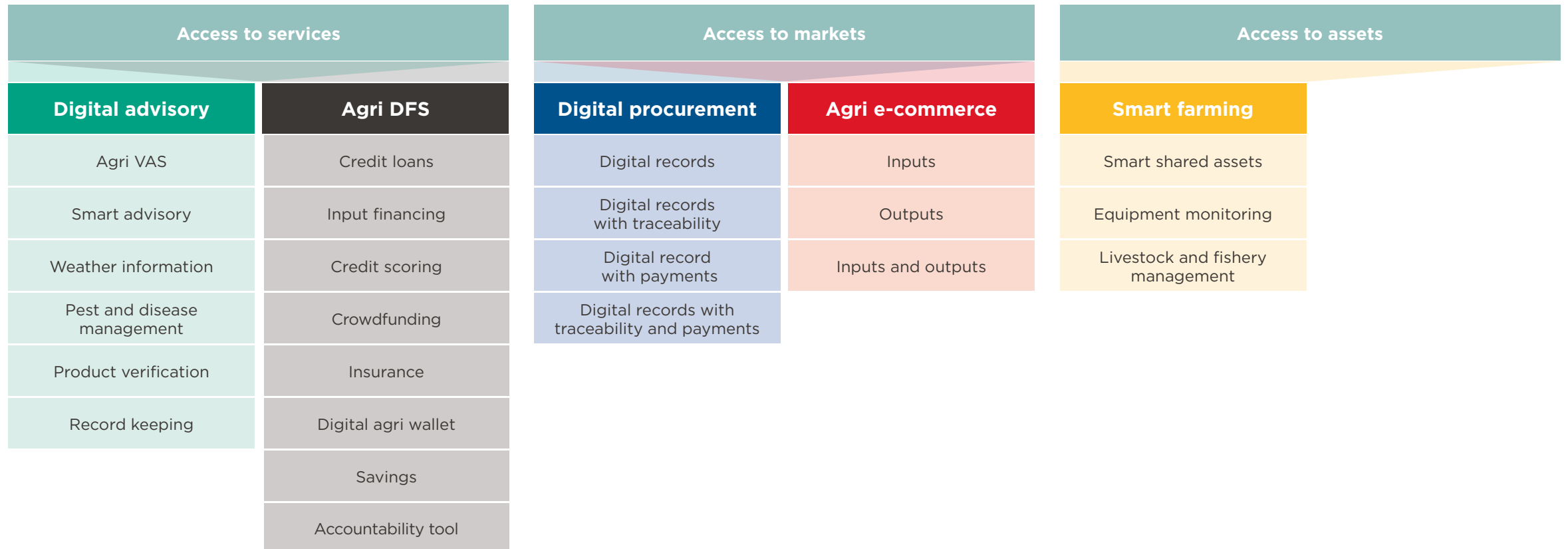


The GSMA AgriTech programme has developed a framework to assess how digital agriculture tools address challenges for farmers and value chain actors

The GSMA AgriTech programme has divided digital agriculture tools into three broad categories of access, which are further divided into five use cases and 24 sub-use cases.⁷⁷ These use cases and sub-use cases support smallholder

farmers in overcoming a range of challenges they experience at various stages of the agricultural cycle.

Figure 13 **Digital agriculture use cases and sub-use cases**

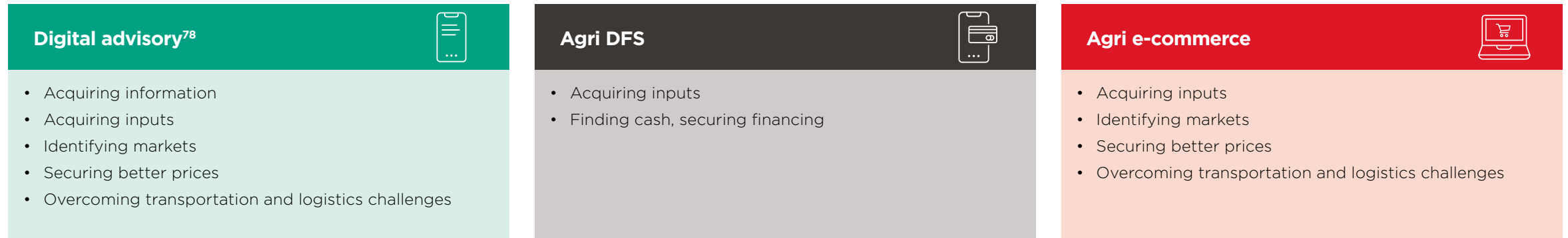


Digital advisory, agri DFS and agri e-commerce have emerged as the three most sought-after digital tools during the COVID-19 pandemic

Each of the five use cases and 24 sub-use cases previously outlined serve to address specific farmer challenges, including knowledge gaps, financial exclusion, low productivity and limited access to markets. While all of these challenges are important and must be addressed to boost incomes, improve livelihoods and build the resilience of smallholder farmers in the face of climate change and one-time shocks, some specific challenges became especially urgent in the months following the imposition of lockdowns, restrictions on

the movement of people and goods, social distancing and other COVID-19 measures. When asked what they needed most in the wake of the COVID-19 pandemic, smallholder farmers overwhelmingly cited agronomic advice, inputs, cash to purchase inputs and to cover farm and non-farm expenses, help in overcoming transportation and logistics challenges, help in identifying markets for their crops and improving the price they can secure for their crops (see Figure 14).

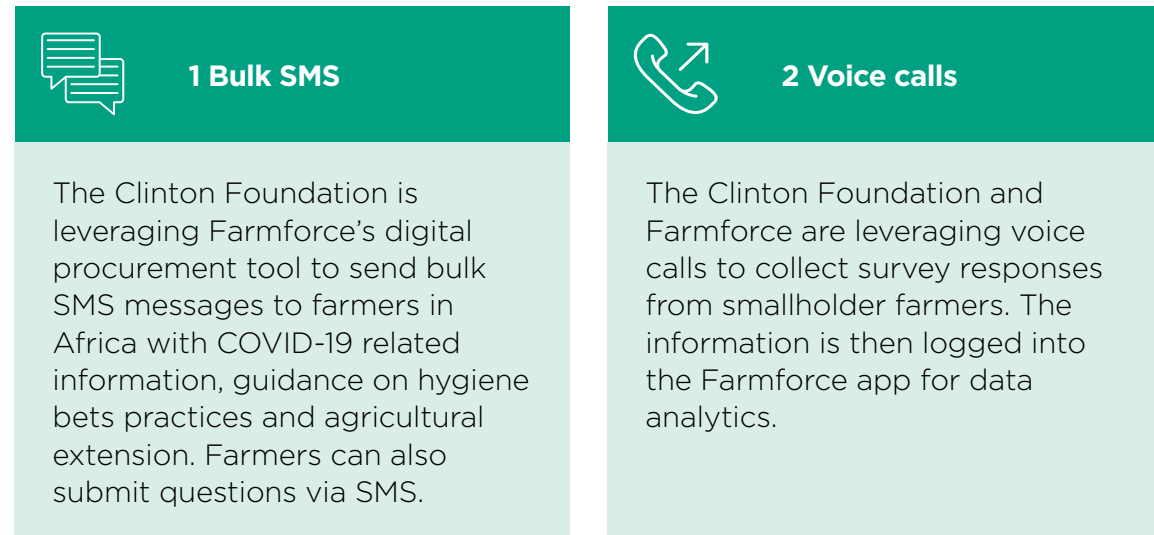
Figure 14 **Digital agriculture use cases and the COVID-19-related challenges they address**



Lockdowns and limits on in-person gatherings shifted advisory from in-person to online during the pandemic

As governments throughout the world imposed lockdowns in March and April 2020 to curb the spread of COVID-19, on-site face-to-face extension support for smallholder farmers came to a halt. The need for communication with farmers, however, remained. In the early days of the pandemic, it was imperative for governments, NGOs and agribusinesses to distribute COVID-19 health advisories to farmers to avoid the spread of the coronavirus in rural areas and minimise disruptions to agricultural supply chains. It was also critically important for farmers to receive updates on new guidelines for processing, transport and packaging. Governments, NGOs, agribusinesses and farmer cooperatives sought to communicate with farmers using various communication media, including radio, print (pamphlets and posters), loudspeakers and phone calls. They also turned to a variety of digital tools, including low-tech services such as IVR and SMS,⁷⁹ social media platforms such as WhatsApp, Facebook and Twitter, as well as proprietary and non-proprietary applications used historically for agronomic advisory and procurement. Agribusiness Olam, for instance, is disseminating COVID-19-related information via their proprietary Olam Direct and AgriCentral platforms.⁸⁰ The Clinton Foundation worked with Farmforce in Malawi, Tanzania and Rwanda to provide COVID-19 advisory as well as ongoing extension support and advisory.⁸¹

Figure 15 **Clinton Foundation and Farmforce leverage various tools for digital advisory in Africa**



Agri-tech companies and agribusinesses added COVID-19 advisory to their existing tools to help farmers navigate challenging times

In the early days of the pandemic, there was significant anxiety in rural communities fuelled in part by misinformation circulating by word of mouth or through social media platforms like WhatsApp. Agribusinesses and agri-tech companies sought to ease smallholder farmer fears by disseminating reliable information not only about the pandemic itself, but also evolving practices and regulations that would impact farmers' daily activities (see Figure 16).

