

REPORT

The Role of Digital Payments in Sustainable Agriculture and Food Security

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ALLIANCE



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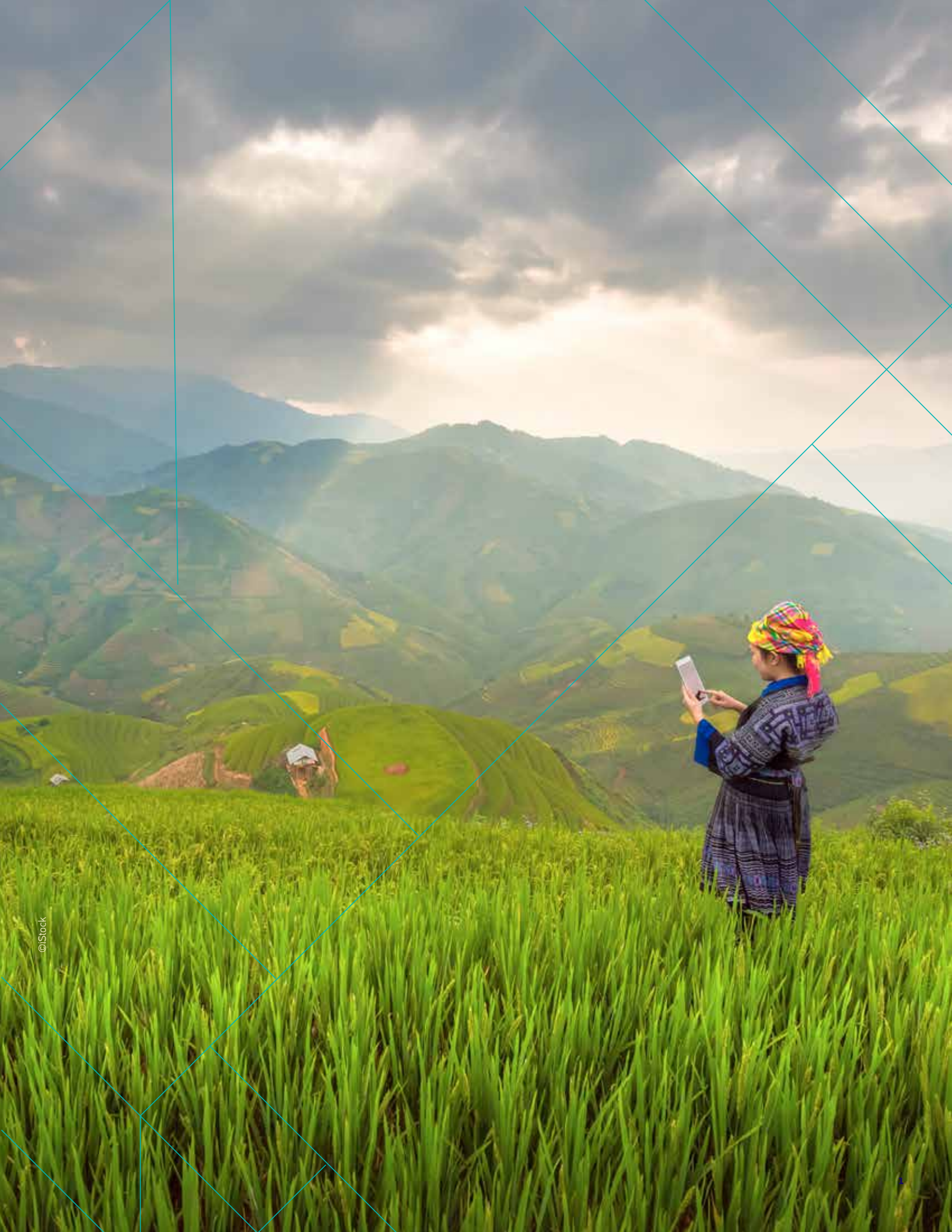


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1. EXECUTIVE SUMMARY

The nations of the world have developed the capabilities to produce enough food for the human population. Solutions have been developed for blight and for drought, for enriching depleted soil and repelling unwanted pests. Yet, in the three-year period from 2014 to 2016, one in every nine people – almost 800 million in total – did not have enough food for at least a year.¹ Effective and proven solutions exist, but they are not reaching enough of those who need them most. As a result, the challenge of hunger continues to be felt every day, during this age of plenty.

Fortunately, technologies exist that can help to eliminate many of these barriers, digitizing financial transactions and connecting farmers more closely to their buyers and suppliers. Digital payment instruments can help farmers sell more quickly for a higher price, allow them to access sorely needed credit for the fertilizer that will help their harvest thrive, and enable their governments to provide aid in case crops do not grow.

This paper by the Better Than Cash Alliance examines how a shift to digital payments can provide powerful solutions that help countries improve agricultural productivity and ensure food security, thus raising incomes, reducing hunger, and driving financial inclusion. These issues have specific relevance to the Asia-Pacific Economic Cooperation Forum (“APEC”), given that agriculture makes a substantial economic contribution to the APEC economies. Additionally, one of the key priorities for APEC Viet Nam 2017 is enhancing food security and sustainable agriculture in response to climate change.³ This report aims to help APEC economies begin (or expedite) the shift to digitize payments in their agriculture sectors. In addition, the information and recommendations herein are likely to assist APEC economies and other countries in fulfilling their commitments toward Sustainable Development Goal #2: “End hunger, achieve food security and improved nutrition and promote sustainable agriculture.”

The paper begins by summarizing the state of food security, agricultural productivity, and the interplay between the two across several geographies, and then examines digital payments as a specific mechanism for improving agricultural productivity and providing social support. Three key barriers to a sustainable agricultural sector are reviewed: inefficient value chains and markets, an overall lack of financial services for farmers, and unreliable safety nets.

This document is intended to help guide APEC decision-makers in the private, public, and development sectors as they work to increase digital payments. To this end, specific actions are presented to enable key stakeholders, including agribusinesses, governments, payments providers, and donors to deliver these solutions.

KEY FINDINGS

Expanding digital payments and building responsible digital payments ecosystems are fundamental to creating a sustainable agricultural sector and addressing poverty and hunger.

By enabling farmers to be compensated quickly, transparently, and securely for their crops, digital payments allow them to save money and reinvest it in their livelihoods. In sparsely populated rural areas, where the majority of smallholders live, digital payments are the crucial first step to providing financial services in a sustainable, profitable manner. The study also finds that inclusive digital payment ecosystems⁴ are critical to building resiliency in vulnerable communities, as they allow governments and NGOs to reach those afflicted by crisis rapidly and effectively.

Investing in agricultural productivity and capacity by enabling more digital payments is likely to have outsized returns.

Seventy-five to 85% of the world's poor live in rural areas and account for the majority of the world's hungry.^{5,6} Of the poor that live in rural areas worldwide, at least 80% depend directly or indirectly on agriculture for their household income.⁷ Regionally, Asia has the greatest absolute number of undernourished people (490 million), while sub-Saharan Africa has the highest prevalence of undernourishment, at 23% of the overall population.

The world's rural poor tend to rely upon agriculture for income and survival, and as a result of this reliance, there are outsized returns to investments in their agricultural capacity and productivity. A 1% increase in agricultural production in eight APEC economies was associated with a 1.4% decrease in the number of rural people living under the poverty line,⁸ and growth in the agricultural sector has been shown to reduce poverty more than industrial or service growth worldwide.⁹ Further, subsistence farmers, who make up roughly 60% of all smallholders,¹⁰ consume most or all that they produce and have little connection with markets, meaning improvements to productivity and capacity can have a considerable impact on their levels of nourishment.

“ The first essential component of social justice is adequate food for all mankind. Food is the moral right of all who are born into this world.”²

DR. NORMAN BORLAUG
AGRONOMIST AND NOBEL LAUREATE

The vast scale of smallholder farming in aggregate also makes investments in productivity and capacity crucial for addressing hunger and financial inclusion, as well as providing broader economic benefits. There are more than 570 million farms globally, of which 84%, or a little over 475 million, are smaller than two hectares.¹¹ These are collectively known as smallholder farms, and are home to as many as 2.5 billion people worldwide.¹² Smallholder farmers produce up to 80% of the food in Africa and Asia.¹³ However, up to 37% of all food produced in sub-Saharan Africa and South Asia goes unconsumed due to difficulties farmers face getting their harvested crops into production and to market, including problems associated with cash-based payment for their crops.¹⁴

Accordingly, this paper finds a key target for process and efficiency improvement is in the area of payments made along the agricultural value chain.

The disadvantages of cash are magnified for people in rural and remote communities.

Farmers, particularly smallholders in the developing world, are overwhelmingly paid in cash. In lower- and middle-income countries in 2014, according to the Global Findex report, 95% of those receiving agricultural payments were paid in cash. Even the least cash-heavy agricultural countries still report 75% of agricultural transactions in cash.¹⁵

The rural poor are disproportionately disadvantaged by the shortcomings of cash. Cash is costly to collect and to send, it can be stolen or misappropriated, and it is slow to transport, leaving farmers waiting days or weeks for compensation. Each of these drawbacks is magnified the farther removed (physically or socially) a person is from a central market. The longer the transfer process of cash, the more expensive, time-consuming, and insecure that process becomes.



There is a wide gender gap in agricultural opportunities and outcomes, which digital payments can help to address.

There is a distinct gender element to agricultural productivity. Women make up 43% of the agricultural labor force,¹⁶ but are “more likely to be asset-poor subsistence farmers.”¹⁷ Female farmers produce less per acre than male counterparts, having less access to seed, fertilizer, and tools.¹⁸ Across the world women are significantly less likely to own land, and to own much smaller plots if they do.¹⁹ The underlying cause, according to the FAO, is “repeated across regions: social norms systematically limit the options available to women.”²⁰

The disparities continue beyond physical inputs. Women are less likely to have access to financial services: 43% of women in India have a bank account, for example, compared to 63% of men.²¹ If women farmers had equal access to non-land inputs, agricultural production could be increased enough to meet the nutritional requirements of up to 150 million people annually.²² Digital payments and digital financial services offer women new ways to transact, save, and borrow, potentially allowing them to circumvent traditional limits to their access.

Digital payments have been slow to catch on with smallholder farmers in poor rural communities.

