



Opportunities in agricultural value chain digitisation

Learnings from Côte d'Ivoire

OCTOBER 2017



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1. Executive Summary

The use of mobile-enabled digital tools in the last mile of agricultural value chains allows agribusinesses to address business challenges and optimise procurement and business performance. At the same time, value chain digitisation brings a wide array of benefits to smallholder farmers such as the promotion of financial inclusion, empowerment through transaction transparency and clear terms of trade, and adoption of better agricultural practices. This document presents four case studies of last mile digitisation from Côte d'Ivoire:

- **The first two case studies are examples of digital financial services offered by financial institutions in partnership with Mobile Network Operators (MNOs);** they target members of local agricultural cooperatives and address farmers' need for credit; they allow farmers to overcome the barrier of accessing formal financial services and even out irregular cash flows resulting from the seasonal nature of agricultural production.
- The services are offered under a financial institution-led model with bank-to-mobile money account (B2M) integration, whereby a formal financial institution offers agricultural cooperatives and their previously unbanked farmers access to remunerated savings bank accounts, while integration with an MNO's mobile money service allows farmers to cash out their savings via the mobile money account.
- **The latter two case studies are examples of digital tools that facilitate collection and analysis of last mile data by the agribusiness** to better support field operations, address bottlenecks and maximise operational efficiencies. They allow for efficient monitoring of operations; they become effective communication channels with farmers and agribusiness field staff and they offer transparency of transactions and of other aspects of last mile procurement that support agribusinesses' efforts in ensuring traceability and driving sustainability initiatives.
- The services are offered under an agribusiness-led model for last mile digitisation, whereby an agribusiness may draw on resources supplied by a software firm that specialises in applications for the agriculture vertical and leads the development of a digital enterprise tool that meets organisational objectives. The MNO involvement is currently indirect and limited to the provision of data connectivity for operating the mobile applications.
- Looking ahead, the digital footprint of last mile digital tools can help develop economic identity for the underserved and radically impact access to formal financial services.



2. Digitising the last mile in Côte d'Ivoire's agricultural value chains

The digital channel is increasingly enabling outreach to smallholder farmers who have only loose connections to value chains and who have, until recently, been largely excluded from the benefits of value chain financing. For agribusinesses, digital technologies are seen as a way to optimise processes in the supply chain, thus offering significant value creation opportunities. In the centre of digital technologies, mobile services such as mobile money and mobile connectivity are helping to unlock a range of new products and services that go beyond the traditional offerings available to value chain actors.

In Côte d'Ivoire, Orange was the first MNO to launch mobile money services in December 2008 followed by MTN (October 2009) and Moov (January 2013).¹ According to Findex 2014 data, the country has the fifth highest mobile money penetration rate in the world and the highest in West Africa.² MNOs have made efforts to increase adoption of ecosystem transactions beyond Person-To-Person (P2P) transfers. Both Orange and MTN, which jointly claim some 94 per cent of the mobile money market,³ are now involved in agriculture-specific payment digitisation initiatives targeting the last mile.⁴ The initiatives are primarily focusing on

digitising payments to smallholder farmers for the sale of agricultural crops as well as payments of quality premiums.⁵ At times, these initiatives are linked to the provision of other financial services such as savings.

Alongside digital payments, a growing number of other digital tools to serve the agricultural last mile have emerged, for example, track and trace and farm management systems developed with the support of third-party software firms which specialise in the development of enterprise applications. These systems enable efficient supply chain management in agriculture and are widely utilised by agribusinesses.⁶ In some instances, last mile digital tools integrate enterprise applications with digital payments and other MNO-led solutions and result in a more holistic suite of services that address the needs of different value chain actors including agribusinesses, cooperatives and farmers. Current evidence from field research reveals that last mile digital tools with functionalities extending beyond payments have, without exception, been commercially driven by agribusinesses without MNO involvement.

1. Mobile Money deployment tracker, GSMA. Available at: <https://www.gsma.com/mobilefordevelopment/m4d-tracker/mobile-money-deployment-tracker>

2. Findex 2014, The World Bank. Available at: <http://datatopics.worldbank.org/financialinclusion/country/cote-d-ivoire>

3. Country Overview: Côte d'Ivoire, GSMA, April 2017. Available at: <https://www.gsmainelligence.com/research/2017/04/country-overview-cote-d-ivoire/620/>

4. In agricultural value chains, the last mile is the web of relationships and transactions between buyers of crops such as agribusinesses, cooperatives and middlemen, and the farmers who produce and sell their crops. Most of this activity takes place in the developing world, where about 1.3 billion people are employed in agriculture and are involved in the production of the majority (at least 70 per cent) of the world's food.

5. In the case of cocoa, certified sustainable cocoa beans attract a premium that is paid on top of state-regulated minimum price charged for procurement.

6. Market size and opportunity in digitising payments in agricultural value chains, GSMA, November 2016. Available at: <https://www.gsmainelligence.com/research/?file=29e480e55371305d7b37fe48efb10cd6&download>

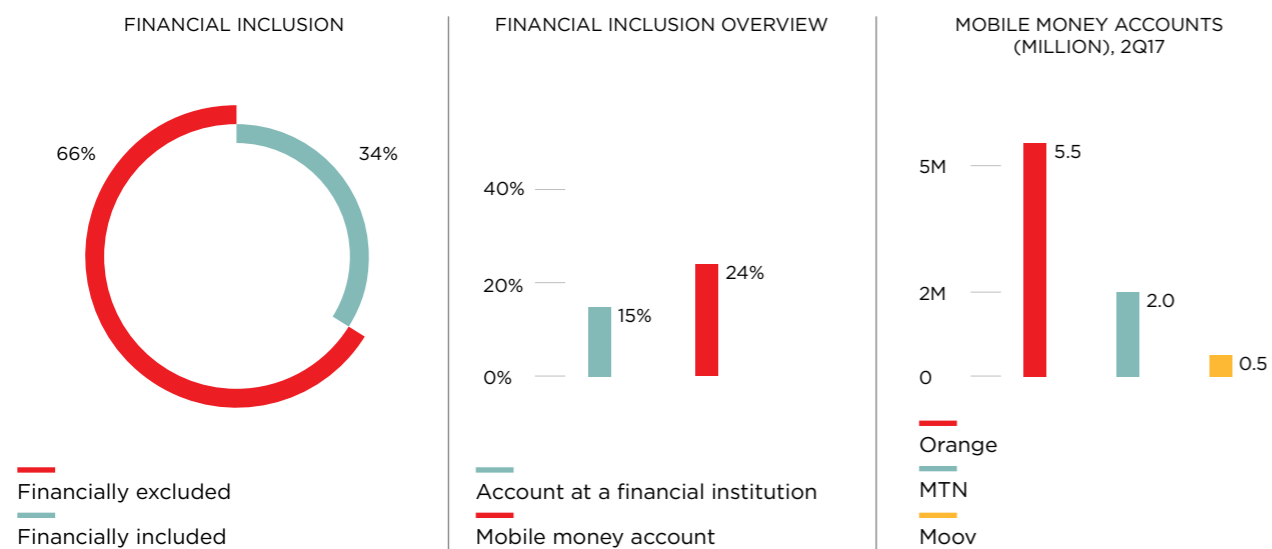
2.1 The opportunity of last mile digitisation for farmers

In Côte d'Ivoire, much of the agriculture sector contribution comes from smallholder farmers. For the country's top export, cocoa, more than five million people depend upon 700,000 farmers for their livelihoods.⁷ Nearly all cocoa production comes from

smallholders, the majority of whom are organised in farmer organisations (cooperatives). Despite the vital role these farmers play to the country's economy, formal financial service providers have to some extent overlooked the rural segment.