Figure 16 **Examples of digital advisory tools developed or adapted to distribute COVID-19 health advisory and safety guidelines**



In Ghana and Côte d'Ivoire, agri-tech Farmerline translated WHO COVID-19 health and safety guidelines into seven Ghanaian languages and French, and sent the translated guidelines to 18,000 farmers via SMS and voice messages.⁸²



In Mexico, agribusiness Agrana Fruit used agri-tech Extensio-Accesso's digital advisory tool to send strawberry farmers information about new guidelines being implemented in the packaging and transport of strawberries.⁸³



In Côte d'Ivoire, agribusiness Cargill leveraged agri-tech Farmforce's digital procurement tool, normally used for farm management and traceability, to send COVID-19 handwashing and health guidelines to 1,200 cooperative and farm coaches. Those leaders were then asked to distribute the information to other farmers in their communities.⁸⁴

Pastoralists increase use of GARBAL digital advisory tool during pandemic

CASE STUDY

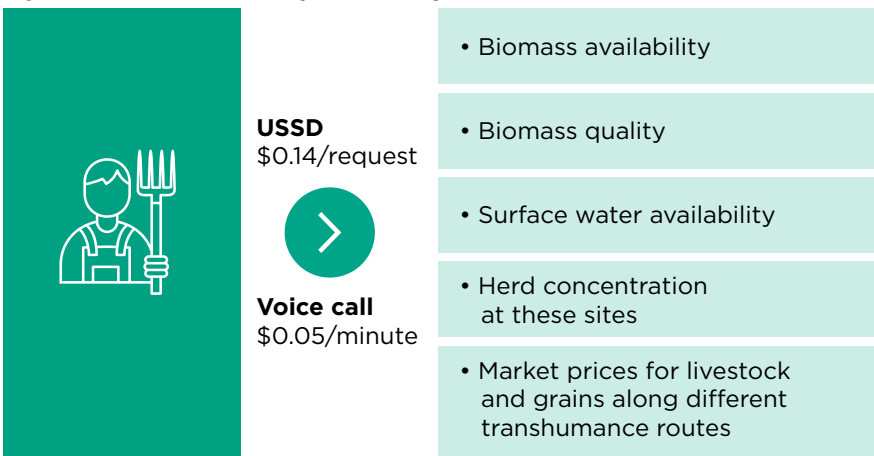
Pastoralism is a form of mobile livestock production that has been around for over 6,000 years and is most prominent in the grazing lands of the Horn of Africa and the Sahel of Western Africa.⁸⁴ There are an estimated 50 to 70 million pastoralists in Africa.⁸⁵ These pastoralists produce about 90 per cent of meat consumed in East Africa and 60 per cent of the meat and milk consumed in West Africa.⁸⁶

Although pastoralism has always been a difficult profession (up to 20 million pastoralists in East and West Africa live below the poverty line), the challenges pastoralists face have increased in recent years due to regional conflicts and the effects of climate change.⁸⁷ To help pastoralists mitigate these challenges, SNV Netherlands Development Organisation teamed with Orange and other organisations to introduce GARBAL, a digital advisory tool that uses satellite data to deliver critical information to pastoralists in Mali and Burkina Faso via USSD or voice calls (see Figure 17), enabling them to use their mobile phones to gain valuable

information about the availability and quality of critical resources for their herds. Initial results have been positive. Pastoralists who use the service in Burkina Faso are reporting an additional \$475 per year in income per herd while in Mali, pastoralists reported a 9.6 per cent increase in milk production and a reduction in losses of \$191 relative to non-users.⁸⁸

The COVID-19 pandemic exacerbated the challenges pastoralists face. Border closures due to COVID left many stranded for months away from home and market closures made it difficult for them to sell their livestock, causing price fluctuations and a decrease in quality as pastoralists had to hold on to livestock longer and struggled to find suitable grazing land and water for their animals. This uncertainty prompted a significant increase in inquiries into GARBAL’S advisory solutions (see Figure 18).

Figure 17 **GARBAL advisory tool description⁸⁹**



Source: SNV

Figure 18 **Increase in GARBAL use in Mali and Burkina Faso during 2020**



Source: SNV estimates

India's Ama Krushi digital advisory tool added about 500,000 customers in 2020 during the COVID-19 pandemic

CASE STUDY

The non-profit Precision Agriculture for Development (PAD) introduced a digital advisory tool called Krishi Tarang (later rebranded as Ama Krushi) in June 2016.⁹⁰ Ama Krushi is a digital advisory tool that provides farmers with agronomic advice on up to 24 different crops through an IVR hotline and SMS. The service, which is free to farmers, is provided in partnership with the Department of Agriculture in the state of Odisha along with other agencies in the various states where Ama Krushi is available.

After the Indian government implemented a COVID-19 lockdown in March 2020, PAD conducted a survey of smallholders to identify specific information gaps and adjusted their advisory accordingly (see Figure 19). With in-person extension services suspended, Ama Krushi was able to add 40,000 to 50,000 customers per month⁹¹ through much of 2020 to reach the one million customer mark in September 2020 (see Figure 20).⁹² They estimate that 5.6 million outbound messages were sent between April and June 2020 alone.⁹³

Figure 19 COVID-19-related agronomic information added to Ama Krushi digital advisory tool⁹⁴

Which markets remain open

Which crops are sold on which days and at what market prices

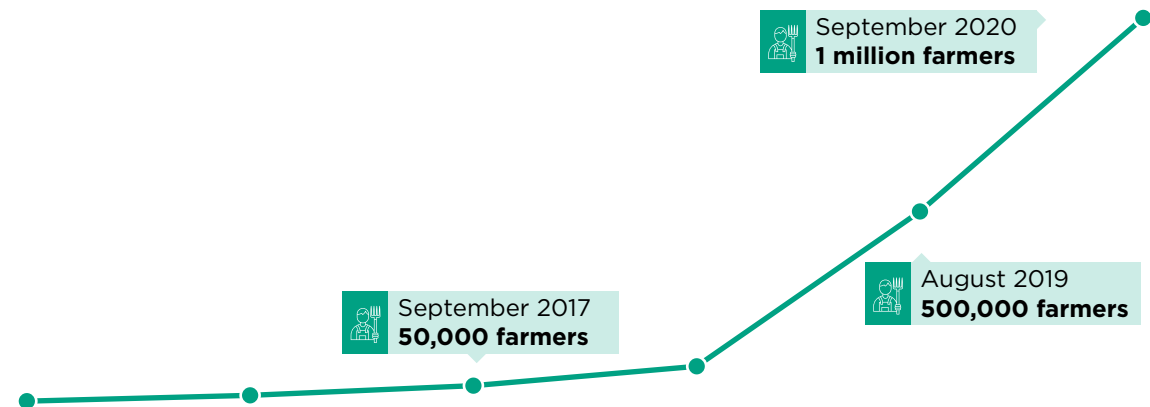
Which agricultural activities are exempt from lockdown

What organic inputs to use while markets are inaccessible

How to store crops that cannot be sold at markets

Source: PAD

Figure 20 PAD India digital advisory user growth, 2016–2020



Source: PAD

MNOs are supporting the adoption of digital advisory tools during the pandemic

General COVID-19 health advisory

- Globally, MNOs sent government-mandated COVID-19 alerts via SMS to their mobile subscribers.⁹⁵
- MNOs such as MTN Rwanda, Dialog Sri Lanka and Reliance Jio, Airtel and BSNL in India voluntarily changed dial tones to COVID-19 alerts.⁹⁶
- MNOs such as Dialog Sri Lanka and Safaricom set up helplines linking their users to doctors.⁹⁷

Digital agriculture advisory

- Dialog Sri Lanka's Govi Mithuru digital agriculture subscribers were sent alerts about government programmes to purchase excess harvests.⁹⁸
- Safaricom expanded their call centre to handle an increase in inbound traffic from DigiFarm subscribers looking for advisory support and inputs.⁹⁹

Subsidised data usage

- Some MNOs offered subscribers free calls, SMS and data usage to access COVID-19 or agricultural advisory.¹⁰⁰
- In Ecuador, the Ministry of Telecommunications declared in March 2020 that MNOs and internet service providers (ISPs) would be unable to suspend the mobile or internet services of customers for non-payment, guaranteeing continuity of access during the pandemic.¹⁰¹

Sri Lanka’s Dialog has seen increased adoption and usage of their Govi Mithuru digital advisory tool during the pandemic

CASE STUDY

MNO Dialog Sri Lanka launched their digital agriculture advisory service Govi Mithuru (Farmer’s Friend in Sinhalese, Uzavar Tholan in the Tamil language version) in October 2015. The service was developed in partnership with the Ministry of Agriculture, Ministry of Health, Nutrition and Indigenous Medicine, the Centre for Agriculture and Biosciences International (CABI) and the GSMA. It provides smallholder farmers with customised advisory at various stages of the agricultural cycle for 24 different value chains. During the pandemic, smallholder

farmers in Sri Lanka suffered from a lack of information, with many abandoning their fields for fear of becoming infected with the virus. Dialog played a key role in educating smallholder farmers about COVID-19 through the use of bulk messages, dial tones and helplines. They waived fees for their Govi Mithuru advisory service (typically billed at one rupee (Rs 1) per day per crop) for five to six weeks. Usage (inquiries) doubled during the pandemic while the number of users increased eight per cent from 600,000 to 650,000 (see Figure 21).¹⁰²

Figure 21 **Impact of the pandemic on key Govi Mithuru KPIs**



Source: Dialog Sri Lanka

Several trends have emerged during the COVID-19 pandemic specific to the digital advisory use case

Trend 1

Rather than introducing new tools and applications, most agribusinesses and agritech companies added COVID-19 advisory to their existing digital advisory or procurement tools

Although there are some exceptions – IICA’s MedAgro¹⁰³ and AgroCenta’s Sentinel, for example – most agribusiness and agritech companies opted to add COVID-19-related advisory to their existing tools rather than create dedicated new ones. Governments teamed with the World Health Organization (WHO) to distribute COVID-19 content via WhatsApp.¹⁰⁴ Agribusinesses and agritech companies translated this content into local languages, adapted it for their audiences and delivered it via smallholder farmers’ preferred medium.