Barriers of geography, infrastructure, and affordability prevent many smallholder farmers from connecting to domestic markets. As a result, the simple act of selling a harvest in exchange for income is beyond the capability of millions of farmers.

Further, because they operate in heavily cash-based economies, farmers often do not see the value of holding digital currency, and cash out their payments at the first possible opportunity, incurring significant fees.

In order to replace cash, digital payments must offer a greater value proposition and operate within a far broader digital payments ecosystem.

Until farmers can be paid digitally for their crops, then use those funds to buy the things they need (fertilizer, food, tools) in the same digital currency, cash is likely to continue dominating rural transactions. The Better Than Cash Alliance’s report *Accelerators to an Inclusive Digital Payments Ecosystem* set out various measures that can help improve the value proposition of digital payments, including the promotion of merchant acceptance infrastructure.

KEY BARRIERS

There are three principal barriers to improving agricultural sector efficiency and food security which can be addressed by digital payments.



Cash-based value chains and inefficient markets

- Agricultural value chains entail numerous transactions between all types of stakeholders: farmers, input sellers, creditors, local buyers, global agribusinesses, and others. The high volume of transactions creates a multiplier for any inefficiencies, such as cash payments.
- In addition, many farmers incur considerable risks when selling their crops due to information asymmetries and other barriers.
- Digital payments help by shortening transaction times and improving transparency through quicker, traceable payments. For agribusinesses procuring from a large group of distributed suppliers, digital transactions offer greater security, speed, and efficiency.
- At the same time, new payment channels could facilitate the establishment of digital marketplaces or virtual trading floors²³ for farmers, allowing them to sell their crops directly to buyers, and for large-scale buyers to track behavior of designated buyers.
- Mobile industry association GSMA estimated that the potential market for digital value chain payments would reach US\$394 billion by 2020, paid to 370 million farmers.²⁴



Lack of non-payment financial services suitable for smallholders

- There is an urgent need for financial services among smallholder farmers. Credit is needed to finance investments, while savings and insurance enable farmers to mitigate risk and build up wealth.
- Financial service providers have struggled to meet the needs of smallholder farmers, due to their volatile incomes and low density.
- Digital payments facilitate access to financial services for smallholder farmers by lowering transaction costs, providing flexibility, and improving the customer experience. This is critical to building a business case for financial service providers in rural areas.
- Demand for just agricultural credit has been estimated to be as high as US\$450 billion.²⁵



Inefficient delivery of social programs and remittances

- Social protection, whether it be in the form of private remittances or public transfers, is necessary to maintain food security.
- Unfortunately, 73% of the world's poor lack the social support structures necessary to assist them during inevitable food shortages,²⁶ and three-quarters of the most vulnerable households are not covered by a social safety net program.²⁷
- Digital payments can help improve the efficiency of social program delivery by reducing costs and leakages for government transfers aimed at the rural poor, and can increase access to private support by lowering the cost of remittances.



ECONOMY-SPECIFIC FINDINGS

MEXICO has a robust social safety net for the poor in general and farmers in particular, with large-scale conditional transfers reaching more than 25 million low-income beneficiaries²⁸ and subsidies to over 1.5 million farms in 2016.²⁹ Both programs are moving to digital payments; however, less developed digital payments ecosystems mean that the vast majority of recipients cash out their payments.³⁰ Only 54% of Mexican municipalities had an ATM, and there were just six POS terminals for every 1,000 inhabitants, compared to 22 for Brazil.^{31,32} A 2014 study estimated that cash costs Mexico over \$100 million and 48 million hours annually.³³ This presents a major opportunity for Mexico to deliver significant economic and social benefits by building out digital payments ecosystems in rural areas, particularly through collaboration between the public and private sector.

INDONESIA has made great progress, almost doubling its financial inclusion rate, from 19.6% of adults having an account to 36.1%, in just three years.³⁴ However, around one-third of the population work in agriculture in some way, and of this cohort, 81% lived below the poverty line in 2015.³⁵ The digitization of Indonesia's rice subsidy, and a wide-scale pilot of a single social payments instrument, currently underway, have the capacity to substantially expand the digital payments ecosystem for the rural poor and drive further gains in financial inclusion. Digitization of agricultural payments in the palm oil industry – valued around US\$2.8 billion³⁶ – is also gathering momentum, with significant benefits expected to flow to rural communities.

ETHIOPIA is among the countries in the world that have the most to gain from digitizing payments in the agricultural sector. In 2013 (the last year for which data is available), agriculture accounted for 73% of total employment, and agricultural value added made up 45% of Ethiopia's GDP, both among the highest in Africa.³⁷ Ethiopia is also one of the most food insecure nations in the world, with almost a third of the population undernourished in 2015.³⁸ To its credit, Ethiopia already has a tremendous asset for any digitization campaign: its extensive agricultural extension service provides an invaluable tool for training farmers in the use and benefits of digital payments.

Digitization of agricultural payments in the palm oil industry - valued around US\$2.8 BILLION³⁶ - is also gathering momentum, with significant benefits expected to flow to rural communities.

IMPROVING FOOD SECURITY THROUGH DIGITAL PAYMENTS



DID YOU KNOW?

ALMOST **800 MILLION** PEOPLE
WENT **UNDERNOURISHED**
BETWEEN 2014 AND 2016



Cash-based value chains and market barriers lead to lower returns for farmers
Digital value chain payments to reach \$394B by 2020



Lack of financial services prevents farmers from hedging against risk and investing
\$450 billion unmet demand for agricultural credit



Inadequate social support leaves poor families with no buffer
75% of the most vulnerable households are not covered by social safety net programs

SOLUTION

DIGITAL PAYMENTS CAN HELP IMPROVE AGRICULTURE PRODUCTIVITY AND FOOD SECURITY



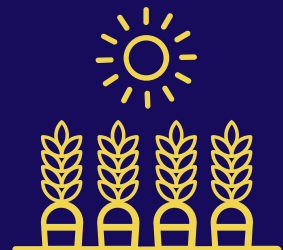
Digital payments tighten links in the value chain, **reduce costs, and enable scalable market solutions**



Digital financial services can lower cost of credit and **expand access to savings/insurance**



Digitizing social transfers and remittances can **lower costs and improve access**



Recommended Actions that Can Enable Digital Payments in the Agricultural Sector

In order for digital payments to strengthen the agricultural sector, this study lays out several immediate actions that can be taken by governments, agribusinesses, payment service providers, and donors:



GOVERNMENTS, PARTICULARLY MINISTRIES OF FINANCE AND AGRICULTURE

- Digitize the payment of routine subsidies, social transfers, and food aid as a means of more effectively reaching remote populations and encouraging digital payment uptake.
- Incorporate training in digital payment usage as a standard part of agricultural extension services.³⁹ Digitizing extension worker salaries can also strongly underpin this effort.
- Investigate cost-effective ways to incentivize the expansion of rural digital payments infrastructure and increase the adoption of merchant digital payments.
- Implement a low-cost, voluntary digital ID program as a way of allowing millions of smallholder farmers to access digital payments and financial services.

Ensure that the regulatory framework for financial services enables safe, low-cost, low-value payments. Examples of such a framework include proportional know-your-customer regimes that allow for remote account opening, agent banking, and a transparent consumer protection regime that allows for timely redress and dispute resolution.



LARGE-SCALE AGRIBUSINESSES

- Evaluate the potential for digitizing crop purchases, as well as other cash flows, as a means of reducing costs, improving productivity, and creating transparency throughout the value chain.
- Work with agricultural supply stores to enable interoperable digital credit and payments services that let farmers use one transaction account for both receiving crop payments as well as making agricultural purchases.



PAYMENT SERVICE PROVIDERS AND MOBILE MONEY OPERATORS

- Particularly in rural markets, integrate payment platforms with leading agricultural buyers and providers of agricultural credit in order to leverage their ties into rural economies.
- Explore new business models for serving rural populations. As mentioned in the Better Than Cash Alliance's "Accelerators"⁴⁰ report, a likely driver of digital payment activity will be the degree to which any one payment service or platform can interoperate with other services or platforms. This is particularly relevant to low-income rural areas that are unable to profitably sustain multiple agents.



DEVELOPMENT ORGANIZATIONS AND NGOS

- Support projects that digitize bulk payments from agribusiness to smallholders, fund digital innovation research aimed at the agricultural sector, and work with payment service providers to support outreach efforts in rural areas.

By incorporating digital payments into the agricultural value chain and opening the door to essential financial services, the productivity and growth potential of the world's 475 million smallholder farms⁴¹ can be substantially increased. Increases in the productivity of these farmers have been shown to have outsized benefits in terms of poverty reduction, inclusive growth, and economic opportunity. At the same time, enabling poor and vulnerable populations to receive digital payments will help governments to respond rapidly and efficiently in the case of drought or famine, while building resilience against future climate shocks. Steps such as these are critical to building a vibrant and sustainable agricultural sector, while providing a reliable social safety net and acceptable standards of living for all people.

Priority Actions for Using Digital Payments to Improve Food Security and Agricultural Productivity

1. Governments

Encourage adoption of digital payments by incorporating training on their benefits and use into existing channels for agricultural education, such as extension officers

2. Agribusinesses

Analyze the business case for digitizing aspects of the value chain, including bulk payments to farmers and supplier credit

3. Payment Providers, Governments, and Aid Organizations

Work together to identify existing food aid, social transfers, and subsidies that benefit smallholder farmers and could be made more efficient through digitization

2. FOOD INSECURITY AND THE LINK TO AGRICULTURAL PRODUCTIVITY

Agriculture remains an important economic sector in low- and middle-income countries. Agricultural value added accounted for 9.5% of GDP for low- and middle-income countries in 2015;⁴³ and for the 10 middle-income APEC economies that reported data to the World Bank in 2015, the median percentage of the workforce employed in agriculture was 28.3%.⁴⁴ Yet, more farmers does not mean less hunger. Seventy-five to 85% of the world's poor live in rural areas and account for the majority of the world's hungry.^{45,46} Of the poor that live in rural areas worldwide, at least 80% depend directly or indirectly on agriculture for their household income.⁴⁷ Regionally, APEC economies were home to 190 million undernourished people in the 2014-2016 period.⁴⁸

FAO defines food security as “a situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life.”⁴⁹ Hunger or undernourishment (the terms are used interchangeably in this report) is “a state, lasting for at least one year, of inability to acquire enough food, defined as a level of food intake insufficient to meet dietary energy requirements.”⁵⁰

The Sustainable Development Goals (SDGs) were adopted on September 25, 2015 by the 194 member states of the United Nations, which spearheaded their creation. Collectively, they represent an ambitious but vital agenda for the next 15 years of global development, during which the world's nations have pledged to eliminate poverty, reduce inequality, and shift the world's economy to long-term sustainability.