FIGURE 1 Source: Global Findex 2014 / Autorité de Régulation des Télécommunications de Côte d'Ivoire (ARTCI)

Financial inclusion statistics, Côte d'Ivoire



Although the proportion of financially included adults living in rural areas is broadly the same as that on a country level (34 per cent), the extent of the challenge becomes clearer when we consider that only a few adults saved for a farm or business in the past year (23 per cent) and for education or school fees (19 per cent). According to Côte d'Ivoire's telecoms regulator, ARTCI, Orange has the highest number of mobile money accounts followed by MTN and Moov.⁸

Farmers entering the digital ecosystem can benefit from new products and services that emerge as a result of Ivorian MNOs' investment in supporting mobile money to reach its commercial and social impact potential. For example, MNOs and the government have already successfully collaborated on digitising school fees. In 2015, 99 per cent of secondary school fee payments were made digitally, 94 per cent of which were via mobile money.⁹

Moreover, mobile money is increasingly being used by individuals for international remittances. For instance, international remittance services had success in Côte d'Ivoire's rural areas where a significant proportion of farmers in the main cocoa and other export crop growing areas are economic migrants from Burkina Faso and Mali. As a result, transfers from MTN Mobile Money subscribers in Côte d'Ivoire to Airtel Money subscribers in Burkina Faso have had particularly strong traction in rural Burkina Faso, where 60 per cent of recipients live.¹⁰

The combination of transactional records from the sale of agricultural produce with other data points offers the potential to assess the creditworthiness of farmers, and opens the way to formal agricultural credit, insurance and saving products.¹¹ Lacking credit

history, financially excluded smallholder farmers find it difficult to secure financing to purchase inputs such as fertilisers, pesticides and seedlings to replace ageing trees and to boost agricultural production, or to make meaningful capital investments in irrigation, processing equipment or storage facilities in their farms. These liquidity constraints often occur alongside market failures, such as the one that hit Côte d'Ivoire's cocoa trade in the 2016-2017 season,¹² which prevented farmers from seeking out the best price for their crops and further enhanced the need for credit. Under these circumstances, mobile money can offer farmers an opportunity to transition from cash to digital payments, can create transparency and digital records, and can eventually open the way to meaningful financial services in an affordable and sustainable manner.

2.2 The opportunity of last mile digitisation for an agribusiness

The GSMA's research in Côte d'Ivoire indicates that the deployment of last mile digital tools benefits agribusinesses in two fundamental ways: the optimisation of last mile operations and the development of more reliable value chains.

First, digital tools enable agribusinesses to optimise last mile operations and drive ongoing sustainability initiatives,¹³ to roll out certification and traceability schemes, to build farmer group and field agent capacity and to deliver targeted information to farmers in a cost efficient and systematic way. Demand for sustainability standards in Côte d'Ivoire's cocoa, coffee and other competitive value chains is high and driven by the following factors, among others: global interest in the economic health of developing countries which

are net commodity exporters, consumer interest in health and safety of food, and the need to assess the impact of agricultural expansion on global biodiversity and the environment. Consequently, high demand for sustainability initiatives encourages the adoption of digital technologies as a means of optimising operations in the last mile.

Such is the demand for sustainable cocoa in developed markets that some of the largest chocolate manufacturers such as Mars, Ferrero and Hershey¹⁴ have committed to sourcing 100 per cent fully certified sustainable cocoa by 2020. Commitments of this type extend to the chocolate manufacturers' suppliers such as Barry Callebaut, Cargill and Olam, all of which have a strong presence in Côte d'Ivoire and have grasped

7. Cocoa farmers' agricultural practices and livelihoods in Côte d'Ivoire, AFD, February 2017. Available at: <http://www.afd.fr/webdav/site/afd/shared/Notes%20techniques/24-notes-techniques.pdf>

8. Autorité de Régulation des Télécommunications de Côte d'Ivoire (ARTCI), March 2015 - March 2017. Available at: <http://www.artci.ci/index.php/historique/Statistiques-des-telecoms/historique-des-statistiques.html>

9. Paying school fees with mobile money in Côte d'Ivoire: A public-private partnership to achieve greater efficiency, GSMA, September 2015. Available at: https://www.gsma.com/mobilefordevelopment/wp-content/uploads/2015/10/2015_GSMA_Paying-school-fees-with-mobile-money-in-Cote-dIvoire.pdf

10. Driving a price revolution: Mobile money in international remittances, GSMA, October 2016. Available at: https://www.gsma.com/mobilefordevelopment/wp-content/uploads/2016/10/2016_GSMA_Driving-a-price-revolution-Mobile-money-in-international-remittances.pdf

11. Big data, small credit, Omidyar Network, 2016. Available at: https://www.omidyar.com/sites/default/files/file_archive/insights/Big%20Data,%20Small%20Credit%20Report%202015/BDS_C_Digital%20Final_RV.pdf

12. Poor weather in the October 2015 - September 2016 season reduced global cocoa supply and led to a spike in prices for the first half of 2016. The expectation of a continued slump in the next season (October 2016 - September 2017) following another weak harvest led Côte d'Ivoire's regulatory body for cocoa and coffee, Conseil Café-Cacao (CCC), to set a high minimum farm gate price just as the harvest was set to begin (CCC fixes farm gate prices according to futures price of cocoa in London). Cocoa exporters bid on contracts before any real trends could be established. Good weather and slumping cocoa demand led to a bumper crop and reduced prices. As a result of the misalignment between market prices and state-set prices, exporters could not purchase cocoa at the price set by the CCC if they wanted to make a profit and trucks with cocoa sat at ports for months due to a lack of buyers. In March 2017, CCC cut farm gate price by 36 percent. Source: Gro Intelligence, April 2017. Available at: <https://gro-intelligence.com/insights/ivory-coast-cocoa-prices>

13. Initiatives that seek to embed sustainable practices across every section of the supply chain. For example, in the case of farmers suppliers, sustainability translates to crops produced in a socially responsible, economically profitable and environmentally sustainable way.

14. Source: <http://www.mars.com/global/about-us/policies-and-practices/cocoa-policy>

the opportunity to replace pen-and-paper data collection with digital tools as an essential step in their commitment to make cocoa more sustainable.

Second, Ivorian agribusinesses benefit from the digitisation of procurement payments to farmers which offer the potential to support the development of more reliable supply chains. For example, whether indirect via community organisations, such as cocoa cooperatives, or direct from crop buyers to farmers, digital payments via mobile money combined with bespoke agriculture-specific savings products offer farmers a route to

financial inclusion. Cocoa farmers use savings made to their bank accounts to purchase agricultural inputs or cover out-of-season expenses such as school fees and health fees. In this context, mobile money becomes the tool to promote farmer productivity, economic livelihoods and community development and enables agribusinesses to optimise supply chain performance. As a result, agribusinesses can purchase greater volumes of higher quality produce from their smallholder suppliers and more reliably meet the volume demands from downstream supply chain actors.

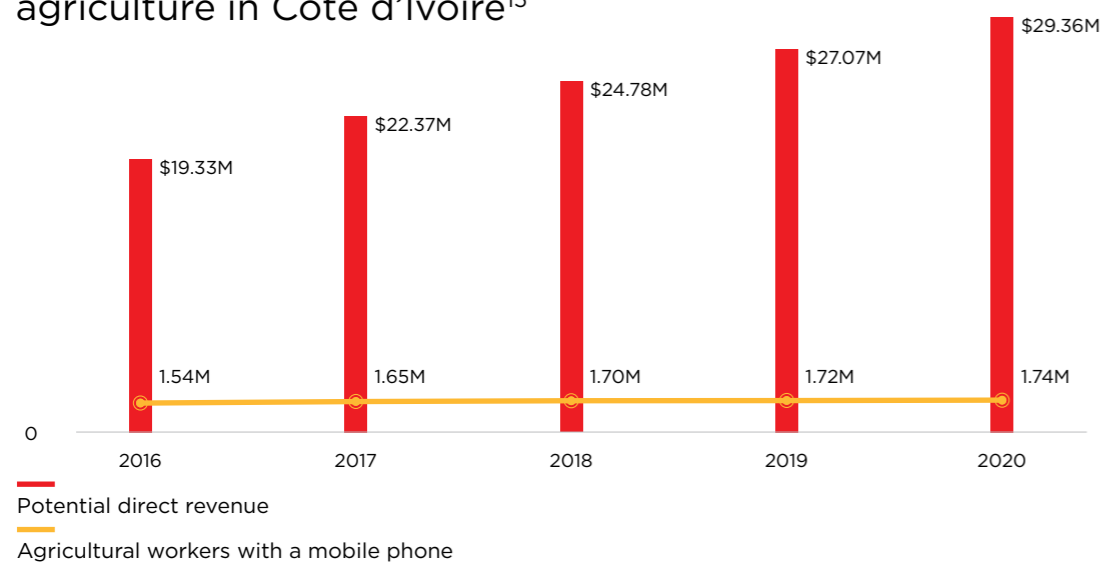
2.3 The opportunity of last mile digitisation for MNOs

There is a large untapped opportunity for mobile money providers in Côte d'Ivoire to digitise last mile agriculture payments. GSMA mAgri estimates that Côte d'Ivoire's digital agricultural Business-To-Person (B2P) value chain payments could be as high as \$ 3.8 billion in 2017 growing to \$ 4.7 billion in 2020. This

would result in a direct revenue opportunity for mobile money providers of \$ 22.4 million growing to \$ 29.4 million respectively. In subscriber market share terms, there is an opportunity to address a base of 1.7 million agricultural workers with a mobile phone (2017).