Trend 2

Agritech companies that put users at the centre of their tool’s (re)design during the pandemic tended to perform better

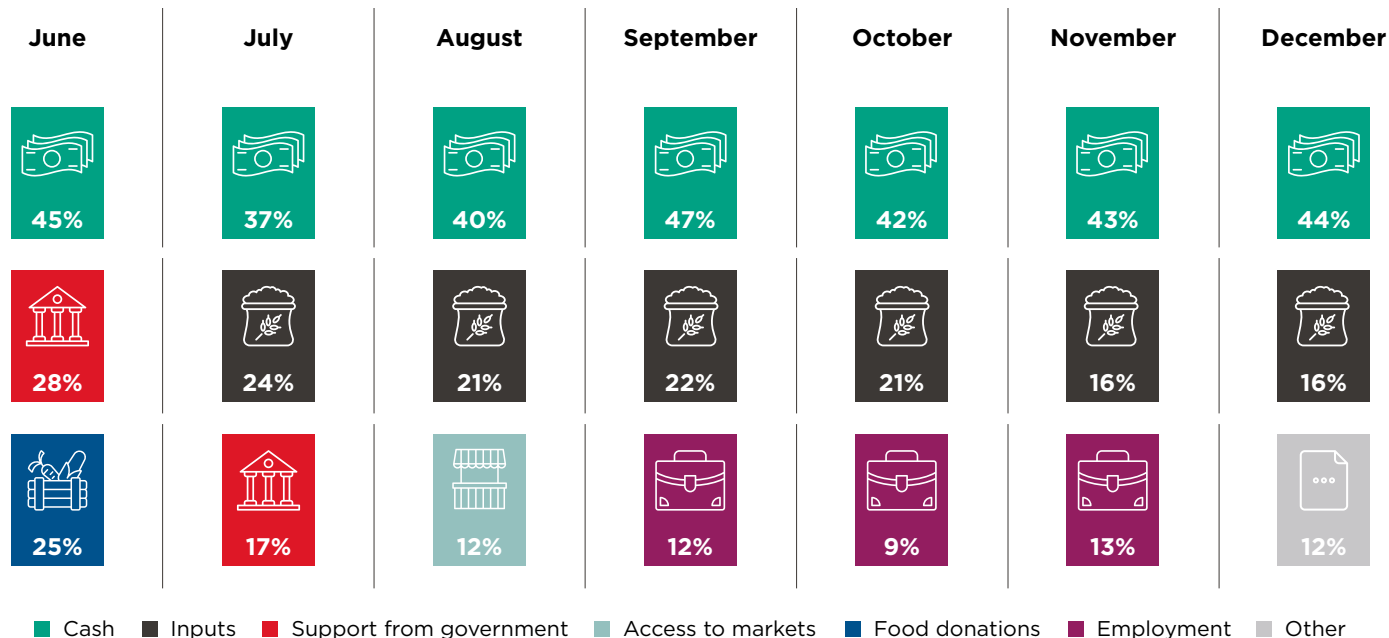
Human Centred Design (HCD), or user-centred design, involves designing products and services around user needs and preferences. HCD identifies the most suitable technology to deliver them and implements a viable marketing and pricing strategy to target different users. It also ensures that users are engaged at every step of product development, from early stages of identifying opportunities and generating concepts, to advanced stages of product realisation, execution and scaling.¹⁰⁵ Precision Agriculture for Development (PAD) relies on what they call “social learning theory” when designing their digital advisory services.¹⁰⁶ This enables them to tailor the information and delivery mechanisms to the needs of their targeted farmers while also achieving scale. As a result, those smallholder farmers are 22 per cent more likely to implement PAD’s recommendations.¹⁰⁷ Those who implement the recommendations are also more likely to see increased yields and incomes. Impressed with the success of PAD’s approach, IFAD teamed with PAD during the height of the COVID-19 pandemic to target 1.7 million farmers in Kenya, Nigeria and Pakistan with digital advisory services.¹⁰⁸

Governments are playing an important role in accelerating the adoption of agri DFS in LMICs

When farmers in Kenya were asked what they needed most during the COVID-19 pandemic, they consistently and overwhelmingly cited financial support or cash (see Figure 22).¹⁰⁹ Governments have responded with a range of measures to help low-income populations and small businesses weather the pandemic, including easing mobile money regulations, issuing moratoriums on existing loans and issuing low-interest loans (see Figure 23). Governments have

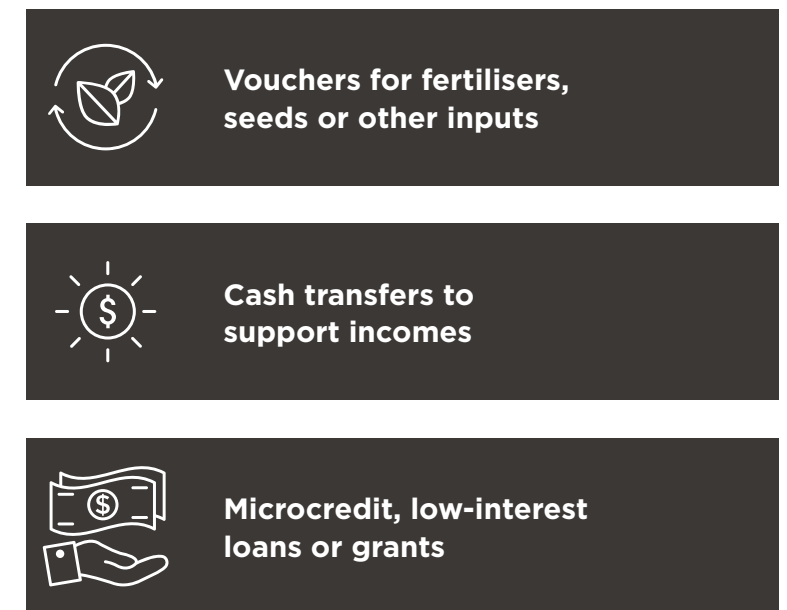
also sought to digitise government-to-person (G2P) subsidy schemes aimed at the agriculture sector. Governments in many LMICs use measures such as subsidies, grants and income support payments to stimulate the use of inputs that enhance agricultural productivity, support smallholder livelihoods and provide a safety net for farmers.¹¹⁰ These measures have become even more relevant in the context of the COVID-19 pandemic.

Figure 22 Top requests by farmers interviewed in Kenya, by month, June to December 2020



Source: 60_decibels

Figure 23 Examples of agricultural subsidy schemes



Source: GSMA

Governments are also helping to boost mobile money usage by waiving fees and raising transaction limits



Ecuador

- Doubled the number of mobile money cash-out points within two weeks to facilitate access to cash.¹¹¹
- Prohibited mobile operators from disconnecting mobile voice and data services for lack of payment.¹¹²



Rwanda

- Eliminated fees on transfers from banks to mobile money wallets, mobile money transfers and merchant fees for contactless transactions, including mobile money, for three months.¹¹³
- Raised the limits on mobile money transactions for Tier 1 customers.¹¹⁴



Bangladesh

- Lifted monthly digital transaction limits and waived charges on cash-outs.¹¹⁵
- Made about \$600 million in loans available for the agriculture sector.¹¹⁶
- Refinanced up to \$350 million in loans for low-income individuals, farmers and microenterprises.¹¹⁷
- Disbursed \$30 per low-income family via mobile money.¹¹⁸



Brazil

- Transferred a monthly \$117 to low-income Brazilians using mobile savings accounts (see [case study](#)).



Togo

- Distributed relief payments to 500,000 citizens in the early days of the pandemic using mobile money.¹²¹



Zambia

- Distributed relief payments to 500 Waived fees on P2P digital transactions.¹¹⁹
- Increased transaction and balance limits for individuals, farmers and small enterprises. Allowed mobile money agents to increase their floats.¹²⁰

Brazil's "coronavoucher" digital payment programme added 36 million previously unbanked users to digital platforms

As part of a \$19 billion relief programme, the Brazilian Government enacted an emergency aid campaign that would transfer a monthly \$117 (R\$600) through state-owned bank Caixa Econômica Federal (CEF) to low-income Brazilians using the Caixa Tem app.¹²² The campaign, dubbed the "coronavoucher", involved setting up mobile savings accounts for Brazilians to facilitate the transfer. As of 3 August 2020, over 66 million Brazilians had enrolled in the programme.¹²³ MasterCard estimates that 36 million of these participants were unbanked, which translated into a 17 per cent reduction in Latin America's unbanked population in less than six months.¹²⁴ Although initially payment recipients largely cashed out their balances upon receipt (or transferred it to another account to withdraw), the government instituted a 30-day waiting period before recipients could transfer or withdraw, leading to increased use of other types of digital transactions (see Figure 24 and Figure 25).¹²⁵

Figure 24 Share of coronavoucher funds used for digital transactions, 2020

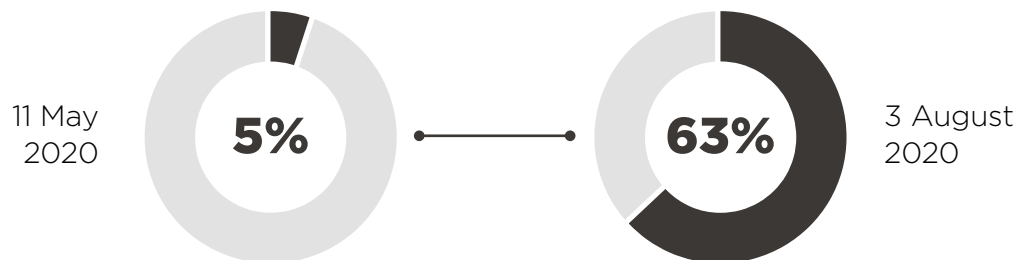


Figure 25 Share of Caixa Tem coronavoucher transactions, May to August 2020

| | | May 19 | Aug 3 |
|--|---|--------|-------|
| | Bill payment | 2% | 8% |
| | Boleto payments (voucher-based payment) | 2% | 19% |
| | Virtual debit cards | 0% | 36% |
| | Money transfers to other banks | 22% | 9% |
| | Money transfers within CEF | 39% | 13% |
| | Withdrawals | 35% | 15% |