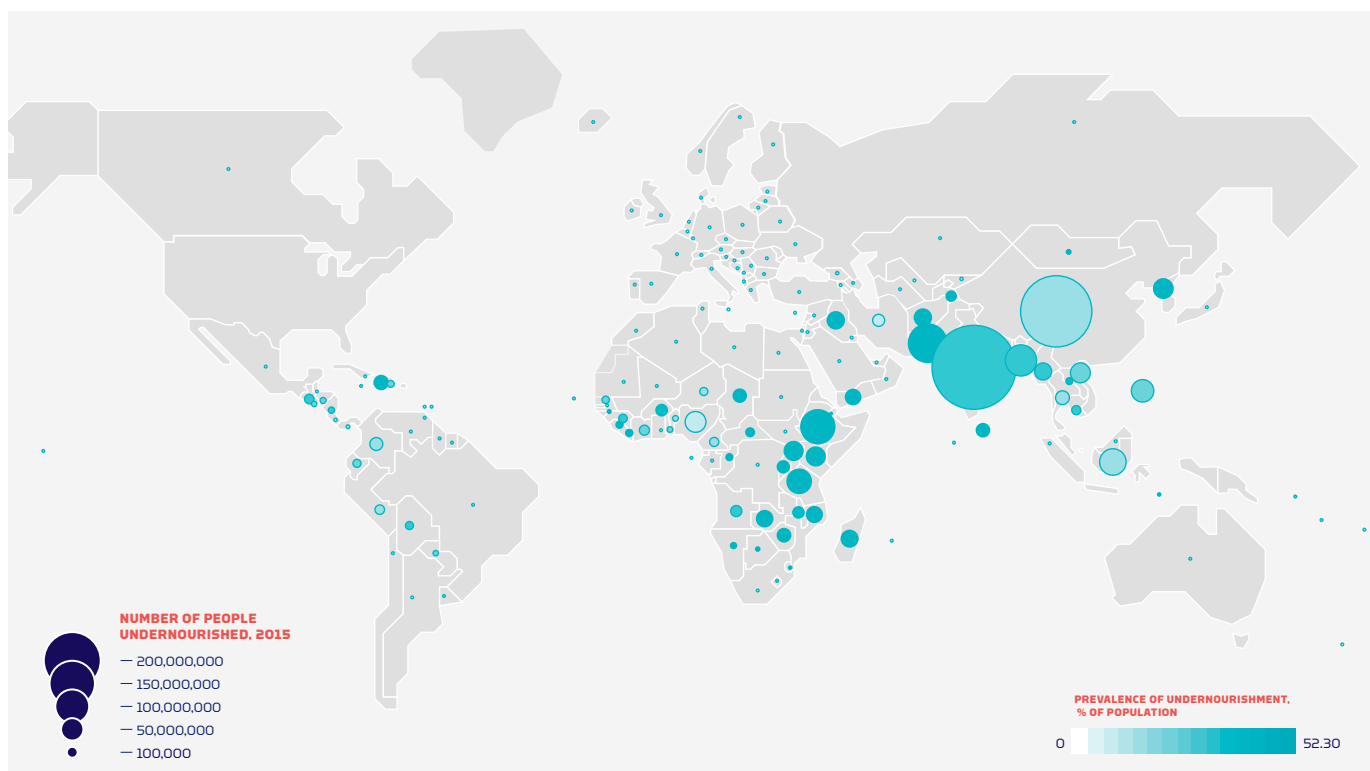
SDG #2 lies at the heart of this agenda; one of the uber-objectives in the fight for a more equitable, livable world. It calls for nations to “End hunger, achieve food security and improved nutrition and promote sustainable agriculture” by 2030. This was an extension of the Millennium Development Goal 1c, which called for the proportion of people who suffer hunger to be cut in half by 2015. This goal was nearly met: The percentage of the world's population who are in a state of undernourishment fell from 23.3% in 1990-92 to 12.9% in 2014-16, a decline of 44.5%.⁴²

The even more ambitious SDG #2 aims for an end to hunger and malnutrition globally, a doubling of agricultural productivity, and sustainability and genetic diversity in the world's food production. Collectively, these represent an achievable but formidable task, one that requires unprecedented levels of coordination between governments, development organizations, multinational corporations, and local agribusinesses.

In absolute terms, the Food and Agricultural Organization estimates that 795 million people were undernourished in the period from 2014 to 2016, or roughly one in every nine people globally.⁵¹ Regionally, Asia has the greatest absolute number of undernourished people (490 million), while sub-Saharan Africa has the highest prevalence of undernourishment, at 23% of the overall population.⁵² (See Figure 1.) Recent reductions in the number of absolute people living in hunger have come from Asia, particularly China and India. In Africa, population growth has outpaced the gains made, meaning the absolute number has gone up while the prevalence of undernourishment has fallen.

FIGURE 1

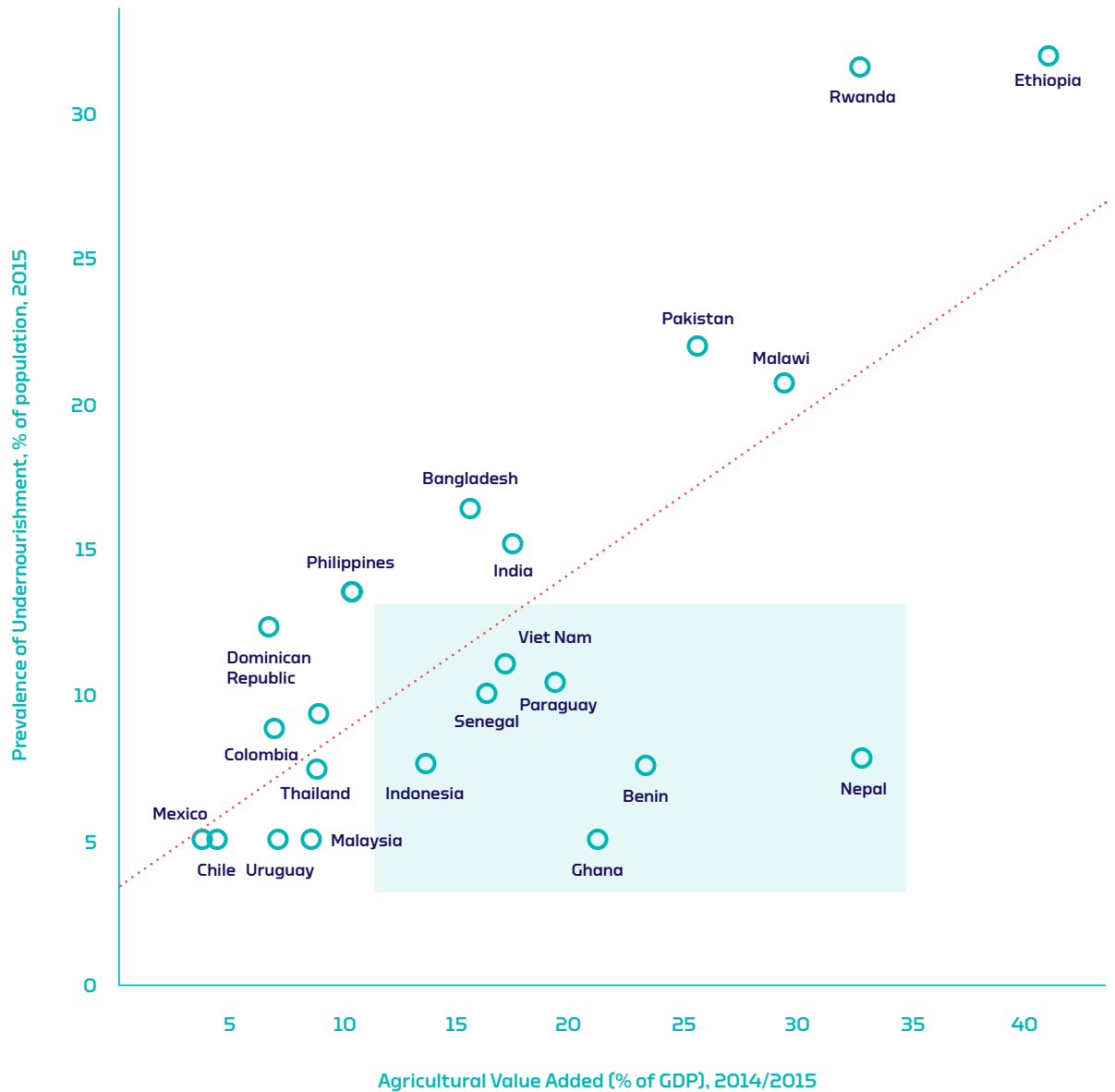
Absolute Number of Undernourished and % of Population Undernourished (2014)



FAO, IFAD, & WFP, 2015.

Figure 2 plots the size of the agricultural sector against the prevalence of undernourishment for low- to middle-income countries, showing a relationship between the importance of agriculture to an economy and the degree of food insecurity. A simple regression run on these data points shows that a 1% increase in agriculture's share of GDP correlates to a 0.54% increase in the prevalence of undernourishment, suggesting that the more rural, agriculture-dependent countries struggle to maintain food security. Yet a group of countries (Nepal, Ghana, Benin, Indonesia, and others) outperformed their structural challenges and attained higher levels of food security, at least in part through strong social safety nets created by remittances and/or government transfers.