FIGURE 2 Source: GSMA Intelligence and GSMA mAgri

Potential direct revenue opportunity for B2P payments digitisation in agriculture in Côte d'Ivoire¹⁵



15. It is important to note that the opportunity to digitise B2P payments can only be realised if mobile money providers are met with key market level foundational enablers. In addition to being able to operate in an enabling regulatory environment, allowing agriculture-specific mobile money use cases (e.g. suitable limits for agricultural transactions) and ensuring that adequate mobile network coverage is deployed in targeted rural regions is crucial. Other key enablers include the setup of a robust agent network scheme supported by training and incentives strategies, as well as careful selection of the value chain that serves a market entry, is only possible through a deep understanding of the agricultural sector and possible business models.

In addition, commercialising enterprise digital tools for the last mile provides a compelling new opportunity for MNOs to diversify their offering for the agricultural sector beyond a Business-To-Consumer (B2C) value proposition. MNOs can leverage their scale, network of enterprise partners

and extensive portfolio of services to offer a holistic enterprise solution that generates a more predictable and steady revenue stream. This last mile solution can include an array of digital tools from information services to mobile money payments, track and trace systems, IoT applications and predictive analytics.

FIGURE 3

Digital tools to optimise the last mile procurement

BUSINESS CHALLENGES	1. Information services: Agricultural extension, education, certification standards, skills development	2. Mobile money: Transfers, payments and digital financial services	3. Digital profiles: Mobile for authentication and verification and as a tool to create economic identities/ digital profile	4. Track and trace systems, farm management systems	5. IoT applications for agriculture: Equipment logistics, crop, soil and weather monitoring, smart warehousing	6. Agribusiness analytics: Predictive analytics, precision agriculture
Farmers do not follow best practices, and lack skills and access to agri-related information, educational resources etc.	Cash payments are risky and costly for agribusinesses and for farmers. A cash economy also prevents farmers from accessing credit savings and insurance	Farmers do not possess formal and/or economic identities that capture transactional history, geolocation, farm size etc.	Agribusinesses need full and real-time visibility for traceability and certification of goods when sourcing from smallholders	Agribusinesses rely on manual systems which do not capture the data required for efficient equipment, farm and warehouse management	Agribusinesses rely on manual data management systems and lack real-time visibility into their business data	

For MNOs, there is an opportunity to position digital offerings as tools that meet agribusiness demands for a comprehensive solution in business process management, which extends from an agribusiness's offices through their entire supply chain down to the field staff and farmers. Digital tools addressing enterprise customer needs offer the potential to expand revenue streams (e.g. mobile money withdrawal fees, data connectivity fees), grow the

subscriber base (e.g. acquisition of new mobile and mobile money subscribers in rural areas) and increase agent activity (higher cash-in and cash-out volumes). For instance, deploying information services / agronomic advisory services via mobile can provide considerable indirect and direct benefits to MNOs¹⁶ targeting rural customers at a time when urban mobile subscriptions are reaching market saturation.

16. Creating scalable, engaging mobile solutions for agriculture, GSMA, July 2017. Available at: <https://www.gsma.com/mobilefordevelopment/programmes/magri/creating-scalable-mobile-solutions>

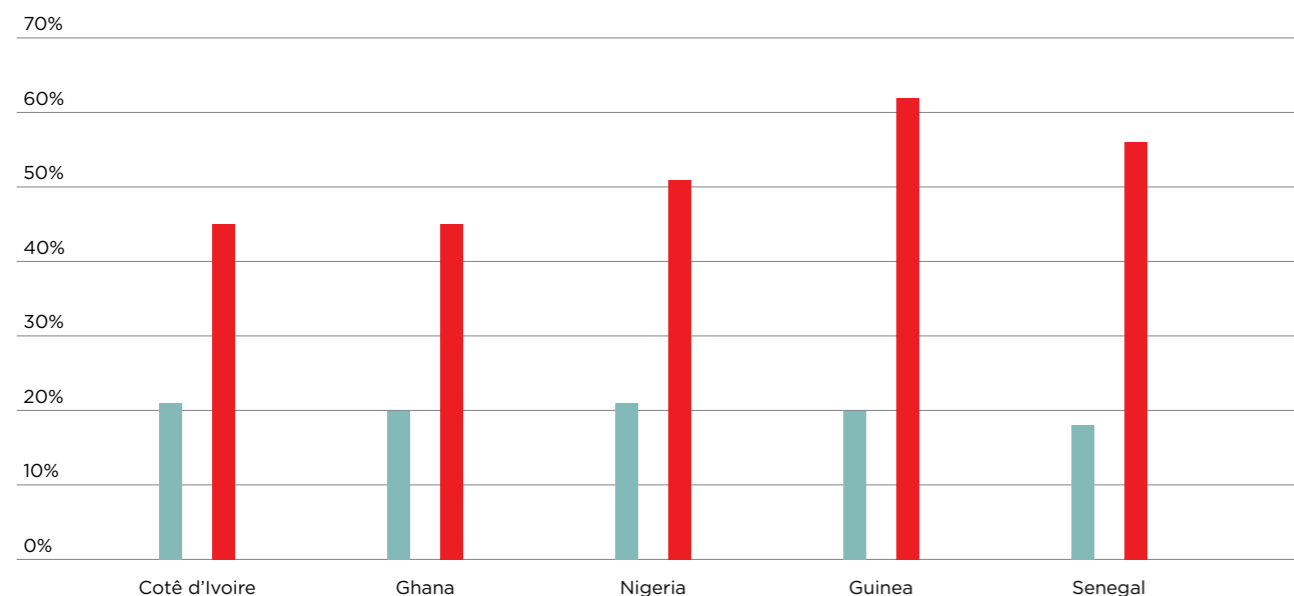
3. Agriculture in Côte d'Ivoire

Agriculture is the primary source of employment in Côte d'Ivoire and is identified as a key driver for growth in the government's National Development Plan,

2016-2020.¹⁷ According to The World Bank, the sector's contribution to total GDP in 2016 was 21.2 per cent,¹⁸ on a par with other regional markets.