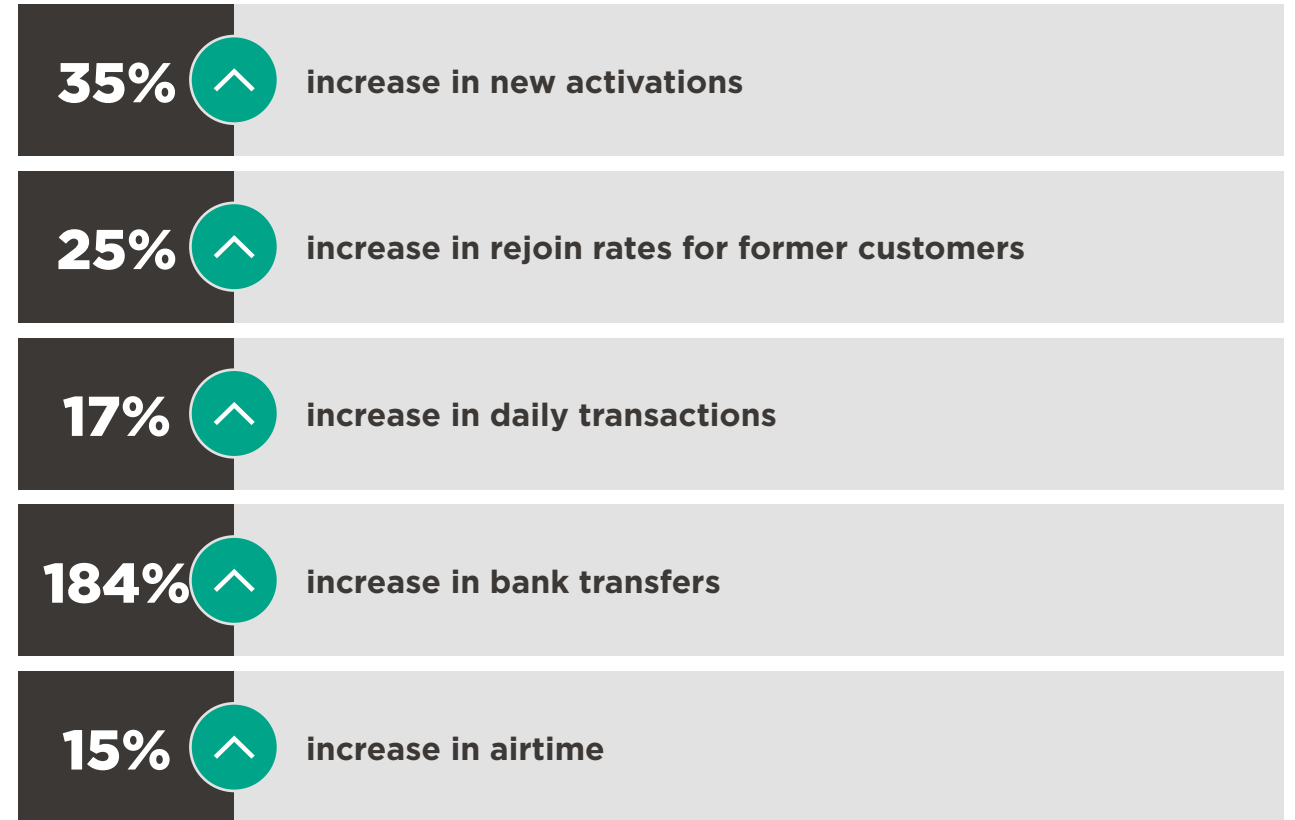
Source: MasterCard, CEF

Mobile money usage is on the rise in LMICs

An easing of mobile money regulations combined with movement restrictions and a move towards contactless payments have boosted the use of mobile money and other mobile financial services. 60_decibels found that 81 per cent of smallholder farmers interviewed in Kenya increased their mobile money use to send or receive payments, 40 per cent increased their use of mobile savings tools and 29 per cent increased their use of digital loans tools.¹²⁶

In Pakistan, EasyPaisa, the mobile money arm of Telenor Microfinance Bank, reported significant increases in both the number of users and the number of transactions in 2020 as a result of the COVID-19 pandemic (see Figure 26).¹²⁷ EasyPaisa became one of the first mobile money platforms to join forces with the government and aid agencies for aid disbursement. Together with the Government of Punjab, they distributed \$9.2 million in social assistance to 170,000 low-income citizens in Punjab through mobile money.¹²⁸ EasyPaisa has also increased their outreach to businesses in Pakistan to accelerate the digitisation of employee payments and added health and COVID-19-related advisories to increase customer engagement.

Figure 26 **Impact of the COVID-19 pandemic on key EasyPaisa KPIs in Pakistan, 2020**¹²⁹



easypaisa

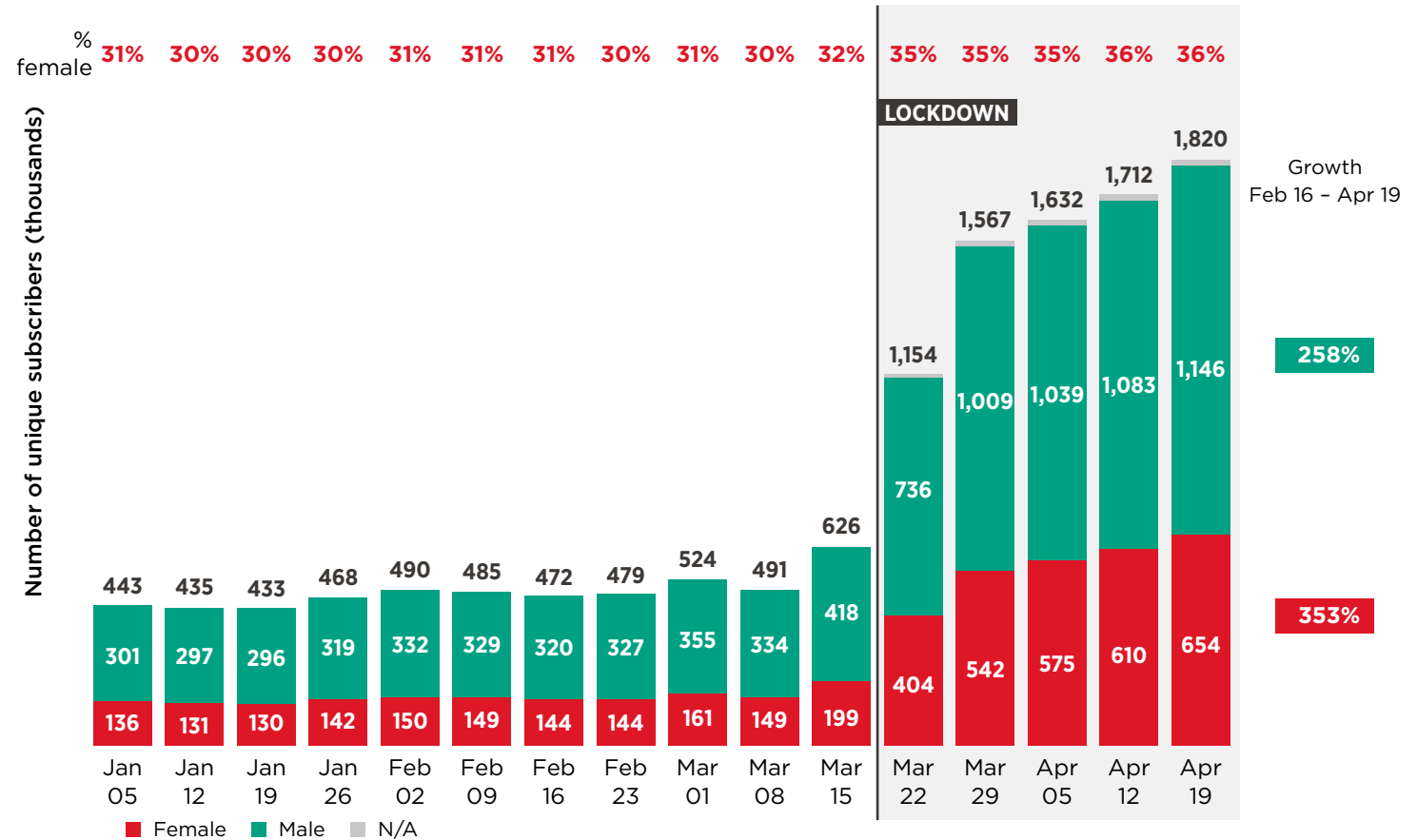
COVID-19's impact on mobile money usage in Rwanda

1

CASE STUDY

On 19 March 2020, the National Bank of Rwanda enacted a number of measures aimed at supporting businesses and citizens during the initial lockdown of the economy. These measures, which were also aimed at promoting the country's digital agenda, included eliminating fees on bank transfers and digital transactions while raising the limit on mobile money transfers.¹³⁰ The impact of these measures – and the business closures caused by the lockdown – were immediate. The number of unique users making mobile money transactions doubled, from 600,000 before the lockdown to 1.2 million in the week after the lockdown went into effect.¹³¹ Within five weeks, the number of unique users climbed to 1.8 million (see Figure 27).¹³² The value of peer-to-peer (P2P) transactions increased fourfold in five weeks (see Figure 28, page 42).¹³³ Interestingly, the number of women making P2P mobile money transactions during the pandemic increased at a faster rate than men, likely due to the lower starting base for women.¹³⁴

Figure 27 P2P senders in Rwanda by gender, pre- and post-lockdown, 2020 (thousands)