FIGURE 2
Agricultural Productivity and Undernourishment
(World Development Indicators, 2014-2015)



For example, between 2007 and 2015, Nepal has seen the prevalence of undernourishment fall from 14.8% to 7.8%.⁵³ At the same time, personal remittances per capita nearly quadrupled, from \$66 to \$235. Compare this to Rwanda, where the agriculture sector is a similar size but remittances are only \$14 per capita, and undernourishment is widely prevalent.⁵⁴ For Nepalese citizens, “Remittance has ... played a key role at pulling people out of hunger,” per agriculture economist Hari Krishna Upadhyaya.⁵⁵ Other countries, such as Ghana and Indonesia, have been successful at implementing social transfer programs (LEAP and Program Keluarga Harapan, respectively) to reduce poverty and hunger.

Agricultural growth reduces extreme poverty 3.2x faster than non-agricultural growth in low-income countries.⁵⁸

Women are less likely to have access to financial services: For example, **43% of women in India have a bank account, compared to 63% of men.**⁵⁶

AGRICULTURAL PRODUCTIVITY AND POVERTY REDUCTION

In developing economies, “agriculture is typically the sector that employs the most people and uses labor least productively.”⁵⁶ One of the main reasons for the productivity gap between agriculture and other sectors is the prevalence of subsistence farmers, who make up roughly 60% of all smallholders, consume most or all that they produce, have little connection with markets, and therefore produce relatively little in terms of measurable economic output.⁵⁷ These same farmers are also the most vulnerable from a food security standpoint. The link between raising agricultural productivity and lowering levels of poverty is a crucial one for policymakers:

- Agricultural growth reduces extreme poverty 3.2x faster than non-agricultural growth in low-income countries;⁵⁸
- A 1% improvement in agricultural yield per land area correlates with a 0.91% decrease in the percentage of people living on less than \$1 per day;⁵⁹
- A 1% increase in agricultural production of eight APEC economies was associated with a 1.4% decrease in the number of rural people living under the poverty line.⁶⁰

There is a distinct gender element to agricultural productivity as well. Women make up 43% of the agricultural labor force,⁶¹ but are “more likely to be asset-poor subsistence farmers.”⁶² Women consistently produce less per acre than men, having less access to seed, fertilizer, and tools than male farmers.⁶³ Only 15% of the agricultural land holders in sub-Saharan Africa are women; and across the world women are significantly less likely to own land, and to own much smaller plots if they do.⁶⁴ The underlying cause, according to the FAO, is “repeated across regions: social norms systematically limit the options available to women.”⁶⁵

The disparities continue beyond physical inputs. Women are less likely to have access to financial services: For example, 43% of women in India have a bank account, compared to 63% of men.⁶⁶ Financial services are crucial to agricultural growth, as they allow farmers to transact securely, access higher-quality inputs on credit, save the profits from their harvests, and mitigate risks.

If women farmers had equal access to non-land inputs, agricultural production could be increased enough to meet the nutritional requirements of up to 150 million people annually.⁶⁷ Digital payments and digital financial services offer women new ways to transact, save, and borrow, potentially allowing them to circumvent traditional limits to their access.

In other words, the poorest and hungriest people around the world overwhelmingly live in rural areas, and tend to rely upon agriculture for income and survival. As a result, there are outsized potential returns on investments in their capacity and productivity. Digital payments are one such investment that can substantially improve productivity, and in doing so transform lives.

CLASSIFYING SMALLHOLDER FARMERS AND AGRICULTURAL VALUE CHAINS

To understand how digital payments can improve productivity among smallholder farmers, it is important to understand the various groups of smallholder farmers, and how their needs vary. There are more than 570 million farms globally, of which 84%, or a bit over 475 million, are smaller than two hectares.⁶⁸ These are collectively known as smallholder farms (SHF), and support as many as 2.5 billion people worldwide, producing up to 80% of the food in Africa and Asia.⁶⁹ Smallholder farmers “supply up to 50% of the world’s cereal, 60% of the world’s meat, and 75% of the world’s dairy production.”⁷⁰ Within this group of SHFs, however, there is a significant amount of diversity. CGAP offers a classification system based primarily on their relationship with agricultural value chains. They divide SHFs into three groups:

Non-commercial farmers:

- Produce staple crops for “subsistence and survival;”
- May have some amount of livestock holdings, sell their labor on other farms, and have additional non-agricultural incomes, but do not sell crops at market on a regular basis;
- Estimated to make up 60% of all smallholders.

Commercial farmers in “loose” value chains:

- Produce enough staple crops to be sold at local levels, but not for any specific buyer;
- May grow some cash crops for undifferentiated markets (e.g., sugar, coffee, cotton);
- Estimated to make up 33% of smallholders.

Commercial farmers in “tight” value chains:

- Producers of cash crops on contract from a specific buyer;
- Enter into habitual agreements to produce a specified crop in a certain manner, often for a guaranteed price should it meet specifications;
- Estimated to make up 7% of smallholders.⁷¹

Generally speaking, non-commercial farmers tend to be poorer than commercial farmers, and those in looser value chains tend to be poorer than those in tighter value chains. However, these are only generalities, and many farmers operate on a spectrum between these classifications.

Use of digital payments, at least initially, is likely to be the product of a farmer’s relationships with value chain actors. A farmer who receives payments directly from a large corporation may be more likely to receive them via a mobile wallet than a farmer who sells to a local market, as the corporation can achieve larger short-term gains through digitization. And subsistence farmers who sell their crops irregularly, if at all, will likely adopt digital payment tools for non-commercial reasons, such as receiving remittances or government transfers. Lastly, geography, language, and cultural attitudes toward borrowing or saving can all influence preferences and uptake of digital finance more generally and digital payments in particular.

A farmer who receives payments directly from a large corporation may be more likely to receive them via a mobile wallet than a farmer who sells to a local market, as the corporation can achieve larger short-term gains through digitization.

3. THE ROLE OF DIGITAL PAYMENTS IN IMPROVING AGRICULTURAL PRODUCTIVITY

Although individual crops and regions may vary, in general the agricultural value chain contains the following steps. At each link in this value chain, there is a transfer: of crops, labor, information, or money. Food is a physical commodity produced with varying degrees of human labor, and so transfers of physical crops and labor cannot be wholly digitized (although they can be made more frictionless, as we shall see). Some agricultural information (weather, prices, basic agronomy) can be delivered digitally and is frequently in short supply, while other information (soil quality, best practices) is in equally high demand, yet may require a physical presence. However, payments are ubiquitous. Unfortunately, they remain overwhelmingly cash-based: In low- and middle-income countries in 2014, according to the 2015 Global Findex report, 95% of those receiving agricultural payments were paid in cash.⁷² Figure 4 breaks out those percentages by economies. Note that even the least cash-heavy agricultural sectors still show 75% of transactions in cash.

The downsides of cash-dominant economies and the benefits of making payments digital are well-documented.⁷³ Generally speaking, cash has the following drawbacks:

- It is expensive. Making payments, transferring money, and withdrawing cash all require travel which brings its own costs, and/or fees.
- It is insecure. Cash can be stolen, leaving the carrier with no recourse.
- It is opaque. When cash changes hands there is often no record of the transaction, making cash transactions a means of potential misappropriation.
- It is slow. As a physical commodity that can move no faster than the humans transporting it, cash payments take days or weeks to be executed.

Each of these drawbacks is magnified by distance, both literal and metaphorical. The longer the transfer of cash takes, the more expensive, time-consuming, and insecure that process becomes. Differences of language, culture, and gender can make transactions more complex and expensive. Compounding these inefficiencies, agricultural workers count on multiple payment streams (input purchases, transport, crop sales, credit, etc.) for their entire livelihood, which multiplies the challenges faced in the sector. And yet, many financial institutions and payment service providers have struggled to justify investing in rural digital payment infrastructure, believing that volumes and values are too low to be sustainable. A key problem with this calculation is that most analyses of rural payments volumes have focused on retail payments and remittances, rather than agricultural value chains.

FIGURE 3
Agriculture Value Chain

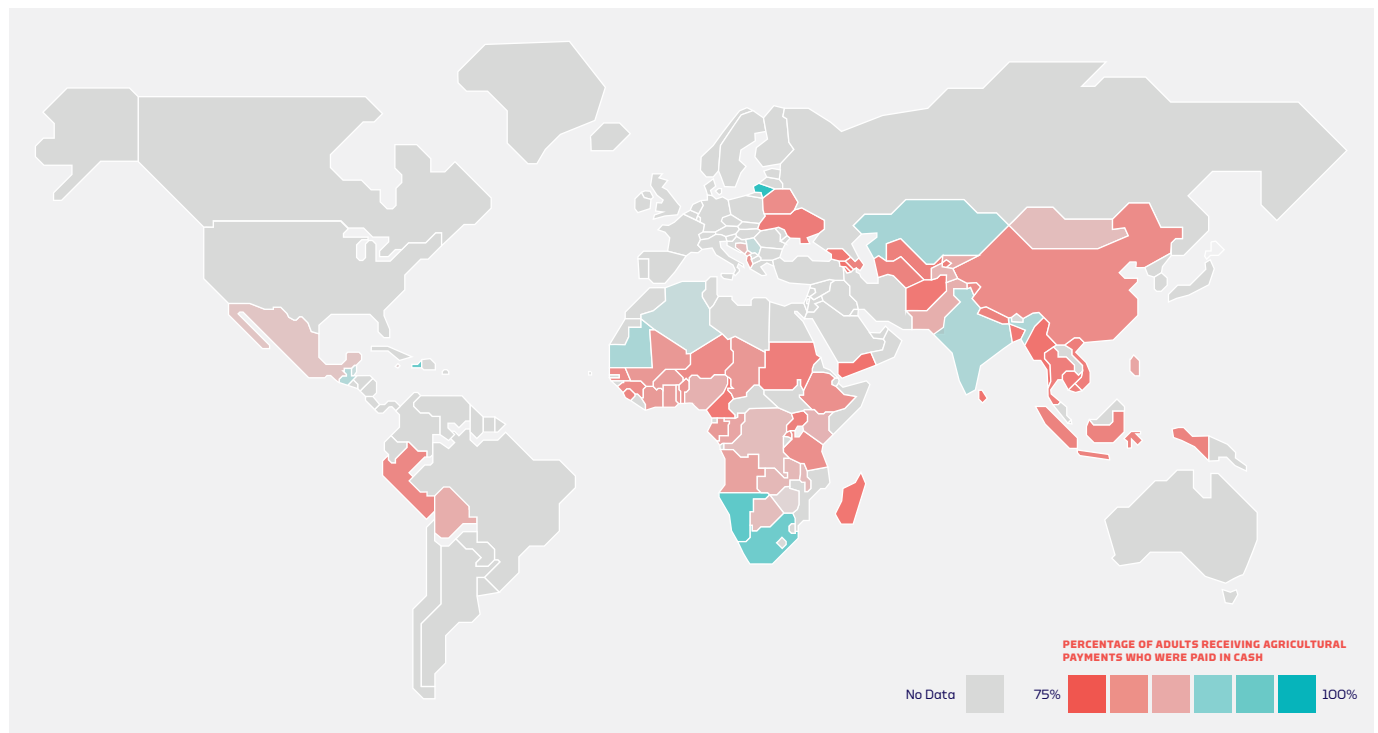


CGAP: DF+ Readiness, Kumar and Tellez-Merchan, 2015

In the agricultural sector, shifting the highest volume payment stream, crop payments to farmers, from cash to digital provides the highest value proposition for creating the requisite infrastructure for digital finance in rural areas. Further, digitizing crop payments can act as a stepping stone to additional digital products and services for both industry and government.