FIGURE 4 Source: The World Bank

National relevance of agriculture in selected countries



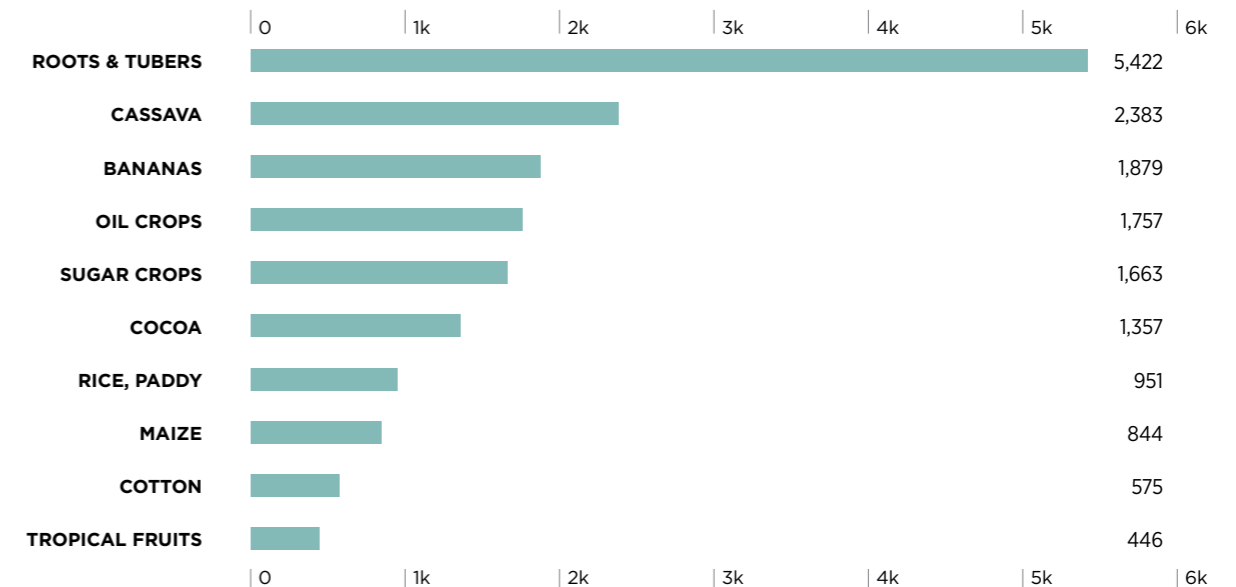
Agriculture, value added (% of GDP)
Rural population (% of total population)

The sector is made up of food crops, cash crops and livestock.¹⁹ Major food crops contributing to the primary sector of the economy include maize, manioc,

millet and sorghum, paddy rice, plantain bananas and yam. Major cash crops include bananas, cocoa, coffee, cotton, pineapple, rubber and sugar cane.

FIGURE 5 Source: GSMA Intelligence

Average yearly production (thousand tonnes), top ten value chains in Côte d'Ivoire, 2000-2014



Since 2012, Côte d'Ivoire has benefited from strong economic development with GDP growth remaining steady at above 8 per cent, making the country Africa's fastest growing economy in 2016.²⁰ Much of this growth originates from a steady expansion of revenue from export crops led by cocoa beans, which in 2015 represented 33 per cent of the total commodities exports by value followed by processed cocoa (17 per cent) and rubber (7 per cent).²¹ These export crops appear to be highly suitable for last mile digitisation.



17. Economic Development Documents - National Development Plan, 2016 - 2020, IMF. Available at: <https://www.imf.org/external/pubs/ft/scr/2016/cr16388.pdf>

18. World Bank Data, The World Bank, 2017. Available at: https://data.worldbank.org/indicator/NV.AGR.TOTL.ZS?locations=CI&year_high_desc=true

19. Statistics Yearbook 2015, Banque Centrale des Etats de l'Afrique de l'Ouest. Available at: http://www.bceao.int/IMG/pdf/annuaire_statistique_2015_de_la_bceao-statistics_yearbook_2015_of_bceao.pdf

20. World Bank Data, The World Bank, 2017. Available at: http://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG?locations=ZG&year_high_desc=true

21. Banque Centrale des Etats de l'Afrique de l'Ouest (BCEAO). Available at: http://www.bceao.int/IMG/pdf/annuaire_statistique_2015_de_la_bceao-statistics_yearbook_2015_of_bceao.pdf

FIGURE 6 Source: BCEAO

Agricultural share by crop of total commodity exports, 2015



Similar to GSMA mAgri's observations in other Sub-Saharan African markets,²² entry points for last mile digitisation in Côte d'Ivoire are more likely to be in formal value chains where direct procurement from farmers takes place. As opposed to informal value chains where farmers sell their crop to middlemen or directly to the open market, formal value chains see the presence of established players interacting with smallholder farmers. The roles and economic relationships between farmers and the entities they interact with in formal value chains are well defined, leading to larger and more predictable transaction values and volumes and a stronger relationship between an agribusiness and its suppliers.

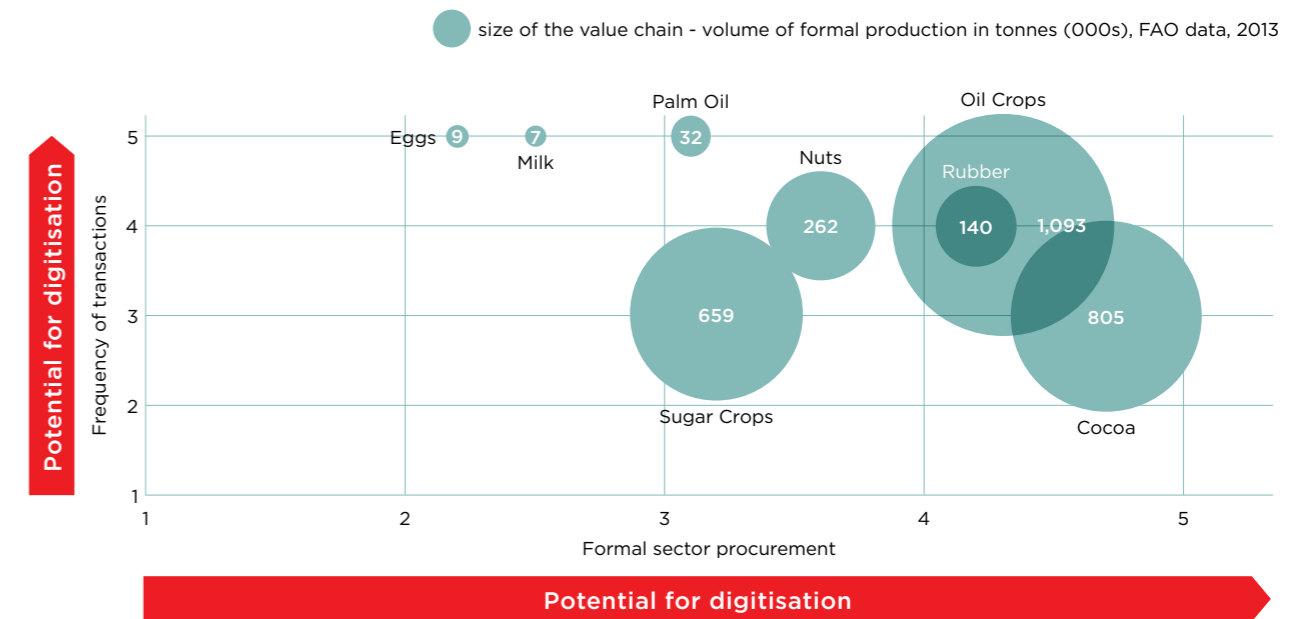
In Côte d'Ivoire, formal value chains consist of mainly export-driven cash crops such as cocoa and coffee whose prices are fixed at farm gate²³ by the government, leaving agribusiness buyers with little room for manoeuvre. At the opposite end of the spectrum, crops belonging to informal value chains

such as onions, manioc and cassava are primarily sold at low volumes to buyers with whom farmers have an unstructured economic relationship. As a result, client engagement is highly fragmented and opportunities for digitisation are limited.

To prioritise the most attractive value chains for digitisation, starting from digital payments (B2P), GSMA mAgri and GSMA Intelligence have developed a model that scores agricultural value chains across 70 emerging markets against the following indicators: Value of agricultural formal sector procurement by value chain in USD; Formal sector procurement by value chain; Volume of production by value chain; Value chain prognosis/growth potential; Average size of transactions in USD by value chain; Frequency of transactions by value chain, and; Interlinkages of value chains. Despite the absence of any agricultural B2P payments digitisation initiatives in the country, the opportunity is ripe. Figure 7 displays eight highly attractive value chains as identified by the model.

FIGURE 7 Source: GSMA Intelligence, GSMA mAgri

Priority value chains for B2P payments digitisation initiatives in Côte d'Ivoire



Using a proprietary model developed by GSMA Intelligence and GSMA mAgri, this figure displays the ten most attractive value chains for digitisation.