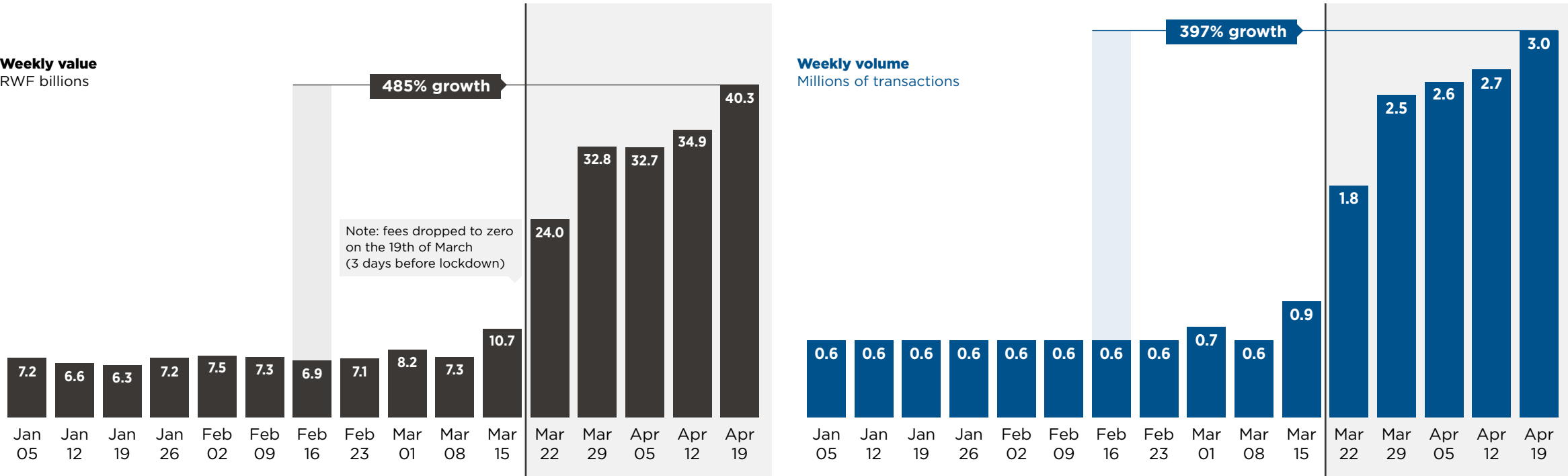
Source: CENFRI and Rwanda Utilities Regulatory Authority

COVID-19's impact on mobile money usage in Rwanda

The value of peer-to-peer (P2P) transactions increased fourfold in five weeks (see Figure 28).¹³³ Interestingly, the number of women making P2P mobile

money transactions during the pandemic increased at a faster rate than men, likely due to the lower starting base for women.¹³⁴

Figure 28 Weekly value and volume of P2P transfers in Rwanda, pre- and post-lockdown, 2020







Source: CENFRI and Rwanda Utilities Regulatory Authority

Donors and agribusinesses are also leveraging digital tools to distribute cash payments, input vouchers and extend loans

In an effort to minimise COVID-19-related disruptions and abide by social distancing guidelines, governments, NGOs, agribusinesses and agritech

companies have embraced agri DFS tools. Examples of solutions implemented during the pandemic are featured in Figure 29.

Figure 29 **Examples of agri DFS solutions introduced during the COVID-19 pandemic**

| Organisation | Country | Description |
|---|---------------|--|
|  | Zambia | The World Food Programme (WFP) teamed with MTN in Zambia to distribute cash payments to Zambians suffering from food insecurity. Payments delivered via mobile money equalled \$44, which was meant to cover half the cost of an average food basket for two months. ¹³⁵ |
|  | Zambia | The WFP, in collaboration with Mayfair Insurance, provides weather index insurance to smallholder farmers in Zambia. Roughly 5,300 smallholder farmers were due a payout as a result of the extended dry season. The payments (averaging \$9 per farmer) were made using MTN's mobile money platform. ¹³⁶ |
|  | Uganda | International agribusiness NKG provided cash advances to its smallholder farmer partners in Uganda using mobile money. ¹³⁷ |
|  | Rwanda | Agribusiness Sorwathe used mobile money to provide advance payments to smallholder farmers for their tea crop. ¹³⁸ |

Financial data collected through agri DFS tools is being used to enhance support to smallholder farmers during the pandemic

A variety of digital tools have been used during the pandemic to collect data from smallholder farmers to enhance financial support (see Figure 30).

For example, the Government of Nigeria has been working with mobile operators to track cash-in and cash-out data from low-income users. A significant drop in cash-in transactions triggers an assistance payment from the government to that mobile subscriber using mobile money.¹³⁹ Many agritech companies are seeking to leverage their data and other assets to extend credit and loans to smallholder farmers. With on-site visits on hold, traditional microfinance institutions (MFIs) and banks have been unable to extend new loans to smallholder farmers.

Rising default rates and the absence of forward contracts is also having a negative impact on farmers' ability to secure new loans. Some digital agri insurance companies have sought to fill the gap by using the data collected from smallholder farmers to generate credit scores for farmers that can then be used to secure new loans. An initiative led by IFPRI and sponsored by Digital Credit Observatory (DCO) and CGIAR in India, for example, uses satellite images and smartphone pictures collected from farmers for insurance purposes to generate credit scores, which can then be used to extend loans to smallholders without an on-site visit. The initiative was set up as a rapid response project to address immediate needs during the COVID-19 pandemic. To date, roughly 200 farmers have received loans through the programme in the state of Odisha, India.¹⁴⁰

Figure 30 **Examples of agri DFS solutions introduced during the COVID-19 pandemic**

| | |
|---|---|
|  | <p>Smartphone and satellite-based crop monitoring capabilities used for insurance are supporting a microcredit product.</p> |
|  | <p>Developed the “KhetScore” credit scoring system to determine the creditworthiness of smallholder farmers. Also maintains an agreement with Government of Odisha.</p> |
|  | <p>Provides microfinance to the poor. Will rely on the KhetScore credit scoring system to extend loans to farmers without farmer visits. Carries 90 per cent of the risk.</p> |

The GSMA AgriTech Programme identified several trends in agri DFS during the COVID-19 pandemic

Trend 1

The pandemic has accelerated the adoption of mobile money among smallholder farmers

There has been a surge in the use of mobile money across LMICs during the COVID-19 pandemic. Governments have led the way in many LMICs by lowering barriers to entry and instituting social programmes that rely on mobile money and other digital financial products to rapidly disburse funds to low-income populations. MasterCard estimates that in Latin America alone, 40 million people became “banked” in the five months after lockdown due in large part to these government-led social programmes.¹⁴¹ Donors and the private sector have also played a role in boosting mobile money usage during the pandemic by leveraging mobile technology to issue assistance payments, input vouchers and to pay farmers.

Trend 2

Agritech companies are using data collected from smallholder farmers through digital procurement or digital insurance products to introduce new credit products

Many agritech companies providing digital financial services have heard from their smallholder farmer clients that what they need most is credit to buy inputs for the next growing season and pay household expenses. This has taken priority over other products the agritech company may be pitching, including insurance. To fill this need, agritech companies, particularly those offering digital agriculture insurance, have been leveraging their assets, including farmer data, big data platforms and remote imaging (drone or satellite) to come up with new and innovative ways to assess a farmer’s ability to repay a loan.

E-commerce experienced a spike in demand in response to the COVID-19 pandemic

Stay-at-home orders, limits on non-essential travel and general concerns about the spread of COVID-19 in public spaces led many consumers to turn to online shopping and home deliveries for their grocery purchases. A survey of 2,000 customers in Latin America by Americas Market Intelligence (AMI) in the early months of the pandemic found that 43 per cent of consumers increased their online purchases, while 12 per cent made their first ever online purchase during the COVID-19 pandemic.¹⁴² In India, initial estimates put online grocery sales at \$3 billion in 2020, a 76 per cent increase over 2019 levels.¹⁴³ A survey conducted by Facebook and Bain & Company found that online grocery sales in Southeast Asia increased threefold in 2020 relative to 2019 levels.¹⁴⁴ Agri e-commerce companies in various LMICs were the beneficiaries of these changing consumer dynamics (see Figure 31).

Figure 31 Increase in demand experienced by various agri e-commerce companies during the pandemic



Smartphone and sat In March, April and May, GrocerApp, an online grocer in Pakistan, reported increases in demand of **50 to 70 per cent** per month.¹⁴⁵ As the pandemic raged on, growth slowed to a still robust **20 to 30 per cent** per month in the final months of 2020.¹⁴⁶



In March and April alone, over 100,000 new users downloaded the TaniHub app.¹⁴⁷ TaniHub, an agri e-commerce company in Indonesia, added a total of 250,000 users in 2020. It also reported an increase in revenue of **639 per cent** in 2020, up from approximately 300 per cent in 2019.¹⁴⁸



Between March and May 2020, the number of users on Mkulima Young's platform increased **fourfold**.¹⁴⁹ Mkulima Young is an online marketplace for agricultural inputs, equipment and crops in Kenya.

Much of the growth in agri e-commerce was powered by a dramatic rise in consumer demand, offsetting losses from the hospitality sector

One of the biggest shifts in demand during the pandemic was from business-to-business (B2B) to business-to-consumer (B2C) (see Figure 32). Demand from the hospitality sector plummeted as lockdowns and subsequent restrictions on public gatherings caused restaurants, hotels and cruises to halt or significantly curb their operations. Agri e-commerce companies, agribusinesses and farmer groups selling directly to the hospitality sector were negatively impacted, as

were agribusinesses, agritech companies and farmer groups selling to schools and other government agencies that were shuttered during the pandemic. Twiga Foods, an agri e-commerce company focused primarily on the B2B space in Kenya prior to the pandemic, teamed with e-commerce player Jumia to accelerate its entry into the consumer segment.

Figure 32 **Change in B2B and B2C demand in the initial months of the pandemic for selected agri e-commerce companies**



Two main models emerged for agri e-commerce companies looking to pivot into B2C sales

The GSMA AgriTech Programme identified two main models that agri e-commerce companies implemented to target the B2C segment (see Figure 33).