There are three principal barriers to improving agricultural sector efficiency and food security which can be addressed by digital payments. Table 1 lists each of these challenges, their impact on the sector, how digital payments can play a role, and the stakeholders necessary for implementing digital payment solutions. Each of these challenges is explored in depth in the following sections.

FIGURE 4
Agricultural Payments Remain Cash-Heavy



Global Findex Database, 2014

TABLE 1

Barriers to Agricultural Sector Productivity

Barrier	Impact	Role of digital payments	Stakeholder(s)
<p>1. CASH-BASED VALUE CHAINS AND INEFFICIENT MARKETS</p> <ul style="list-style-type: none"> High costs of distributing cash Opaque pricing Physical barriers 	<p>26-37% of all food produced in sub-Saharan Africa and South Asia goes unconsumed⁷⁴</p> <p>Unlike in developed countries, 40% of wastage occurs between harvest and production⁷⁵</p>	<ul style="list-style-type: none"> Improve value chain transactions through quicker, traceable payments Reduce costs and improve convenience for farmers Enable scalable innovations such as digital agriculture marketplaces 	<p>a) Agribusinesses</p> <p>b) Digital payment providers</p>
<p>2. LACK OF ADDITIONAL FINANCIAL SERVICES</p> <ul style="list-style-type: none"> Insufficient access to credit Inability to hedge against risk 	<p>Up to a \$450B gap in smallholder credit globally⁷⁶</p> <p>Urgent need for savings and insurance to mitigate risk, build up wealth</p>	<ul style="list-style-type: none"> Lower the cost of providing financing for FSPs or value-chain actors Connect smallholders with digital savings and insurance products 	<p>a) Financial service providers</p> <p>b) Agribusinesses</p> <p>c) Buyers of agricultural commodities</p> <p>d) Digital payment providers</p>
<p>3. INEFFICIENT DELIVERY OF SOCIAL PROGRAMS AND REMITTANCES</p> <ul style="list-style-type: none"> Expensive service delivery Duplicate recipients and leakages High cost of remittances 	<p>Three-quarters of the most vulnerable households are not covered by social safety net programs⁷⁷</p> <p>73% of the global population has insufficient social protection⁷⁸</p>	<ul style="list-style-type: none"> Increase program efficiency Eliminate leakages Provide lower-cost remittance services 	<p>a) Ministries of Finance, Agriculture, and Social Welfare</p> <p>b) International remittance providers</p>

It is important to note that these barriers are not the only ones facing the agricultural sector. The politicization of cereal prices and food aid,⁷⁹ soil degradation,⁸⁰ and insecure land rights⁸¹ are just a few of the other challenges that cannot be overcome solely by digitization. However, solving agricultural payments challenges will go a long way toward improving productivity and building a sustainable agricultural sector.

DIGITIZING VALUE CHAINS AND CREATING MORE EFFICIENT MARKETS

Farmers and businesses throughout the agricultural value chain face significant obstacles and high costs when bringing goods to market. The sheer volume of transactions means cash inefficiencies will slow the movement of goods and capital, and information asymmetries create uncertainty, particularly for smallholders. **Digitizing payments can improve the efficiency and openness of agricultural value chains, reducing cost and uncertainty for businesses and farmers alike, and enabling scalable innovations that allow farmers to capture a greater share of the value they produce.**

Kyagalanyi Coffee Limited is the largest single coffee exporter in Uganda. As coffee crops grow well on mountains, many farmers are located in hard-to-reach areas, making cash payments for crops a timely and expensive endeavor. This is the case around Mount Elgon, one of Africa's highest mountains and home to 5,500 smallholder coffee farmers that supply Kyagalanyi and who are paid in cash. During coffee washing season, this means that an employee must drive >50km to town every day, collect \$50,000 in cash, and drive back to make payments at four separate washing stations (MM4P Project Document, 2015). In addition to being dangerous, these cash payments take time.

UNCDF's Mobile Money for the Poor (MM4P), in partnership with the Bill & Melinda Gates Foundation, has sought to drive financial inclusion in Uganda through the digitization of agricultural value chains. The Kyagalanyi project represents their first effort. Working with MTN Uganda (a mobile network operator) to establish basic mobile connectivity and with Fenix International (a pay-as-you-go solar provider) to finance mobile handsets, MM4P helped build the basic infrastructure necessary to digitize payments. Farmers were then onboarded to MTN Mobile Money, through which they receive their payments.

Agribusiness perspective

Digitizing bulk payments from agricultural buyers to their smallholder suppliers is viewed as a strong entry point for integrating digital financial services into agriculture value chains.⁸² For agribusinesses procuring from a large group of distributed suppliers, digital payments offer two attributes lacking with cash: security and speed. The following description from a CGAP blog post paints a vivid picture: "In rural Uganda, helicopters and armored vehicles regularly drop hundreds of thousands of dollars in cash for coffee farmers in remote areas. In rural Ghana, it is not unusual for small cocoa buyers to stuff \$20,000 in cash in a plastic bag every week and disburse it from their motorbikes."⁸³

Cash disbursed in this manner is highly insecure, as well as expensive. Company officers must make bulk cash withdrawals, then travel long distances to pay individual farmers. In other cases, farmers must physically arrive at the buyer's location, forcing them to incur additional expenses in travel and lost time.

Disbursing cash payments to hundreds or thousands of remote farmers is also a large, unproductive administrative expense for a business. Manually reconciling receipts with payables, verifying that the correct farmer has received the correct amount of cash, and settling disputes creates administrative burdens and opens up possibilities for theft or fraud.

Businesses that purchase agricultural products in bulk have shown themselves willing and able to digitize their receivables, if they (a) are clear on the cost savings or revenue impact, (b) are committed from the top down to digitization, and (c) understand the importance of educating clients and staff of the benefits.⁸⁴ In many cases, these businesses have benefited from the support of donor organizations that have funded pilots to help demonstrate the case for digitization.

The potential impact of digitizing bulk payments is significant: Research on behalf of UNCDF concluded that "Agricultural mobile finance ... can promote increased investment in value chains by providing a cheaper, more efficient, traceable and transparent payment method for high-volume, low-value transactions."⁸⁵ What's more, this sector represents an attractive market to payment service providers: Mobile industry association GSMA estimated that the potential market for digital value chain payments would reach \$394 billion by 2020, paid to 370 million farmers.⁸⁶

Such a shift has the following benefits for agribusinesses:

- Cost savings on revenue disbursement for buyers;
- Greater security and transparency for distributors, buyers, and lenders; and
- Opening a distribution channel (the mobile wallet) to customers, which can be used for additional financial services, such as agricultural credit.

The last point represents an important opportunity. Once a buyer and supplier have established a digital means of transaction, it can be used both ways. Many farmers in tight value chains require specific inputs, which are often provided by the buyer on credit. Others may require working capital loans as they await their harvest. Agricultural businesses are one of the largest sources of smallholder finance, and loan disbursement over a digital channel can lower their costs, while proving more convenient for remote farmers to access and utilize.

Farmer perspective

Despite its clear benefits, bulk payment digitization has been slow to catch on with smallholder farmers. Because they operate in heavily cash-based economies, farmers often do not see the value of holding digital currency, and cash-out their payments at the first possible opportunity, incurring significant fees. Digital payment instruments are often intimidating for smallholder farmers, who may be reluctant to trust an unknown entity with their hard-earned money.

In order to replace cash, digital payments must offer a greater value proposition beyond payment receipt. The Better Than Cash Alliance study of the top accelerators of digital payments ecosystems found the promotion of merchant acceptance infrastructure to be vital.⁸⁷ Until farmers can be paid digitally for their crop, then buy the things they need (fertilizer, food, tools) in the same digital currency, cash will likely continue to dominate rural transactions.

When digital payments are being introduced into an agricultural value chain, governments have the opportunity to assist by leveraging their rural extension networks. Agricultural extension officers are some of the most important and respected people in rural communities worldwide, providing agronomy training, cultivating best practices, and disseminating information on weather, prices, and government programs. If digital payments are to succeed, educating extension officers on their use, fees, benefits, and modes of recourse is a crucial first step. Another powerful means of reinforcing such education is to pay extension officer salaries via digital payments. Such an intervention can have a powerful multiplier effect. Once digital payments have been widely adopted, smallholders will be much easier to reach with additional financial services, as discussed in the following section.

Amar Account

In Bangladesh, rice farmers generally buy inputs in small amounts, and pay in cash. Financing extends throughout the value chain: from input wholesalers to retailers, and from retailers to farmers. Yet all of these transactions take time and carry risk when carried out in cash - costs that could be mitigated with the right digital product.

IFIC Bank Limited, in conjunction with USAID's mSTAR/Bangladesh and the International Rice Research Institute, has launched a new product designed for value chain actors. The Amar Account is a transactional account combining deposit and loan facilities. Farmers are able to save at an annual interest rate of 7.5%, purchase inputs digitally from participating retailers, and secure low-cost, flexible loans from IFIC. Instead of making weekly payments to an MFI, farmers can now pay in a lump sum after six months, or as they bring in revenue. This in turn enables them to time the market to sell their product for its maximum price.