Factors taken into account include, amongst others: The size of the value chain (volume of formal production in tonnes, FAO data 2013), which is here shown in the green bubbles; Formal sector procurement by value chain (horizontal axis); Frequency of transactions by value chain (vertical axis).

Formal sector procurement is a metric worked out as the weighted average of three sub-indicators: Commercial Activity in Value Chain (subsistence crop versus cash crop); Structure of the value chain (localised traders versus institutional buyers); Share of exports (consumed locally versus exported). The assumption is that formal value chains, with established structures where actor roles and economic relationships are well-defined, offer mobile money providers greater opportunities for digital payments. Each value chain has been given an aggregate score (1-5) against the sub-indicators, the higher the score the strongest the potential for digitisation.

Frequency of transactions is a major factor to consider while assessing a value chain's viability for digitisation, as regular transactions ease liquidity management for a mobile money provider and provide stable revenues to its mobile money agents. Similarly to "formal sector procurement", agricultural value chains receive a score of 1 to 5 depending on the estimated number of transactions per year: 1 transaction (scores 1); 2-5 transactions (2); 6-20 transactions (3); 21-50 transactions (4); 50+ transaction (5).

For example, the cocoa value chain's high score in agricultural formal sector procurement outweighs the comparatively low score in frequency of transactions making the sizeable cocoa value chain highly suitable for B2P payments digitisation in Côte d'Ivoire. At the

other end of the scale, the eggs value chain's low score in agricultural formal sector procurement and volume of formal production make a less promising entry point for digitisation despite a relatively high score in frequency of transactions.

22. Opportunities in agricultural value chain digitisation: Learnings from Uganda, GSMA, 2017. Available at: <https://www.gsma.com/mobilefordevelopment/wp-content/uploads/2017/09/mAgri-Opportunities-in-agricultural-value-chain-digitisation-Learnings-from-Uganda.pdf>

23. The farm gate prices are in principal the prices received by farmers for their produce at the location of the farm. Thus the costs of transporting from the farm gate to the nearest market or first point of sale and market charges (if any) for selling the produce are, by definition, not included in the farm gate prices. Source: FAO

4. Spotlight on digitisation initiatives in Côte d'Ivoire

This section explores four ongoing examples of digitising the agricultural last mile in Côte d'Ivoire. The first two are examples of digital financial services offered by financial institutions in partnership with MNOs that target members of local agricultural cooperatives. These services combine the financial product portfolio and expertise of the financial institution with the MNO's extensive subscriber base and agent network for the purpose of making traditional financial services accessible to new customer segments.

4.1 Advans savings account with B2M integration

In August 2014, Ivorian microfinance institution Advans Côte d'Ivoire partnered with a network of cocoa cooperatives nationwide and MTN Côte d'Ivoire to offer farmers a branchless Advans savings account accessible via a mobile money account. The service was initially designed to reach 7,500 farmers distributed among 40 cooperatives; it promoted saving and received support from The Consultative Group to Assist the Poor (CGAP).

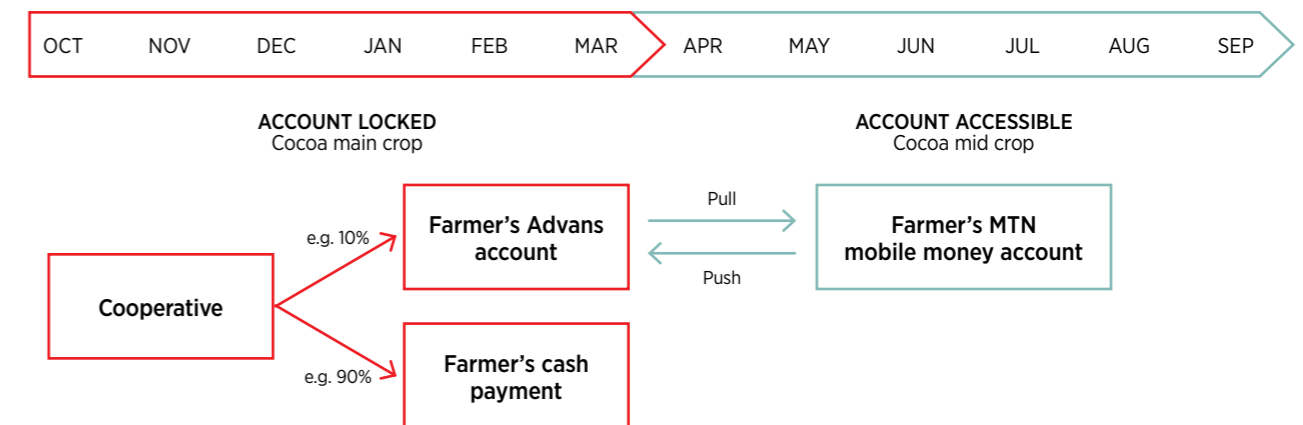
Farmers decide what proportion of payment, coming from the sale of crops, they want to save and the remaining amount is paid in cash (see figure 8 below). The cooperative processes payments to participating farmers' Advans savings accounts (3.5 per cent Annual Equivalent Rate or AER) of the amount

The latter two are examples of last mile digital tools that facilitate data collection and analysis to better support field operations, address bottlenecks and maximise operational efficiencies. These tools, one of which was developed in partnership with enterprise application software provider SAP are used not only as sustainability monitoring tools, but also to ensure quality of produce and meet the demands of downstream actors in the supply chain.

they choose to save; farmers are allowed to access their savings after the end of the main crop season (between April and September) at an MTN agent following a B2M transfer; farmers are also allowed to make reverse transfers of money from their mobile money accounts to their Advans accounts. Farmers are charged XOF 2,500 (\$ 4.5) annual Advans account maintenance fees. Even though transfers between an Advans account and the mobile money account are free, all other relevant mobile money transaction fees apply. As of August 2017, the service had reached over 13,500 farmers spread among 100 cocoa cooperatives. So far, some 6,000 farmers have used the new digital channel to transfer money from their Advans accounts to the mobile money accounts.

FIGURE 8

Advans-to-MTN mobile money account (B2M) sample process flow



4.2 SIB savings account with B2M integration

In May 2015, Ivorian bank Société Ivoirienne de Banque (SIB) partnered with three cocoa cooperatives and Orange Côte d'Ivoire to launch a pilot targeting the digitisation, via a B2M channel, of 1,000 cocoa farmers' bi-annual premium payments (January and June) for certified sustainable cocoa. The pilot was designed to incentivise saving and received support from IFC and The MasterCard Foundation.

The cooperative processes the payment of premiums to participating farmers' SIB savings accounts (3.5 per cent AER); farmers have the choice to cash out their savings either at a SIB branch or at an Orange Money agent following a B2M transfer. Participating farmers are charged XOF 1,000 (\$ 1.8) per transfer between a SIB

account and the mobile money account as well as all other relevant mobile money transaction fees. As of May 2017, 48 percent of 2,400 farmers' SIB bank accounts (1,150 bank accounts) had integrated with Orange's mobile money account. In the same period, close to 500 farmers were paid their quality premium (a total of \$ 76,381) in their SIB accounts, half of whom used the new digital channel to transfer money from their bank accounts to their mobile money accounts. Looking ahead to 2018, project partners are looking to extend the pilot to reach 8,500 farmers across nine cooperatives and digitise procurement payments alongside premium payments. In parallel, project partners are now testing direct mobile money bulk payments with the ambition to pay 100,000 farmers via digital means by the end of 2018.