Figure 33 **Different models pursued by agri e-commerce companies entering the consumer market**

| Model | Benefits | Examples |
|--|--|--|
| Direct model B2B agri e-commerce companies enter the B2C channel by leveraging their own assets. | <ul style="list-style-type: none"> Retains full control over customer relationship | <p>After seeing demand from their B2B customers fall 95 per cent when lockdowns went into effect, Colombian agri e-commerce company PLAZ simplified their website to make it easier to use for residential customers.¹⁵¹</p> <p>Frubana, a Colombian agri e-commerce company selling primarily to restaurants, launched a new e-commerce platform called Tuccán aimed exclusively at residential customers.¹⁵²</p> |
| Partnership model B2B agri e-commerce companies enter the B2C channel by partnering with companies with B2C expertise. | <ul style="list-style-type: none"> Allows for quick entry into B2C Leverages B2C expertise and assets (customers, logistics, payment platform) of partners | <p>India's agri e-commerce company Ninjacart teamed with online grocers Zomato Market, Swiggy Grocery and Dunzo Fruits and Vegetables for the Harvest the Farms initiative. Zomato, Swiggy and Dunzo customers can purchase Ninjacart-sourced produce through their websites, benefiting both Ninjacart and the smallholder farmers that grow the produce sold on these sites.¹⁵³</p> <p>Kenya's Twiga Foods agri e-commerce company teamed with African e-commerce giant Jumia to accelerate entry into the B2C market. Jumia is picking up Twiga Foods-sourced fresh produce and delivering to residential customers who pay digitally over the Jumia platform.¹⁵⁴</p> |

Agritech companies are leveraging their digital assets and start-up mentality to launch marketplace capabilities

Understanding that finding markets for their products had become a pressing concern for their smallholder clients, many agritech providers adapted their digital agriculture solutions to include e-commerce or marketplace capabilities. In some cases these e-commerce capabilities are relatively simple, using messaging or social media platforms like WhatsApp, Facebook or Twitter, to link buyers and sellers. India's Harvesting Farmer Network (HFN), for instance, helps smallholder farmers post their available crop on Twitter. Interested buyers can then contact the smallholder directly to negotiate the purchase of the crop. The marketplace was launched at the start of the pandemic (in April 2020) and quickly added 2,000 farmers.¹⁵⁵ Lentera in Kenya is leveraging WhatsApp, Facebook Groups and its proprietary CropHQ mobile app to connect farmers to quality inputs and marketplaces. JALA in Indonesia added a linkage feature to their existing app aimed at shrimp farmers (see Figure 34).

Figure 34 Agri e-commerce companies introduce or enhance marketplace capabilities during the pandemic

| | | | |
|--|---|---|--|
|  | <p>Countries: Kenya, Tanzania, Uganda</p> <p>Farmers: 2.5 million</p> <p>Digital services: peer-to-peer knowledge sharing and input marketplace</p> <p>New capabilities added: new WeFarm app connecting farmers¹⁵⁶</p> |  | <p>Countries: Kenya</p> <p>Farmers: n/a</p> <p>Digital services: Agronomic advisory and access to inputs</p> <p>New capabilities added: Marketplace through Facebook, WhatsApp and its proprietary CropHQ app¹⁵⁸</p> |
|  | <p>Country: Nigeria</p> <p>Farmers: about 25,000</p> <p>Digital services: Crowdfunding</p> <p>New capabilities added: Digital marketplace that allows Farmcrowdy to purchase produce from their farmers and sell to buyers in Lagos¹⁵⁷</p> |  | <p>Countries: Indonesia</p> <p>Farmers: 8,600</p> <p>Digital services: Smart monitoring of shrimp farms (IoT and data analytics)</p> <p>New capabilities added: Marketplace to purchase shrimp from smallholders¹⁵⁹</p> |

Agri e-commerce platforms focused on inputs saw growing demand as farmers struggled to access them

Accessing inputs remains one of the most significant challenges for smallholder farmers and agribusinesses during the pandemic. Restrictions on imports and the movement of people and goods within countries have made it more difficult, and expensive, for smallholders to access the inputs they need for the next growing season. Even large agro-industrial companies like Bayer are struggling to get inputs to the farmers that need them. This gap has created an opportunity for agri e-commerce companies focused on the sale and delivery of inputs to rural areas to step up and fill the need. One such agritech is India's AgroStar, an e-commerce and digital advisory company that provides farmers with a range of solutions, from real-time agronomic advisory to agricultural input products delivered at the farmer's doorstep. Farmers can access AgroStar's services by phone or through the company's Android-based mobile app.

CASE STUDY

Bayer and AgroStar partner to deliver inputs to farmers via e-commerce platform

With input shops closed in India, Bayer's Crop Science Division needed a way to get their inputs and crop protection products to smallholder farmers before the next planting season. In April 2020, Bayer teamed with Pune-based AgroStar, an e-commerce company that delivers agricultural inputs, to deliver products directly to the homes or farms of their smallholder customers. Bayer's clients can place their orders online, and AgroStar handles the logistics, leveraging their network of over 500 delivery partners to make the on-site deliveries. AgroStar also offers Bayer clients agronomic advisory. To date, 15,000 farmers have benefited from the programme.¹⁶⁰



India's Kisan Rath app uses the shared economy model to address transportation challenges during the pandemic

CASE STUDY

In India, the Ministry of Agriculture introduced a new app called Kisan Rath in April 2020 in response to transportation restrictions and mandi (market) closures that impacted smallholders nationwide.¹⁶¹ The Android-based app is an Uber-like app that links smallholder farmers and traders to transportation companies. Farmers upload information on the volume and destination of the crop. Truck owners can then agree to transport that volume to the appropriate destination. Despite some early glitches, the app registered over 80,000 farmers and 70,000 traders in the first week after it launched, a sign of the demand for this type of service.¹⁶²



KISAN RATH
कृषि उत्पाद भेजने की सुविधा
Facilitating Transportation of Agri Produce

1
Register and log in to app



Farmers



Traders

2
Post a load

5
View response and transporter's contact number

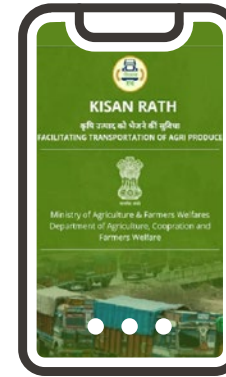
6
Negotiate offline with transporter & finalise the deal

7
Provide feedback and rating



3
View load requests

4
Submit response against the load request



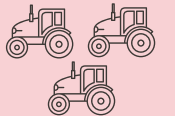
Kisan Rath App



Transport aggregators



Individual transporters



Tractor aggregators



CHC tractor owners

Uganda's SafeBoda uses the shared economy model to move produce from farm to fork

CASE STUDY

In Uganda, the United Nations Capital Development Fund (UNCDF), in conjunction with the Swedish International Development Cooperation Agency (Sida) teamed up with the SafeBoda ride-sharing app to help food vendors identify new customers following the imposition of lockdowns and other COVID-19-related safety measures. UNCDF trained 800 food vendors in the use of the app, linking them to SafeBoda's network of 18,000 drivers to make their produce deliveries.¹⁶³ The UNCDF estimated that the new tool could reach up to 50,000 customers daily.¹⁶⁴ One of the first vendors to adopt the SafeBoda app has seen sales increase to above pre-COVID levels. In fact, she recorded her highest ever daily sales (over \$135 or UGX 500,000) after she began selling her produce through the SafeBoda app, which is critical if vendors are to continue using the digital tool once restrictions ease.¹⁶⁴

800 vendors find new customers for their produce

18,000 drivers supplement their income to mitigate income losses from COVID-19

50,000 customers can have fresh produce delivered safely to their homes



Agritech companies are leveraging their digital assets and start-up mentality to launch marketplace capabilities

Trend 1

To stay afloat, many agri e-commerce companies added a B2C sales channel to their business to mitigate the collapse in demand from the hospitality segment

Before the pandemic, the priority of most agri e-commerce companies was linking smallholders to businesses, including restaurants, small family-run stores, hotels, supermarkets or a combination of all four. The COVID-19 pandemic put pressure on agri e-commerce companies that focused exclusively on B2B markets, forcing many to develop (or accelerate) plans to set up a B2C channel. Some agri e-commerce companies have done so themselves while others have developed partnerships with companies that have expertise in B2C e-commerce.

Trend 2

Dozens, if not hundreds, of digital agriculture tools added market linkages in response to smallholder requests during 2020

With farmers eager to find new markets for their products, many government agencies, donors and agritech companies quickly added market linkage capabilities to their digital agriculture tools. For the most part, these have been relatively simple tools that enable farmers to find potential buyers for their crops. Because these tools do not necessarily solve the logistics challenge, they are sometimes met with frustration when a farmer identifies a potential buyer, but then has no way to deliver the product because of distance or COVID-19-related restrictions.

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4 Key findings and recommendations



COVID-19 has accelerated the adoption of digital agriculture solutions in LMICs

COVID-19 has highlighted the need for resilient and efficient agricultural value chains

COVID-19 has exposed the vulnerability of agricultural value chains worldwide, particularly in LMICs. Global and local supply chains have been interrupted, markets have closed and movement has been restricted, leading to labour shortages and challenges in moving food from farm to fork. Across many LMICs, up to 70 per cent or more of smallholder farmers are reporting lower incomes as a direct result of the measures enacted by governments around the world to combat the pandemic.¹⁶⁸ Rising poverty among smallholder farmers poses a risk to the future health of the agriculture sector worldwide.