Marketplace innovations

Farmers in loose value chains and non-commercial farmers face high barriers to accessing markets and considerable risks when they sell their crops. They are often either indebted or surviving on minimal savings by the time harvest arrives, and need to sell their crops as quickly as possible. A lack of critical infrastructure can also prevent them from bringing their harvest to the best possible market. In many locations, smallholders are forced to rely upon middlemen who pay discounted prices for crops, and are then able to charge mark-ups simply by having direct access to the final buyers.

Digital payments also enable the establishment of digital marketplaces (or *virtual trading floors*, as FAO branded the concept in its *ICT for Agriculture* publication⁸⁸) for farmers, allowing them to sell their crops directly to buyers, or enabling large-scale buyers to track the behavior of their agents. These marketplaces are structured similarly to e-commerce platforms, in that they allow for escrowed payments which are only released when the buyer is satisfied.

In more sophisticated scenarios, farmers could also minimize future risk through futures or option contracts, thereby assuring themselves of a guaranteed price at harvest. Such platforms could, by eliminating the money lost to middlemen, benefit both buyers and producers. In 2011 Vodafone estimated that access to agricultural trading, tendering, and bartering platforms could result in \$35 billion of additional income for smallholders.⁸⁹

Buy/sell platforms are becoming a reality in Tanzania (NINAYO), Kenya (Soko+), India (SEWA RUDI), and elsewhere. Further innovations throughout the value chain could help increase access to markets, decrease crop wastage, and bring more investment into the agricultural sector. Digitally enabled structured finance for agricultural input sellers, inventory financing for merchants, and the ability to accept digital payments throughout the value chain are all innovations that could lower costs and increase access to much-needed capital.

NINAYO

Ninayo (Kiswahili for “I am with it”) is a two-sided buy/sell platform, in which farmers can advertise their crop holdings and buyers can advertise their crop needs. The two are able to find each other through an online interface (currently available only via smartphones, but with a USSD product in development), and can link up for the sale.

NINAYO’s CEO and founder, Jack Langworthy, created the service because of the market inefficiency he saw on the ground: “I’d seen how wasteful the Tanzanian agriculture sector was from a market perspective, and from a farmer perspective. Supply and demand transparency just wasn’t there.” Through NINAYO buyers are able to connect directly with producers, lowering their costs and potentially providing them with higher-quality product. Farmers are able to access up-to-date pricing on the platform, then sell their crops for maximum value.

Started in 2014, NINAYO is already serving over 15,000 farmers in southern Tanzania, and is working with UNCDF to introduce integrated payments functionality to the application in 2017.



FACILITATING ACCESS TO FINANCIAL SERVICES

Digital payments can facilitate access to financial services for smallholder farmers by lowering transaction costs, providing flexibility, and improving the customer experience.

Financial service providers have traditionally struggled to adapt their businesses to meet the needs of smallholder farmers, whose incomes are small and irregular, offering low margins, and who are widely dispersed geographically and difficult to reach with traditional branch and ATM infrastructure. Successfully serving such customers requires products that are flexible, convenient, and easily accessible. Thus, merely repurposing existing products that target other client segments and marketing them to smallholders has limited prospects of success.

The most common financial service sought by smallholders has usually been credit. For commercial smallholders who sell their crops in order to realize returns that can be used to pay off loans, credit is undeniably important. However, for subsistence smallholders in most developing countries, taking out a loan has usually been unrealistic in the short-to-medium term. For this segment, other financial products that help farmers mitigate risk and plan for the future can be far more important. For this reason, credit and other financial services are addressed separately.

Credit

Well-designed credit markets are fundamental to a sustainable agricultural sector. Farming is a capital-intensive business model, and while more information around prices and best practices can improve yields, the largest constraint for most farmers (particularly female farmers) is access to, and funds to pay for, high-quality inputs. One estimate put the worldwide demand for agricultural credit at US\$450 billion.⁹⁰ USAID has noted that digital financial services can “lower transaction costs to lend to smallholder farmers, making credit more available.”⁹¹

Microfinance Institutions (MFIs), who historically have been an important source of agricultural finance, usually require a loan to be opened in the presence of a loan officer, and that the same loan officer periodically collect repayments in person. This high-touch model, while effective in building relationships, imposes high transaction costs on the MFI, which must reflect those costs in its pricing. Cash carried by loan officers is easily stolen or misappropriated, which also presents a reputational risk to the lender.

Digital payments lower the transaction cost of credit by allowing lenders to operate low-touch, scalable credit models. If a borrower has access to a digital transaction account (e.g., a mobile money account), the lender can simply disburse the funds directly to that account, and be repaid via the same means. This innovation, although simple, can facilitate entirely new models of lending for agricultural financiers.

Digital agricultural credit has the potential to emulate the successful m-Shwari loan product in Kenya, which has reached over 14 million customers.⁹² Developed by Commercial Bank of Africa and offered through the M-Pesa mobile money platform by Safaricom, m-Shwari allows M-Pesa users to apply for and receive short-term loans directly on their mobile phone, as well as earning interest on digital savings deposits. The underwriting criteria is based on an algorithm that analyzes a borrower’s call data records, airtime top-ups, and mobile money history.⁹³ Digital credit products like m-Shwari, albeit larger in size and longer in tenor, can provide farmers with the capital they need at a lower cost to the lender.

Smallholder credit can take other forms as well. Digital repayments can lower costs for value chain financiers (seed companies, fertilizer vendors, and even large buyers), who are a critical link in the finance chain, and who often extend credit to farmers already.⁹⁴ Such payments can also allow agribusinesses to offload their invoices to special purpose vehicles (SPVs) established by banks or investors, thereby freeing up additional capital to the sector.

And as can be seen in the *One Acre Fund* case study below, input credit that is repaid digitally and combined with farmer support may yield even greater benefits than lump sums of credit.

One Acre Fund

As documented in a recent Better Than Cash Alliance case study, One Acre Fund is fighting rural poverty in Africa by providing farmers with agricultural inputs on credit. In March of 2016, One Acre Fund's 208,000 Kenyan farmers received an input package including enhanced seed, fertilizer, tree seedlings, as well as optional add-ons (solar home systems, cook stoves, etc.). The median loan size was just US\$90, and the average payment size was ~\$6.50. However, the impact created by that loan is substantial: OAF farmers in Kenya earned on average US\$211 more from agricultural activities compared to similar farmers in similar areas, a 48% increase over their peers.

Just a few years ago, OAF loan repayments were entirely cash-based. But the system was inefficient and insecure; OAF training officers had to spend valuable time making cash collections, and payments took weeks to process and reconcile. In 2014 OAF started piloting mobile loan repayments, and in 2016 they shifted all farmers in Kenya to M-Pesa. OAF worked with Safaricom to absorb all of the transaction fees, and reconciliation issues were managed by OAF and Citi Kenya.

The results were impressive: Repayment leakages and collection costs fell 85% and 80%, respectively. It now takes 2-4 days to reconcile a payment, compared to 12-16 days prior to the shift. As one farmer explained, in the old system, "you didn't know if the money had arrived, and you used to get confirmation after a week. Now, the very day (I make a payment) I get an SMS with my name on it, and my balance has reduced." For this reason and others, farmers have responded positively to the shift: A survey in 2015 of 250 farmers showed that 100% of them prefer the mobile repayment service over cash, citing transparency and convenience as the main benefits.



Other financial services

For the same reasons that digital payments increase access to credit (through lower transaction costs, greater reach, security, and transparency), shifting from cash to digital can enable the provision of other financial services, particularly savings and insurance.

Although short-term credit is vitally important in allowing farmers to grow their operations and access high-quality inputs, there is a real risk in perpetual borrowing, particularly in an industry as volatile as agriculture. Shocks may limit smallholders' ability to repay loans, and trap them in cycles of debt servicing and refinancing that are difficult to escape. Even without major adverse events, smallholders have many financial burdens outside of agriculture: Education, weddings, funerals, and household improvements all need to be planned for. Ignoring these other commitments can result in lenders overestimating the debt servicing capacity of smallholders.

Instead of relying solely on credit, a mix of financial services can help farmers to make needed investments in the short term, while mitigating risks and planning for the future. Evidence suggests that smallholder households, when faced with having to allocate meager resources between agriculture and other expenses such as education, will often shift resources away from their farms.⁹⁵ This allows families to meet their short-term obligations, but keeps them trapped in long-term poverty.

Standard savings or commitment savings products, where deposits are held until certain conditions are met, allow farmers to deposit their money toward an established goal. This could be the next planting season, the start of an education term, or some other specified purpose. Evidence shows that the gains can be substantial: Farmers in Malawi who had their earnings deposited into a bank account – instead of being paid in cash – invested 13% more than their peers on agricultural inputs the next season, and saw outputs grow by 21%.⁹⁶

Save 4 School

In many surveys of smallholder financial needs, education emerges as a top expense. School fees, lunch, books, and uniforms combine to create a formidable, and lumpy, expense for farmers.

Save 4 School is a mobile, goal-based savings account being piloted by CGAP and EcoNet in Zimbabwe. It allows smallholder parents to save up money for a child's education, while providing limited liquidity at key junctures in the school year.

Smallholders use EcoNet's mobile money service, EcoCash, to set their minimum monthly deposit goals, and then make flexible digital deposits toward their savings goal. When school fees are due at start of term, EcoCash automatically transfers the money from the user's savings account.

Farmers are able to save toward a significant expense, and EcoNet is able to drive use of EcoCash while mobilizing deposits.

Similarly, insurance products that help farmers mitigate risk can also help them to plan for their futures and invest more strategically in their farms. In Ghana, an experiment conducted from 2009–2012 demonstrated that farmers with weather-indexed insurance – that made payouts when rainfall fell below certain historical levels – invested more in their farms than control farmers.⁹⁷ However, despite these and other positive experiences, price elasticity for insurance products remains extremely high among smallholders, even negative in some cases.⁹⁸ The problem is not complicated: People on very low incomes often do not want to pay money for something that may never produce benefits for them. Bundling insurance with inputs may provide some additional value, but a broader business case remains to be demonstrated.