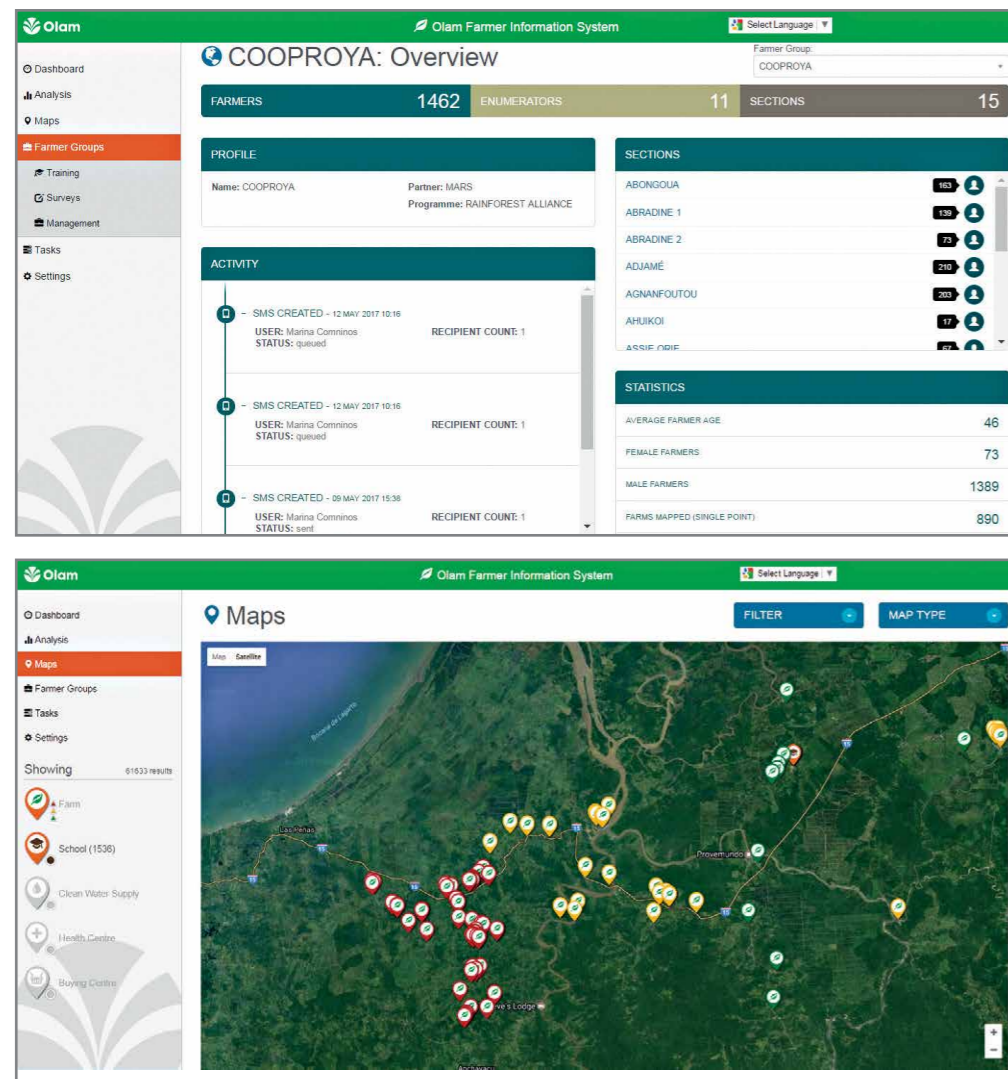
4.3 Olam enterprise tool for last mile digitisation

The Olam Farmer Information System ("OFIS") is an enterprise tool developed in-house. OFIS replaces data collection using pen and paper with a purpose-built Android OS application and a cloud-based server. Among other things, Olam uses OFIS to collect targeted farm gate data, record GPS data points directly on the ground, analyse and visualise key statistical data, keep track of field training implementation versus any predetermined training targets and communicate directly with field staff

through application notifications (see figure 9 below). OFIS allows farmer groups and cooperatives to manage their operations, offers end-to-end traceability through a bar coding system and integrates digital payments functionality via MNOs' mobile money platforms. So far, over 100,000 farmers in 21 countries have been enrolled to the system, and Olam aims to reach 500,000 by 2020. In Côte d'Ivoire, OFIS is used in cocoa, coffee, rubber and cashew nut value chains.

FIGURE 9 Source: courtesy Olam

OFIS application user interface



4.4 Barry Callebaut enterprise tool for last mile digitisation

Katchilè is a cloud-based geo-traceability application developed by SAP. Information on farmers, their activities and their communities can be recorded digitally at every step of the supply chain. The enterprise digital tool enables cocoa beans to be traced from the farmer back to Barry Callebaut's warehouse. Additionally, records on sustainability-related activities allow for assessment of individual farmer and community needs and provision of higher

impact support through a digital farm management system. The solution operates offline and information is synchronised once data connectivity is restored. Katchilè was first introduced by Barry Callebaut in Côte d'Ivoire in 2016 in the cocoa value chain with the ambition to cover some 65,000 farmers who participate in the company's sustainability activities. Katchilè is now being rolled out in Ghana and Indonesia.

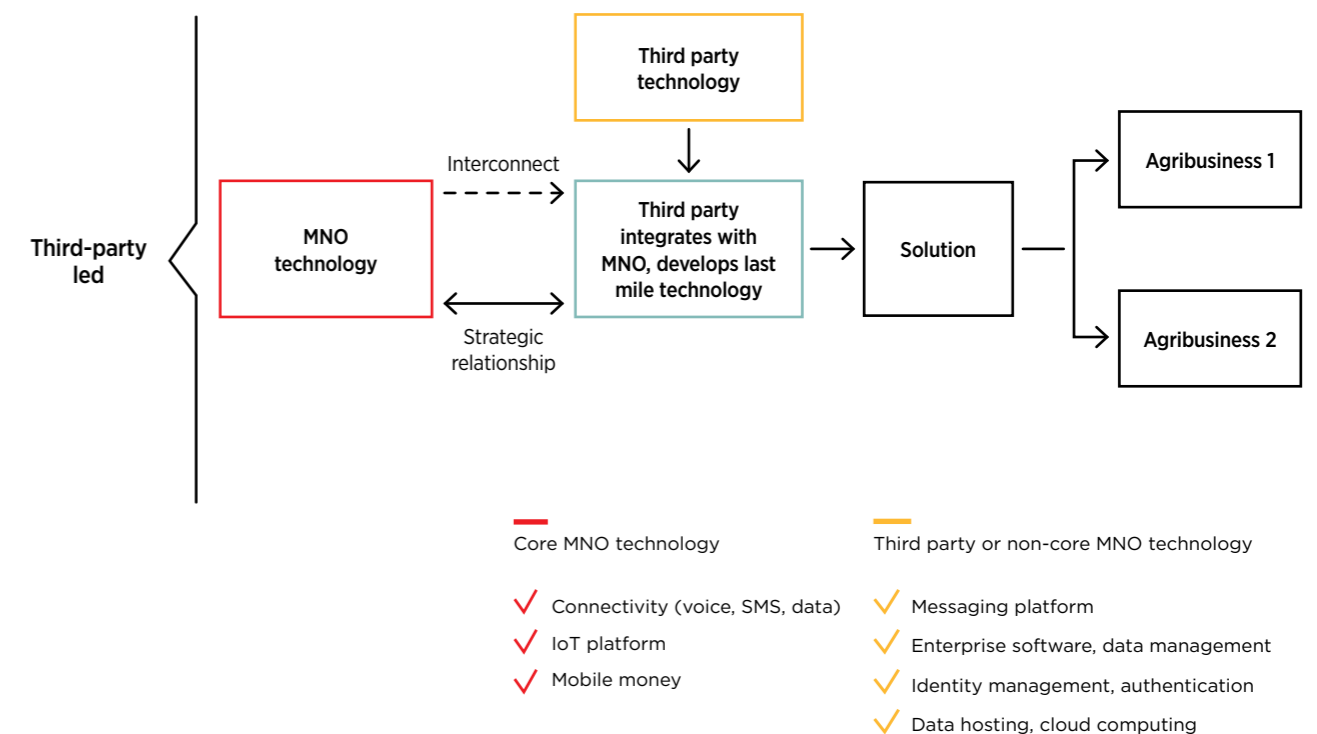
5. Ownership models in Côte d'Ivoire

In Côte d'Ivoire, last mile digital tools are available to farmer cooperatives and agribusinesses under a third party-led model, whereby organisations with different skillsets and capabilities use MNO core assets, such as connectivity and mobile money, to develop their own digital tools as described in figure

10 below. Depending on the nature of the digitisation initiative, this third party-led model manifests in two fundamental ways: a financial institution-led model with B2M integration and an agribusiness-led model for last mile digitisation.