The pandemic has shown that digital agriculture tools have the ability to help smallholder farmers and agribusinesses overcome a variety of pain points, making them more resilient to future shocks

The COVID-19 pandemic has accelerated the rate of digitisation among smallholder farmers in LMICs. At the onset of the pandemic, governments, donors and agribusinesses needed a quick and contactless way to distribute billions in assistance and relay critical information to smallholder farmers. With few options, smallholder farmers have had to adopt digital tools to access much-needed information or inputs, get paid or find buyers for their products. Smallholder farmers have found that access to digital tools has made them more resilient to the pandemic than those who do not use these tools. For example, smallholder farmers working with agri e-commerce company TaniHub in Indonesia found that their incomes were higher than neighbouring farmers without the same connection.¹⁶⁹ In Uganda, small retailers that signed up for SafeBoda's digital marketplace were able to exceed pre-pandemic income levels (see [SafeBoda case study](#)).

Digital advisory, agri DFS and agri e-commerce became the most sought-after solutions during the pandemic

Some of the challenges faced by smallholder farmers became more urgent during the COVID-19 pandemic, including limited access to information, inability to access affordable inputs and limited access to markets, competitive prices and finance. Digital advisory, agri DFS (particularly mobile money and credit) and agri e-commerce proved to be the solutions best suited to addressing these challenges during the pandemic. All these solutions recorded a major uptick in use in 2020.

Several obstacles need to be overcome to sustain long-term adoption of digital agriculture tools

Challenges related to availability and access to technology have been exacerbated by the pandemic.

The availability of affordable devices and the price of data is a key constraints for many smallholder farmers, particularly female farmers in LMICs. 60_decibels found that a large proportion of farmers in Kenya who reduced their use of digital tools during the pandemic did so mainly because of the high cost of data and lower income levels.¹⁶⁵

There is a risk that the digital divide between female and male farmers will widen if steps are not taken to address the problem.

Women generally lag behind men in digital literacy and phone ownership. During the pandemic, women have been more likely than men to be laid off and to have taken a bigger hit to their incomes, and they also shoulder a heavier burden of housework and childcare.

Misinformation has been a challenge in some countries.

Particularly in P2P communications that use social media platforms like WhatsApp and Facebook Groups. In India, for example, erroneous information about the spread of COVID-19 through contaminated chickens circulated on WhatsApp, causing demand for poultry to collapse. Providers need to build trust in the reliability of the information and advisory they provide.¹⁶⁶

Decline in profitability from mobile money services.

Although an easing of mobile money and contactless transactions has increased adoption and transaction volumes, MNOs and mobile money providers are in some cases recording lower revenue due to the elimination of fees and lower transaction values. MTN, for instance, reported a drop in mobile money revenue in the months following the pandemic.¹⁶⁷ MTN removed fees on various services as a way of supporting different government initiatives aimed at curbing the spread of the pandemic.

Recommendations for agritech companies



Engage with governments and donors leading digital agriculture projects worldwide.

Governments, investors and donors are directing hundreds of millions of dollars to supporting the agriculture sector in LMICs during the pandemic. They are not only accelerating the deployment of funds, but also prioritising digitisation initiatives with longer-term potential. The World Bank, for example, has teamed with 15 agritech start-ups in Kenya to address various challenges facing smallholder farmers, including input delivery, crop insurance, soil testing, credit provision, advisory and market linkages.¹⁷⁰ UNCTAD's "eTrade for all" prioritises investments in e-commerce initiatives in LMICs,¹⁷¹ and supports other digital solutions through their five-year "Leaving No One Behind in the Digital Era" strategy. Similar initiatives are being launched in other LMICs, opening up new opportunities to agritech companies, particularly those that have seen a tightening of traditional private financing channels.



Seek partnerships with organisations that have complementary assets.

The COVID-19 pandemic has forced agritech companies to shift their strategies quickly. Agri e-commerce companies that had focused on B2B before the pandemic had to launch B2C channels within weeks or build logistics infrastructure from scratch. Companies offering insurance services pivoted to offer credit products when their customers struggled to find credit elsewhere. Digital procurement, smart farming and crowdfunding tools added market linkages when they noted that their smallholder farmer partners were unable to find markets for their products. Adding new capabilities quickly can be complicated and costly, and can result in poorly designed tools that do not address user challenges. Partnerships with companies that have expertise in the capabilities being added and provide more than "just a technology platform" (e.g. retail e-commerce experience for B2B agri e-commerce companies looking to add a B2C arm) can not only speed up the roll out of new products, they can also increase the chance that the new products will be successful in addressing farmer challenges.



Prioritise digital agriculture advisory tools over third-party platforms like WhatsApp and Facebook Groups.

Although platforms like WhatsApp and Facebook hold significant appeal given their large-scale adoption by smallholder farmers in LMICs, these platforms were not designed with agriculture in mind and have several limitations that should be considered when introducing digital advisory services. First, WhatsApp and Facebook require an active data connection, which can be a challenge in rural areas. Second, it is the platform – not the agribusiness, agritech company or cooperative – that manages the relationship with the smallholder. Third, the peer-to-peer (P2P) nature of these platforms makes them highly susceptible to the rapid spread of misinformation, which can have devastating results as the poultry case in India demonstrates. Digital advisory tools that rely on IVR, SMS or even applications that can be accessed offline are more scalable, and can be far more effective at meeting the medium- and long-term advisory needs of both smallholder farmers and agribusinesses.

Recommendations for investors, donors and multilateral organisations



Focus on opportunities with a strong value proposition that offer end-to-end solutions and clear revenue models.

Digital agriculture solutions should solve a range of challenges facing stakeholders in agricultural value chains rather than one specific problem. For instance, improving farmers' access to inputs and finance is not enough on its own. Farmers are more likely to make the best use of seeds and credit if inputs are supplemented with regular agricultural advisory and access to markets, both of which digital solutions can provide. The need to offer a full range of solutions via a single platform became even more apparent during the COVID-19 pandemic when agriculture sector stakeholders had to act with a sense of urgency.



Support the development of the ecosystems underlying the successful development of various tools.

Developing agri DFS without an enabling digital payments ecosystem to support them greatly reduces their ability to build economic resilience among smallholder farmers. Similarly, introducing potential crop buyers to smallholder farmers will not help them improve their livelihoods if the crop cannot be transported to the buyer or if there is no underlying logistics support. Many new tools emerged virtually overnight during the pandemic, but not all of them took the time to build an enabling ecosystem. Investors, donors and particularly multilateral organisations, will need to ensure that this ecosystem is in place before making an investment. Alternatively, they can use their resources and ability to influence government policy and regulation to help develop the ecosystem necessary to support digital agriculture solutions.



Support initiatives that have specific strategies to address the challenges facing those most negatively impacted by the pandemic, notably women.

The gains made by female smallholder farmers over the last decade are at risk of being reversed if specific actions are not taken by agriculture sector stakeholders. Impact investors, donors and multilateral organisations can and should play a critical role in ensuring that new initiatives include provisions to address challenges specific to women.

Endnotes

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5 Appendix



Selected list of reports consulted for this study

1

The GSMA AgriTech programme drew on insights from a growing body of literature focused on the short and longer-term impacts of the COVID-19 pandemic on the agriculture sector in LMICs:

Literature on the impact of COVID-19 on agriculture

- Clingendael (2020), The Impact of COVID-19 Measures on Indonesian Value Chains.
- Clingendael (2020), COVID-19 Impact on West African Value Chains.
- Committee on World Food Security (CFS) (2020), Impacts of COVID-19 on Food Security and Nutrition: Developing Effective Policy Responses to Address the Hunger and Malnutrition Pandemic.
- Environmental and Resource Economics (2020), Impacts of the COVID-19 Pandemic on the Global Agricultural Markets.
- Food and Agriculture Organization of the United Nations (FAO) (2020), Extension and Advisory Services: At the Frontline of the Response to COVID-19 to Ensure Food Security.
- FAO (2020), Q&A COVID-19 Pandemic: Impact on Food and Agriculture.
- International Fund for Agricultural Development (IFAD) (2020), COVID-19 Response must Target African Agriculture and the Rural Poor.
- International Monetary Fund (IMF) (2020), Food Markets During COVID-19.
- MDPI (2020), Growing and Eating Food During the COVID-19 Pandemic: Farmers' Perspectives on Local Food System Resilience to Shocks in Southern Africa and Indonesia.
- Mercy Corps (2020), COVID-19 and Livestock Market Systems: The Impact of COVID-19 on Livestock-based Economies in the Horn of Africa.
- Organisation for Economic Co-operation and Development (OECD) (2020), COVID-19 and the Food and Agriculture Sector: Issues and Policy Responses.
- Rural and Agricultural Finance Learning Lab and ISF Advisors (2020), COVID-19 Emergency Briefing Series.
- World Food Programme (WFP) (2020), WFP Global Update on COVID-19: November 2020 Growing Needs, Response to Date and What's to Come in 2021.
- World Bank (2020), COVID-19 High Frequency Monitoring Dashboard.
- World Bank (2020), Food Security and COVID-19.

Selected list of reports consulted for this study

2

Literature on the impact of COVID-19 on gender dynamics

- FAO (2020), Gendered Impacts of COVID-19 and Equitable Policy Responses in Agriculture, Food Security and Nutrition.
- World Bank (2020), Gender Dimensions of the COVID-19 Pandemic.
- UNCTAD (2020), Trade and Gender Linkages: The Gender Impact of Technological Upgrading in Agriculture.
- World Bank (2020), COVID-19: A Pivotal Moment to Support Women Farmers.
- UN Women (202), From Insight to Action: Gender Equality in the Wake of COVID-19.

Literature on the impact of COVID-19 on mobile money trends

- IMF (2020), Mobile Money in the COVID-19 Pandemic.
- FAO (2020), Digital Finance and Inclusion in the Time of COVID-19.
- CGAP (2020), Social Assistance Payments in Response to COVID-19: The Role of Donors.