A critical element in providing these additional financial services to rural smallholders is in delivering them via digital means, namely, mobile. Maintaining a traditional branch-and-ATM network in rural areas is financially unsustainable. However, digital savings accounts that can be deposited into and withdrawn remotely via digital transfers can provide smallholders with access to formal savings at a sufficiently low cost to providers. Similarly, insurance providers have struggled to profitably serve rural clients with a high-touch, analog method. Digital premium payments, remote monitoring, and automated payouts are all necessary to create a sustainable business case for insurance providers. The primary value and power of digital payments within financial services is their ability to reduce transaction costs and expand reach, allowing banks, MFIs, and insurance providers to reach wider segments of the population at lower cost.

By working together, agribusinesses, payments providers, government, and donors can build a viable business case around such operations, helping them become effective. Unfortunately, there is often an initial reluctance to invest in frontier markets, in the belief that little financial activity is taking place. As this section has shown, nothing could be further from the truth. Digital crop payments can be the gateway for other digital finance services that would combine to create a robust digital ecosystem.

Acre Africa

Formerly branded as Kilimo Salama, Acre Africa is a service provider that links farmers to insurance products so they can safely invest in their livelihoods. Working with local insurers in Kenya, Tanzania, and Rwanda, they offer services that facilitate access to insurance products, such as risk assessment, product development, and risk monitoring.

Products include a weather-indexed insurance plan which provides farmers with a Replanting Guarantee. When farmers purchase bags of seed or fertilizer, they can register for insurance via their mobile, using a code in the bag. Their location and planting date are calculated based on their registration, and weather is monitored in that area via satellite.

If a drought occurs, the insurer pays a disbursement to the farmer's mobile money wallet that allows the farmer to buy new seed or inputs and plant again.

By the end of 2016, over 1 million farmers had insured assets worth \$29.5 million through products designed by Acre Africa.⁹⁹ An impact study found that insured farmers earned 16% more than their uninsured neighbors thanks to higher investment. Seventy-six percent of farmers insured in 2016 were able to take out a loan linked to the insurance.



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Digital transfers to beneficiary accounts **have consistently been shown to reduce operational expenditures and curtail leakages**

ENABLING MORE EFFECTIVE SOCIAL SUPPORT

The FAO notes that “access to food is primarily determined by incomes, food prices and **the ability of households and individuals to obtain access to social support.**”¹⁰⁰ The last point is often overlooked, despite reports such as that produced by the ILO showing 73% of the world’s poor lack the social support structures necessary to assist them during inevitable food shortages.¹⁰¹ **Digital payments can help improve the efficiency of social program delivery by reducing costs and leakages for government transfers aimed at the rural poor, and can increase access to private support by lowering the cost of remittances.**

Public support

There are a variety of ways that governments and NGOs provide social support in order to alleviate the worst effects of deprivation: for example, social transfers (both conditional and unconditional), food aid, and social employment schemes. For each of these, digital transfers have clear advantages over the physical distribution of cash to recipients.

In Kenya, the World Food Programme decided to transition **from in-kind food aid to electronic transfers when pilots showed cost savings of 15%.**

In times of drought or famine, government intervention is necessary to avoid harmful deprivation and support vulnerable farmers. However, governments often struggle to support farmers living in remote rural areas: In low- and lower-middle-income countries, only a quarter of households in the bottom quintile of income are covered by a social safety net program.¹⁰² One reason is expense: Although particularly true of in-kind transfers, even cash transfers impose unnecessary transaction and opportunity costs by forcing rural dwellers to travel to a central point for every disbursement. At the same time, cash-based transfer schemes can experience heavy leakages: “Ghost” program recipients or kickbacks to disbursement agents each direct needed resources away from recipients.

Digital transfers to beneficiary accounts have consistently been shown to reduce operational expenditures and curtail leakages:

- In India, shifting payments for two major welfare programs, including the largest work-based welfare program in the world, from cash-based to biometric-linked smart cards increased recipient benefits by 24% without increasing government expenditures at all, implying a sizeable reduction in program leakages.¹⁰³
- In Kenya, the World Food Programme decided to transition from in-kind food aid to electronic transfers when pilots showed cost savings of 15 percent.¹⁰⁴
- In Niger, a randomized comparison of cash and mobile money transfers showed that the latter were significantly more efficient for recipients, allowing them to collect their transfers in only a quarter of the time of cash recipients.¹⁰⁵
- In Jordan, the World Food Programme has pioneered the use of blockchain in the distribution of humanitarian relief, with initial results of its Building Blocks platform resulting in a 98% reduction in local bank fees.¹⁰⁶

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Private support

More than 250 million people, or over 3.4% of the world's population, live outside of their country of birth.¹⁰⁷ Collectively, these migrants sent \$403 billion in remittances to low- and middle-income countries in 2016, a figure that has been rising steadily for years and far exceeds Official Development Assistance paid by governments.¹⁰⁸

There is broad agreement among researchers that remittances to rural areas reduce poverty among recipients. Research has shown a 10% increase in per capita international remittances, translating to a 3.5% decline in severe domestic poverty.¹⁰⁹ We see remittances' value even more starkly in their absence: In 2015 when 30,000 Tajik migrants returned home from Russia, the percentage of households in Tajikistan (where remittances are a third of the economy) who were able to buy sufficient food reduced 7 percentage points in just four months.¹¹⁰

These examples capture only the impact of international remittances. Evidence from India indicates that domestic remittances play at least an equal role in reducing poverty.¹¹¹ Taken together, remittances provide enough income for basic needs, particularly food, which can reduce dependence upon agriculture as a primary income source, and help facilitate investments in human capital, particularly education.¹¹²

While they play a critical role in economic development, the cost of remittances remains high, and this cost directly impacts migrants and their families. In the fourth quarter of 2015, according to the World Bank, it cost US\$14.80, on average, to remit US\$200.¹¹³ At 7.4%, this cost remains far above the 3% target set out by global policymakers¹¹⁴ as part of the UN's Sustainable Development Goals. It is estimated that at the 2015 volume of remittances and existing fees, a reduction in cost to 3% would equate to \$19 billion in annual savings for migrants worldwide, money that would end up with recipients rather than service providers.¹¹⁵

Digital payments can play a critical role in reducing the cost of remittances. In 2013, a review of initiatives designed to lower remittance costs through digitization, conducted by the International Fund for Agricultural Development (IFAD), found that such initiatives lowered fees by 20-50%, while expanding access to formal remittance services.

In addition to saving money, digital remittances also enable more secure transfers. For migrants in Africa, where remittance costs average more than 10%,¹¹⁶ many resort to less secure means of sending money. Digital remittances also allow senders to target remittances for specific purposes such as crop inputs, utility bills, or education, eliminating fears of misuse.

The International Fund for Agricultural Development (IFAD), found that **using digital payments could lower fees by 20-50%**, while expanding access to formal remittance services.

4. SPOTLIGHTS

MEXICO

Building out rural infrastructure

Mexico has a large and growing economy based heavily on manufacturing, a population that is 80% urban, and a well-developed financial sector. And yet even in a rapidly developing economy, digital payments are still playing a vital role in reducing food insecurity. Urban areas have become more prosperous in Mexico: In 2014, the percentage of people living in poverty in rural areas was 12 points higher than in urban.¹¹⁷ Only 28% of rural Mexicans had a financial account of any kind in 2014, compared to 39% of the population as a whole.¹¹⁸ Magaña-Lemus et al. (2016) looked at survey data from 2010, and determined that 11% of Mexicans had reported experiencing severe food insecurity in the past year.¹¹⁹ Rural households were less likely to be food secure than average, although agricultural households were more likely to be food secure.¹²⁰

To address these problems, Mexico has developed a robust social safety net for the poor in general and farmers in particular. Prospera is a program descended from PROGRESA, one of the first large-scale conditional transfers in the world. Over 26 million people are helped through the program, which disburses lump sums to households who fulfill certain criteria, such as vaccinations, doctor visits, and school attendance for children.¹²¹ ProAgro Productivo, on the other hand, provides subsidies to farmers based on outputs, with over 1.5 million producers receiving subsidies in 2016.¹²² Both programs overwhelmingly serve rural areas, and historically both distributed cash from centralized offices. But in 2012 and 2013 respectively, Prospera and ProAgro began to transfer money to recipient bank accounts. Yet a 2015 analysis indicated that only 12% of Prospera recipients saved money in their accounts; the remaining 88% cashed out almost immediately.¹²³



Mexico has seen a dramatic decrease in the use of cash in recent years, but rural transactions remain cash-heavy. The most recent survey conducted by the Comisión Nacional Bancaria y de Valores (CNBV) and the Instituto Nacional de Estadística y Geografía (INEGI) showed that 92% of Mexicans preferred to make payments in cash.¹²⁴ For rural areas, this is partly a supply-side problem: In 2014, only 54% of Mexican municipalities had an ATM, and there were just six POS terminals for every 1,000 inhabitants, compared to 22 for Brazil.^{125,126} A 2014 study estimated that cash costs Mexico over \$100 million and 48 million hours annually.¹²⁷

Grupo Bimbo is one company working to drive usage of digital payment instruments, having partnered with Visa to install 75,000 point-of-sale terminals in its rural shops throughout Mexico.¹²⁸ Using existing transfer programs as entry points, governments can offer training on the usage and benefits of digital payments, as well as establishing and communicating a robust consumer protection strategy. Meanwhile, payment providers and agricultural financiers can work to build products that interact seamlessly with users' transfer accounts. All of the pieces are in place to develop a digital ecosystem in rural Mexico that will increase financial inclusion and ensure food security.

INDONESIA

Digitizing food aid and value chains

Consisting of over 6,000 inhabited islands, Indonesia provides a unique use case for digital payments. The government has supported the development of cashless payment instruments, particularly credit/debit cards and mobile money. Card transactions have grown at a rate of 15% annually from 2012-2016,¹²⁹ and the 100,000-150,000 digital financial services (DFS) agents nationwide¹³⁰ have collectively registered more than 34 million accounts.¹³¹ From 2011 to 2014, Indonesia's financial inclusion rate nearly doubled, growing from 19.6% of adults having an account to 36.1% in just three years.¹³²

The next step in this digital evolution is to bring smallholder farmers onboard. In the last Financial Inclusion Insight survey conducted by Intermedia in late 2015, 36% of adults surveyed were involved in agriculture in some form or fashion: They lived on a farm, worked on a farm, or occasionally grew and/or sold agricultural products as a form of income.¹³³ Of the 29% of adults who worked on or owned a farm, 81% lived below the poverty line.¹³⁴ Those who work or live on a farm were also more than twice as likely to regularly experience economic vulnerability, and almost half as likely to have a financial account of any kind.¹³⁵

The KKS card enables the government to shift its rice subsidies over to electronic food vouchers, and it is being piloted in 2017 with 1.4 million families in 44 cities.