FIGURE 10

Providers of agricultural last mile digital tools in Côte d'Ivoire



5.1 Financial institution-led model with B2M integration

In the case of last mile payments digitisation initiatives (see sections 4.1 and 4.2), a formal financial institution offers agricultural cooperatives and their previously unbanked farmers access to remunerated savings bank accounts, while integration with an MNO's mobile money service allows farmers to cash out their savings via the mobile money account ("Financial institution-led"). Partnering with a mobile money provider allows the financial institution to develop its footprint and to operate at a profitable scale in rural locations of low population density, without having to invest large fixed costs in setting up and maintaining a traditional brick-and-mortar branch network.

In the context of a financial institution-led model, the benefits to the mobile money provider are manifold and range from subscriber base and mobile money account base expansion to an inflow of money into the ecosystem and growth of the number of mobile money transactions. The bank, on the other hand, is allowed to penetrate previously untapped customer segments and to capitalise on the provision of agri-focused financial products such as input and tractor loans.

FIGURE 11

Considerations of a financial institution-led solution with B2M integration

	Mobile Money Provider	Financial Institution
Incentives	<ul style="list-style-type: none"> • Benefits from new SIM registrations and new mobile money account creation • Benefits from an increase of mobile money transactions e.g. cash-outs, remittances, which in turn lead to increased transaction revenues (positive network effect) • Can benefit from offering cooperatives a bulk payments solution to be used for the portion of payment that is currently paid in cash 	<ul style="list-style-type: none"> • Benefits from organic customer base growth that comes from tapping into previously unbanked population segments • Benefits from offering agri-focused products such as input loans for purchase of fertilisers and pesticides and their derived revenues e.g. annual interest • Benefits from the collection of bank account maintenance fees e.g. XOF 2,500 (\$ 4.5) per year for Advans savings account
Mobile money network	<ul style="list-style-type: none"> • Manages directly sales and distribution network, agent deployment and liquidity • Offers ad-hoc support in targeted areas with high concentration of participating farmers 	<ul style="list-style-type: none"> • As opening physical bank branches remains an expensive proposition, the mobile money network becomes the viable alternative that allows for service expansion • Not in control of mobile money agent distribution and liquidity
Commercial arrangement	<ul style="list-style-type: none"> • Flexible mobile money platform allows MNO to offer preferential rates 	<ul style="list-style-type: none"> • Financial institution has the power to negotiate with mobile money provider
Mobile money service ecosystem	<ul style="list-style-type: none"> • Benefits from inflow of digital money into the ecosystem • Can develop new rural-focused services 	<ul style="list-style-type: none"> • Not in control, and dependent on MNO for mobile money service ecosystem development • Can develop new services for rural users and complement MNO's service ecosystem e.g. MTN's mobile money licence allows for cash and float only

For farmers, B2M integration serves as the stepping stone to achieving financial inclusion. The solution enables farmers to overcome the barrier of accessing formal financial services, namely the lack of banking infrastructure, which is an intrinsic trait of rural areas where agricultural cooperatives are active. Also, as agricultural production is by nature seasonal and leads to irregular cash inflows and outflows over the course of a year, access to savings offers a means to even out such cash flows and minimise the risks of dealing with relatively large and irregular amounts of cash.

While there are significant benefits for smallholder farmers, the gains to the cooperatives are also important. A digital tool empowers the cooperative by strengthening relationships with farmers suppliers and promoting farmer loyalty (having farmers returning to sell their crop). Member loyalty and the subsequent impact that positive word-of-mouth among farmers has on membership growth keep the cooperative strong in a competitive marketplace. Additionally, digitisation

of payments mitigates the cooperative's cash handling risks, including the risk of injury, threat to life and losing cash through theft or robbery.

Service design requires the attention of the mobile money provider. The seasonality of cash flows means that farmers may only make use of the mobile money account at specific times of the year. Under such circumstances, mobile money account deactivation rules may need to be adjusted to suit farmer's annual activity profile in order to avoid account cancellation that will hamper the success of the service. Besides, when transactions are made after the end of the season, the farmer is cash poor and most likely to use mobile money for cashing out significant lump sums from the savings account to cover day-to-day expenditures. When such lump sums trigger transactions the size of which are at levels exceeding basic mobile money account limits, enhanced Know-Your-Customer (KYC) procedures need to apply.

5.2 Agribusiness-led model for last mile digitisation

In the case of agricultural last mile digital tools that extend beyond payments, an agribusiness may draw on resources supplied by a specialist software firm and lead the development of an enterprise digital tool that meets organisational objectives. The agribusiness-owned tool offers real time visibility and analytics to support a diverse portfolio of digital tools encompassing traceability, certification compliance and roll out of agricultural extension among others ("Agribusiness-led"). Integration of the enterprise tool with other mobile services of one or more MNOs, such as IoT solutions and bulk messaging to farmers, allows to upgrade to a more holistic suite of services that covers the full breadth of opportunities for last mile digitisation across different value chains.

For an agribusiness, the case of Côte d'Ivoire shows that the incentives for deploying a last mile digital

tool are substantial. First, a digital tool allows for efficient monitoring of operations by providing an integrated system across the agribusiness's extensive operations in last mile procurement and plantations, core supply chain operations, midstream processing and downstream distribution. For example, data informing on land use practices and environmental impact allows Barry Callebaut to move towards deforestation-free production models and compliance with certification protocols. This is pertinent to cocoa which grows best in forested or formerly forested areas and, consequently, expansion of cocoa production has been identified as a major driver of deforestation in Côte d'Ivoire.²⁴

Second, a digital tool becomes an effective communication channel with farmers and agribusiness field staff through notifications, programme progress reports and the dissemination of content such as

24. In March 2017, twelve of the world's leading cocoa and chocolate companies, including Barry Callebaut, Mars, Mondelez International and Olam, came together for the first time to set up a cooperative initiative to end deforestation and forest degradation in the global cocoa supply chain. Since then, additional companies have joined and, by May 2017, more than 30 were committed to the effort. Source: The World Bank, May 2017. Available at: <http://www.worldbank.org/en/news/feature/2017/05/22/cutting-deforestation-out-of-the-cocoa-supply-chain>

agronomic tips, weather information and pricing. For example, the use as a communication tool is valuable when crop producing areas where Olam field staff are found like Côte d'Ivoire's cotton-growing northern regions, are far away from crop processing centres.

Third, a digital tool offers transparency of transactions and of other aspects of last mile procurement that support an agribusiness's efforts in ensuring traceability and building an understanding of how raw ingredients are produced from a human angle. For example, demand for traceability as part of a wider sustainability initiative is particularly high in the palm oil value chain and relevant to agribusinesses operating in the West African nation. When supplemented with analytics and data visualisations functionalities, as in the case of Olam's OFIS, a last mile digital tool offers unparalleled efficiency improvements and has a direct positive impact on business performance contributing to increased productivity, cost reduction and revenue and profitability growth.

On the farmers' side, last mile digital tools offer empowerment through transaction transparency and

clear terms of trade thus building a fair environment for farmers to supply their produce. Even though these agribusiness-led enterprise digital tools are not currently used for processing digital payments in Côte d'Ivoire, they nevertheless have the potential to allow farmers to enjoy all benefits arising from the digitisation of procurement payments as covered in section 2.1. New lines of credit combined with access to reliable information and effective training programmes permit informed investments that can lead to increased productivity and overall crop quality.

For implementing partners, the use of digital tools raises some important considerations: the model anticipates partnership with a third-party/tech provider (so-called "aggregator")²⁵ or mobile money provider to allow integration with the mobile money service and implementation of digital payments. A direct relationship with a mobile money provider can ensure a seamless integration of payments. This model can help mitigate risks relating to the management of the actual sales and distribution channel and the provision of liquidity and lead to reduction of costs during the implementation phase.



25. Aggregators are entities that act as the conduit between payment instrument providers (mobile money /e-money providers and banks) and third parties.

6. Key learnings

6.1 Strong partnerships are key to the success of the financial institution-led model

When financial institutions and mobile money providers come together to form a partnership, both must have a clear understanding of their motivations, roles and expectations for their respective organisations. Additionally, the partnership must be structured in such a way that allows both the mobile money provider and the financial institution to generate value which can be either direct (from the implementation of the service) or indirect (from the development of additional revenue streams).