Literature on the impact of COVID-19 on digitisation

- IFC (2020), The Impact of COVID-19 on Disruptive Technology Adoption in Emerging Markets.
- The Fletcher School, Tufts University (2020), Digital in the Time of COVID.
- Harvard Business Review (2020), Reevaluating Digital Transformation During Covid-19: Why Leading Companies are Focusing on Operational Agility.

Surveys consulted for this study

The GSMA AgriTech programme drew on insights from quantitative surveys conducted in many LMICs in 2020 to better understand the impact of COVID-19 on smallholder farmers and rural communities. Among the surveys reviewed for this study were:

- International Food Policy Research Institute (IFPRI) survey of 1,515 farmers in Haryana and Odisha, India: Impacts of a National Lockdown on Smallholder Farmers' Income and Food Security: Empirical Evidence from two States in India
- World Bank's COVID-19 High Frequency Monitoring Dashboard
- CGIAR-led phone-based survey of 1,275 wheat and 632 tomato farmers in the state of Haryana, India: Reduced Crop Income During the COVID-19 Pandemic in India: The Perils of Price Risk (forthcoming)
- Root Capital's survey of 134 clients in Africa, Latin America and Indonesia: Impacts of COVID-19 on Agricultural Businesses in Africa, Latin America and Indonesia
- TechnoServe's monthly survey of 800 farmers globally, Smallholder Farmers and the Impact of the COVID-19 Pandemic
- 60_decibels survey of farmers in Kenya between June 2020 and October 2020. Roughly 500 surveys completed each month for a total of 2,572 surveys: 60_decibels COVID-19 Agriculture Dashboard
- Precision Agriculture for Development (PAD) survey conducted monthly between April and September 2020 in Kenya and two states in India. Survey results capture data from 4,166 farmers: COVID-19 Survey Dashboard
- Technoserve and Laterite survey of coffee farmers in Kenya, Ethiopia and Uganda: Overview of COVID-19 Impact on Farmers
- Hivos survey of 71 farmers in the horticulture value chain in Kenya: Hivos Rapid Assessment 2020: Impact of Covid-19 on Women Workers in the Horticulture Sector in Kenya
- World Bank, IDinsight and Data Development Lab survey of 4,576 rural households across six Indian states undertaken in May 2020 and 5,005 rural households in July 2020: Economic Impacts of COVID-19: Rapid Survey of Rural Households
- AMI + EchoMR survey of 2,000 consumers in Colombia, Mexico and Brazil: The New COVID Consumer
- UNCTAD survey of 257 e-commerce companies between March and July 2020 in 23 countries, primarily in Africa and Asia: COVID-19 and E-Commerce: Impact on Businesses and Policy Responses
- RBM and ACF interviews with pastoralists in West Africa during 2020 and early 2021: Pastoral Monitoring – COVID-19

Conferences or webinars attended for this study

The GSMA AgriTech programme drew on insights from several virtual events held between March 2020 and December 2020.

- ICT4D Conference (May 2020): Supporting Farmers with Low-Cost Digital Tools During COVID-19
- ANDE West Africa (December 2020): Food Security and Nutrition Innovation in Agribusiness Value Chain
- Agrilinks (November 2020): Socioeconomic Impacts of COVID-19 in Four African Countries
- FAO and AfDB (June 2020): Digitalization to Transform Agriculture in Africa – Covid-19 & Beyond
- AfDB (February 2021): The Acceleration of Digitalization in COVID-19 Times

The GSMA AgriTech Programme use case definitions

| Characteristics | Sub-category | Characteristics |
|--|--|--|
| 1 Digital advisory | | |
| Information-based services providing smallholder farmers with agronomic and livestock advice and best practices, information on market prices, weather and climate information as well as financial and digital literacy training. | 1. Agricultural value-added services (Agri VAS) | One-to-many advisories covering agricultural and livestock information, weather and climate information and information on market prices. Agri VAS are delivered via voice channels (IVR, helplines), text channels (SMS and USSD) and via apps. |
| | 2. Smart advisory | Data-driven advisory based on tailored, farm-level agro-climatic and crop-specific information to support decision making, maximise productivity and reduce costs. Technologies such as sensors, satellites and drones, as well as big data analytics and AI, underpin many of these services. |
| | 3. Weather information | Specialist services that provide regional and localised weather forecasts. This sub-category may include weather-adaptive and climate-smart advice. |
| | 4. Pest and disease management | Digital tools that help farmers diagnose plant disease and develop strategies to treat diseased plants as well as mitigate future outbreaks. Most of the services are accessible via mobile applications and require a farmer to upload a picture of the infected plant for diagnosis. Some services are also accessible via USSD. Also includes national and regional-level pest and disease early warning systems. |
| | 5. Product verification | Digital tools designed to enable farmers to validate the authenticity of agriculture inputs such as seeds, fertilisers, agro chemicals and other agro inputs and prevent the proliferation of counterfeit products. Most services require farmers to send a scratch-off code from the product to a specified number via SMS. |
| | 6. Record keeping | Digital tools that enable farmers to keep detailed records of livestock, including health and feeding data, to help mitigate diseases and avoid missed conceptions. Record keeping tools are also used to keep details of input use, procurement, cost and revenue and sales records. |

The GSMA AgriTech Programme use case definitions

2 Agri digital financial services

Digitally-enabled financial services for smallholders to facilitate their inclusion in the formal financial economy and allow investment in farming activities. These services are customised to meet farmers' needs and tailored to suit their cropping cycles. This category also includes financial products that enable financial service providers to lower the risk of lending to smallholders.

7. Credit and loans

Lending products that target smallholders and address specific agricultural needs. Most of these products enable the provision of short-term financing for agricultural inputs.

8. Credit scoring

Digital solutions that assess the creditworthiness of smallholder farmers using aggregated data from multiple sources, including bio data, procurement records and mobile money transactions. These tools enable financial service providers to serve smallholder farmers and lower their risks.

9. Crowdfunding

Online platforms that enable investment in smallholders by sourcing funds from individuals (investors or sponsors). Most platforms also allow investors to "follow" the farmers they have invested in by providing updates via text, pictures and videos from their dashboard through a website or an app.

10. Input financing

Digital tools that enable financing for the purchase of inputs like seeds, fertiliser, pesticides/herbicides from various sources, including governments, through subsidies.

11. Savings

Targeted digital savings products for farmers designed to match their spending and savings habits, enabling them to put money aside for agricultural activities.

12. Digital agri wallets

Digital wallets enable farmers to transact with various actors within the agriculture ecosystem, for instance, making and receiving payments, including electronic vouchers with which to redeem agricultural inputs. Digital wallets also allow farmers to save money and develop a transactional history, which can be used alongside other types of data to access additional financial services.

13. Insurance

Digitally-enabled agricultural insurance services that help smallholder farmers mitigate the risks associated with external shocks, such as weather events and pest and disease outbreaks. Agricultural insurance includes weather index, area yield index, multi-peril, livestock and livestock index insurance products.

14. Accountability tool

Digital tools designed to help farmers view farming as a business by allowing them to track farming expenses and revenues and prove their creditworthiness.

The GSMA AgriTech Programme use case definitions

3 Digital procurement

Digital solutions in the agricultural last mile that enable a range of digital systems and processes to transition from paper to digital. These solutions help agribusinesses increase transparency in their transactions with smallholders and improve efficiency and operational profitability. At the same time, farmers benefit from more transparent transactions, improved market access and from establishing a digital footprint, which can be used to access financial services.

15. Digital records

Digital solutions that replace paper-based systems and digitise transactions between farmers and agribusinesses.

16. Digital records with payments

Digital solutions that replace paper-based systems, digitise transactions between farmers and agribusinesses and enable the integration of digital payments for the procurement of crops.

17. Digital records with traceability

Digital solutions that replace paper-based systems, digitise transactions between farmers and agribusinesses and support the traceability of produce from "farm to fork".

18. Digital records with payments and traceability

Digital solutions that replace paper-based systems, digitise transactions between farmers and agribusinesses, enable the integration of digital payments for the procurement of crops and support the traceability of produce from "farm to fork".

The GSMA AgriTech Programme use case definitions

4 Agri e-commerce

Digital platforms that enable the buying and selling of agricultural produce and inputs online. Although most agri e-commerce businesses sell domestically to urban consumers, agri e-commerce also enables farmers to reach international buyers.

19. Inputs

Agri input platforms enable the sale of inputs, such as seeds, fertilisers, pesticides/herbicides, from input suppliers to farmers. Such platforms may also enable groups of farmers to aggregate demand and place bulk orders.

20. Outputs

Platforms that enable farmers to sell to consumers (B2C model) and to enterprise customers (B2B model), such as companies in the catering industry (e.g. hotels, restaurants) and market retailers, or a hybrid of the two.

21. Inputs and outputs

Platforms that enable the sale of agricultural inputs to farmers from input suppliers, as well as the sale of agricultural produce from farmers to consumers and businesses.

5 Smart farming

Smart farming refers to the use of sensors, drones, satellites and other farm assets to generate and transmit data about a specific crop, animal or practice to support agricultural activities. Smart farming solutions rely on connectivity between IoT-enabled devices to optimise production processes and growth conditions while minimising costs and saving resources.

22. Equipment monitoring

The smart monitoring of equipment, such as irrigation systems that enable farmers to remotely control, track and look after their equipment and farming operations, leading to a reduction in water consumption and waste.

23. Livestock and aquaculture management

Digital tools that allow farmers to monitor herds remotely to determine their exact location at any time and track the health and habits of livestock, including when they are in oestrus or about to calve. Similarly, aquaculture management systems enable farmers to monitor feeding patterns of fish and other aquaculture, detect diseases in advance, control water quality and, in some cases, automate feeding completely.

24. Smart shared assets

Digital tools that enable the sharing economy for assets, such as tractors, drones and other mechanised farming equipment. They provide smallholder farmers an opportunity to mechanise processes, such as crop spraying, crop monitoring and land preparation.



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