Two ongoing shifts hold great potential to develop a digital ecosystem that benefits Indonesian smallholders and those suffering from food insecurity. The first is the digitization of the Indonesian rice subsidy, called Raskin or Rastra. This program benefitted 15.5 million households in 2015, but was hampered by the inefficiencies involved in distributing rice to rural locations.¹³⁶ There is movement underway to improve the social safety net: The Indonesian government is undertaking a pilot of a single social payments instrument, the Kartu Keluarga Sejahtera, or KKS card. This card enables the government to shift its rice subsidies over to electronic food vouchers, and it is being piloted in 2017 with 1.4 million families in 44 cities.¹³⁷ But the government plans a step beyond digitization: They are also building an e-portal, called e-Warung, which will allow citizens to connect their KKS cards with mobile wallets, as well as to purchase rice or other foodstuffs, according to individual need. Together, the KKS card and the e-portal have the potential to bring increased efficiency to one of Indonesia's key food security programs.

The second shift is agricultural. Indonesia is the world's largest producer of palm oil.¹³⁸ Research from Mercy Corps on the readiness of various agricultural value chains indicates that the palm oil industry in Indonesia is a prime candidate for digitization. Mercy Corps estimated that there are over 175 million payments made to farmers for palm oil in 2013, split 55%, 27%, 15%, and 3% between aggregators, farmer associations, producing companies, and the government.¹³⁹ Combined, these payments were worth approximately \$2.8 billion, but took farmers anywhere from 10-21 days to be paid.¹⁴⁰ Perhaps unsurprisingly, farmers expressed a distrust in banks and mobile money, and preferred to continue to be paid in cash. However, farmer associations and aggregators are interested in digitizing payments. By working through farmer associations in the palm oil and cocoa sectors, payment providers can begin the development of a digital ecosystem at the association level, and use existing information services to educate farmers about the time and cost savings of digitization.

ETHIOPIA

Leveraging extension services

Few countries have more to gain from the acceleration of digital payments to the agricultural sector than Ethiopia. In 2013, the last year for which we have data, agriculture accounted for 73% of total employment, and agricultural value added made up 45% of Ethiopia's GDP, both among the highest in Africa.¹⁴¹ Ethiopia is also one of the most food insecure nations in the world, with almost a third of the population reported as undernourished in 2015. The high proportion of the population involved in farming means that climate disruptions often have catastrophic consequences, with poor infrastructure and drought combining to produce devastating famines, including the infamous famine of 1983-1985 which killed over 400,000 people.¹⁴²

With food security being a critical issue, the government has recognized the imperative of food aid that can reach those in need quickly and efficiently, particularly in the more far-flung reaches of Ethiopia, such as the eastern Somali State. It is there that Feed the Future, the United States government's program to reduce hunger worldwide, has partnered with Belcash and Somali Micro Finance Institution to launch HelloCash, a mobile banking service that will enable farmers to save money, make and receive payments for agricultural products, and also receive government assistance should the need arise.¹⁴³

With two other banking partners, Lion International Bank and Cooperative Bank of Oromia, there is potential for HelloCash to become a lower-cost alternative to existing channels for distributing food aid, particularly as its agent footprint expands. For the Ethiopian government, shifting cash transfers to mobile channels within its highly successful social safety net programs, the Productive Safety Net Programme (PSNP) and Household Asset Building Programme (HABP), could help drive the development of a digital ecosystem in rural areas.



Ethiopia already has a tremendous asset for any digitization campaign: its agricultural extension service. With roughly 21 extension agents per every 10,000 farmers, Ethiopia has one of the most dense extension services in the world.¹⁴⁴ That network is an invaluable tool for training farmers in the use and benefits of digital payments. By embedding digital payments in the traditional channels for agricultural knowledge exchange, Ethiopia and similar markets can help drive uptake through the use of local experts who understand smallholder farmers and how to reach them with important tools and training.¹⁴⁵

5. RECOMMENDATIONS

Addressing food insecurity, inefficient agricultural value chains, and related financial exclusion problems among vulnerable agricultural communities is a broad and complex challenge that will require the involvement of multiple stakeholders. The key actors with the ability to help solve these challenges include governments (in particular financial regulators, along with ministries of finance and agriculture), large-scale private agribusinesses (such as agricultural buyers and input suppliers), and payment service providers (especially mobile money operators). Development organizations and donors also have an important role to play in supporting innovations in this sector. This report offers the following recommendations for key stakeholder groups:

GOVERNMENTS, PARTICULARLY MINISTRIES OF FINANCE AND AGRICULTURE

- Digitize the payment of routine subsidies, social transfers, and food aid as a means of more effectively reaching remote populations, building familiarity with digital payments, and encouraging digital payment uptake. Digitization of government to person (G2P) programs can create significant operational efficiencies, bring more people within the social safety net, and function as a supply-side catalyst for building out a responsible and equitable digital payments ecosystem.
- Incorporate training in digital payment usage as a standard part of agricultural extension services.¹⁴⁶ By linking digitization to existing trainings and workshops, governments could leverage the widespread coverage of agricultural extension officers in rural areas and help drive financial inclusion. Digitizing extension worker salaries will also strongly underpin this effort.
- Encourage the uptake of merchant digital payments as appropriate in each market. Options would require careful cost-benefit analysis and could include, for example, time-limited subsidies or targeted incentives for digital payments, or disincentives for cash. Promote the expansion of rural digital payments infrastructure, including through licensing requirements, shared infrastructure investments, incentives etc. As noted above, any incentives would require careful cost-benefit analyses.
- Implement a digital ID program. Over 1.1 billion people globally lack an officially recognized form of identification, often forming a barrier to accessing digital financial services.¹⁴⁷ Implementing a low-cost, voluntary digital ID could allow millions of smallholder farmers in APEC economies to access digital payments and financial services.
- Ensure that regulatory frameworks for financial services enable safe, low-cost, low-value payments. Examples of such frameworks include simplified or tiered KYC regimes that allow for remote account opening, agent banking, and a transparent consumer protection regime that allows for timely redress and dispute resolution.

Over 1.1 billion people globally lack an officially recognized form of identification, often forming a barrier to accessing digital financial services.

LARGE-SCALE AGRIBUSINESSES

- Evaluate the potential for digitizing crop purchase transactions, as well as other cash flows, as a means of reducing costs and improving transparency throughout the value chain. For businesses that purchase agricultural outputs or that finance inputs, there are often significant cost savings to be achieved by increasing digital payment acceptance. Businesses that purchase agricultural products in bulk have shown themselves willing and able to digitize their receivables if they a) have a clear understanding of the cost savings or revenue impacts, b) are committed from the senior leadership level down to digitization, and c) understand the importance of educating both clients and staff on the benefits.
- Work with agricultural supply merchants to enable interoperable digital credit and payments services that allow farmers to use one transaction account for both receiving crop payments as well as making related purchases.



PAYMENT SERVICE PROVIDERS AND MOBILE MONEY OPERATORS

- Establish partnerships with leading agricultural buyers and providers of agricultural credit in order to leverage their ties into rural economies.
- Explore new business models for serving rural populations. As mentioned in the Better Than Cash Alliance's "Accelerators" report, a likely driver of digital payment activity will be the degree of interoperability with other services. This is particularly relevant to low-income rural areas that are unable to profitably sustain multiple service providers.

DEVELOPMENT ORGANIZATIONS AND NGOS

- Support projects that digitize bulk payments from agribusiness to smallholders, fund digital innovation research aimed at the agricultural sector, and work with payment service providers to support outreach efforts in rural areas.

By incorporating digital payments into the agricultural value chain and helping make essential financial services available to more people in agricultural communities, it is possible to increase the productivity and growth potential of the world's 475 million smallholder farmers. Increases in the productivity of these farmers have been shown to have outsized benefits in terms of poverty reduction and inclusive growth. At the same time, linking poor and vulnerable populations with digital payments will help governments to respond rapidly and efficiently in the case of drought or famine, while building resiliency against climatological shocks.

Achievements such as these are critical to building a healthy, vibrant, and sustainable agricultural sector, while providing a reliable social safety net for all people, including those in rural and remote communities. An inclusive digital payments ecosystem will be invaluable in helping the world's poorest citizens to withstand shocks, invest in their livelihoods, increase their prospects of improved living standards, and participate meaningfully in global prosperity.

Priority Actions for Using Digital Payments to Improve Food Security and Agricultural Productivity

1. Governments

Encourage adoption of digital payments by incorporating training on their benefits and use into existing channels for agricultural education, such as extension officers

2. Agribusinesses

Analyze the business case for digitizing aspects of the value chain, including bulk payments to farmers or credit to suppliers

3. Payment Providers, Governments, and Aid Organizations

Work together to identify existing food aid, cash transfers, and subsidies that benefit smallholder farmers and could be made more efficient through digitization

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The Better Than Cash Alliance

The Better Than Cash Alliance is a global partnership of governments, companies, and international organizations that accelerates the transition from cash to digital payments in order to reduce poverty and drive inclusive growth. Based at the United Nations Capital Development Fund (UNCDF), the Alliance has over 60 members, works closely with other global organizations, and is an implementing partner for the G20 Global Partnership for Financial Inclusion.

Asia-Pacific Economic Cooperation (APEC)

The Asia-Pacific Economic Cooperation (APEC) is a regional economic forum established in 1989 to leverage the growing interdependence of the Asia-Pacific. APEC's 21 members aim to create greater prosperity for the people of the region by promoting balanced, inclusive, sustainable, innovative and secure growth and by accelerating regional economic integration. APEC's 21 member economies are Australia; Brunei Darussalam; Canada; Chile; People's Republic of China; Hong Kong, China; Indonesia; Japan; Republic of Korea; Malaysia; Mexico; New Zealand; Papua New Guinea; Peru; The Philippines; The Russian Federation; Singapore; Chinese Taipei; Thailand; United States of America; and Viet Nam.

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