In the financial institution-led model, coordinated efforts are required on several levels as MNOs and financial institutions are often dependent on mutual performance of defined roles for the success of the service. For example, in order to onboard farmers, financial institution and mobile money agents need to cooperate in the registration and training of farmers

and cooperative staff to stimulate adoption in the early phases of service implementation. To this end, a dedicated back office team is necessary to support the accounts creation process following a seamless execution of KYC rounds, both on the financial institution and MNO sides.

For example, in the service led by SIB bank in Côte d'Ivoire, paper-based registration of farmers and manual interconnection for B2M integration resulted in slowing down the uptake of the new digital channel. At the same time, training of farmers has also been a challenge. In an evaluation survey conducted some six months after the launch of the service, 50 per cent of participants could not explain the payment process and 67 per cent of participants did not know the applicable mobile money transaction fees.

6.2 An MNO-led model offers a pathway to financial inclusion

In Côte d'Ivoire, the financial institution-led model seeks the transition of previously unbanked farmers from a cash environment to financial institution account ownership and digital financial services. For farmers, this path represents a giant leap in the process of bridging the cash-digital divide. Evidence from Côte d'Ivoire suggests that farmers find the process to be difficult which may lead to confusion and poor service adoption. In this context, MNOs' wider reach to a large, diverse pool of customers and

larger network of physical access points permit them to become key enablers along the pathway to an inclusive digital economy.

To maximise this opportunity, MNOs may be able to offer a simplified pathway to digital financial inclusion. This pathway first sees farmers connect to a digital payments system that allows them to transact with their peers as well as with other providers connected to the system. Once farmers are transacting under a

range of customer use cases that span beyond money transfers, the MNO has the opportunity to engage in a mutually beneficial partnership with a financial institution for the implementation and delivery of derivative financial services such as savings, credit

and insurance products. Crucially, this multi-stage approach generates measurable benefits to farmers through several channels such as transacting with peers and institutions and it allows them to address the financial inclusion gap.

6.3 Cooperatives and agribusinesses are likely to benefit immediately from a mobile money bulk payments solution

One common characteristic between the two projects operating under a financial institution-led model is that only a small proportion of a payment goes through the B2M channel with the balance paid in cash. Under these circumstances, cooperatives (and agribusinesses procuring crops directly from farmers) have the opportunity to digitally process the cash part of the payment with the support of a mobile money bulk payments platform, to extend the value proposition and to drive immediate benefits related to increased efficiency, safety and cost reduction both for them and for the farmers. For organisations with reduced technology readiness and low adoption of ICT tools, such as the cocoa cooperatives engaged in the financial institution-led model initiatives, bulk payments represent a likely first use case for connecting to a digital payments system and moving along the digital pathway.

From a farmer standpoint, activation of a basic mobile money account that allows participation in a bulk

payments scheme is often simple and relies on KYC information already stored in the MNO's database from the SIM card registration. This type of account is likely to have low limits on the amount per transaction, the amount that may be sent per day and the maximum balance that can be stored at any time. For high value crops such as cocoa and coffee, if farmers wanted to conduct transactions over these limits e.g. receive payments for crops they sold and to store money in the mobile money account, they would need to follow enhanced KYC rules with rigid identification requirements. In the case of Côte d'Ivoire, that could be challenging due to the significant proportion of migrant farmers from neighbouring countries who are likely to have limited evidence to support their identification. To bypass the issue of transaction sizes falling above the mobile money transaction limits, agribusinesses making bulk payments to farmers may consider to adjust the frequency and volume of transactions to facilitate the disbursement of payments.

6.4 A last mile digital tool empowers agribusiness's quest for smallholder farmer loyalty

The success of an agribusiness depends on a steady supply of high quality agricultural crops from smallholder farmers that allow it to develop a more distinctive and wide suite of products and remain competitive in the marketplace. This is particularly true in competitive value chains where farmers are less dependent on a specific buyer and agribusinesses compete to procure crops from the same farmer. In this environment, an agribusiness may seek to offer a wide range of benefits to farmers to increase their loyalty e.g. delivery of training, pre-financing options for purchase of inputs and so on. Farmers, on the other hand, secure a market for their crops which incentivises them to work with the agribusiness repeatedly.

In this quest for loyalty, last mile digital tools emerge as a key enabler for delivering those benefits to farmers while also allowing the agribusiness to support traceability requirements and roll out farm management systems to optimise supply chain performance. By integrating digital payments functionality, IoT applications for agriculture and agribusiness analytics, digital enterprise tools offer a unique suite of services for the agricultural sector and promote farmers' financial inclusion.

6.5 A holistic enterprise tool enables the creation of economic identity as a first step to farmers financial inclusion

Discussions with value chain actors involved in last mile digital tools in Côte d'Ivoire have revealed that farmers value the prospect of developing an economic identity and gaining access to formal financial services, primarily credit. To this end, a digital footprint becomes the vehicle to reach unbanked smallholder farmers and radically impact financial access for poor people. In a holistic enterprise tool, a digital footprint is a trail of data created while using the tool i.e. financial transaction data (e.g. procurement payments), farm data (e.g. farm size, GPS or non-GPS enabled geolocation data, mix of crops), farmer profile data (e.g. family size, strength of relationships with extended family members and community leaders) as well as other mobile communication data (e.g. call detail records, data from use of value-added services). In the context of a cocoa farmer in Côte d'Ivoire, for example, a digital footprint may include a wealth of data such as the size and location of the farm, the frequency and size of transactions and volume of production over a number of seasons as well as information on other regular cash inflows and outflows (e.g. loans).

While no single data type in isolation is likely to be sufficient to profile a farmer's credit risk, a combination of data might be able to do so. Companies involved in the use of digital footprints then use the information to assess farmer's income predictability, spending behaviour, financial planning awareness and financial planning ability and to define farmer's risk and their ability to repay. Although work is still at an early stage, there is potential to develop models that make use of digital footprint for profiling farmers' credit risk, matching farmers to types of insurance products or offering tailored solutions of other financial products (e.g. savings to fit farmers' abilities and needs). Even though there are opportunities for innovation, data protection issues come into play alongside calls for protecting farmers' privacy and ethical use of their digital footprints. MNOs' experience in handling vast amounts of personal data put them in a strong position to play an active role in leveraging the digital footprint for the benefit of the farmers.

6.6 Ensuring data accuracy is paramount to the success of a last mile digital tool

The ability to realise the benefits that arise from deploying a last mile digital tool is highly dependent on the ability to obtain and maintain high quality data. When facing data quality issues, an agribusiness should consider the potential impact on the efficiency of supply chains, decision-making process, adoption of last mile digital tool by cooperatives and farmers and implications on the management of operations. Poor quality data involves multiple dimensions including accuracy, completeness and relevance. Quality issues often emerge at point of entry resulting from field staff inputting incorrect information (e.g. volume of crops sold to the agribusiness), leaving blank fields (e.g. farmer's location), data duplication (e.g. farmer accounts), incorrect formatting (e.g. volume of crops entered in incorrect units of measurement) and others.

As a first step in managing data quality, agribusinesses operating digital enterprise tools need to define data quality and raise awareness among field staff of the importance of data quality in the success of the business (e.g. through training). In parallel,

agribusinesses need to identify regularly-occurring quality problems followed by technologies and practices that can be used to resolve these problems. In order to ensure data quality when implementing its last mile digital tools, Olam has taken a number of steps. First, Olam configured the system and introduced input constraints to ensure that certain information is mandatory and that only valid data can be entered. Second, Olam recognised the importance of trust in agribusiness agents to make the right processing decisions when using the application. To achieve this goal, the agribusiness offered field agents training on necessary steps and knowledge to interact with the system. Third, Olam introduced a quarantine functionality as a means to validate seemingly inaccurate data. Disregarding the challenges associated with the implementation of these steps, such as the delivery of training to a network of field agent scattered across the country, assuring the quality of data has been crucial in the successful implementation of the digital tool.





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