



ANALYSIS

Agricultural value-added services (Agri VAS): market opportunity and emerging business models

February 2015

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Executive summary

1. There is a mismatch between the productivity level of farmers in developing countries and the size of the agriculture labour force in those countries. This is attributable to a wide range of farming and non-farming related factors, including poor farmers' access to relevant information and widespread inefficiencies in food production, storage and distribution processes. Meanwhile, the growing reliance on agricultural products from developing countries by consumers in developed countries underscores the threat to global food security from continued sub-optimal agriculture productivity levels in developing countries.

Agri VAS, one of the three main types of mobile agriculture (mAgri) solutions, are well suited to mitigate the information gap faced by rural farmers in developing countries as well as create efficient platforms for them to engage with key players in the agriculture ecosystem, such as farmers in other communities, businesses buying the agricultural produce and input suppliers. There is a significant growth opportunity in Agri VAS. We estimate that agricultural workers with mobile connectivity will account for 47% of the total labour force in South Asia and Sub-Saharan Africa by 2020, with 30% of them being potential Agri VAS users. Presently, there are 98 live Agri VAS services tracked by GSMA in Asia, Africa, Latin America and the Middle East. In view of the growth outlook for Agri VAS over the next five years and the shortfall of quality Agri VAS solutions at scale in many developing countries, there is significant scope for more services in the space.

2. For existing and new Agri VAS services to reach their commercial and developmental potential, they must possess a strong business case that would eventually ensure their financial sustainability at a feasible scale. This primarily depends on the business model the service is operating on and the barriers it has to overcome within a given environment. Although some of these barriers are universal, such as poor network coverage in rural areas where majority of farmers live, high cost of mobile phone ownership and low technology literacy levels among rural farmers, others are business model-specific.

We have identified three broad business models based on the operations of existing Agri VAS services. These are the direct revenue, the indirect benefits and the subsidised business models. The direct revenue model has three variants - the business-to-consumer, the business-to-business and the hybrid models. From our research, Agri VAS based on business models with well-defined and measurable direct and indirect benefits for stakeholders are better placed to achieve financial sustainability. However, there is no general-purpose business model, with each of them susceptible to various barriers in different markets. For example, some variants of the direct revenue model are susceptible to poor rural farmers' ability and willingness to pay while the indirect benefits model depends on the accurate evaluation of the indirect benefits for critical partners. In order to ensure growth and sustainability in the Agri VAS space, Agri VAS providers and investors must match the key advantages and barriers of each model against the local dynamics in a given market to ensure that they develop and support services with the best prospects to reach sustainability.

3. Mobile operators are central to the provision of Agri VAS services and, therefore, need to understand the market opportunities and potential for a variety of direct and indirect benefits from optimising their engagement in the Agri VAS space. In addition to network infrastructure, mobile operators can leverage other vital assets, including billing, marketing and customer care capabilities, to facilitate the effective delivery of Agri VAS services.

As mobile operators step up their rural rollout strategies to sustain subscription growth and the overall cost of mobile phone ownership continues to decline, there is a strong case to leverage their network assets to take advantage of opportunities in the Agri VAS space. While some mobile operators already provide Agri VAS based on direct and indirect benefits, there is scope for them to become more involved in Agri VAS for enterprise customers in view of the growth potential of business-to-business services in developing countries. This might involve building up in-house capabilities or developing strategic partnerships with organisations that have a superior understanding of the agriculture sector dynamics.

Context: rural rollout as an opportunity for mAgri solutions

The extension of mobile network services to rural areas will drive the next wave of subscriptions growth in the mobile industry. GSMA estimates that the vast majority of the 1.8 billion new connections expected over the next five years will involve connecting ‘unconnected’ users in developing countries, which will require building-out network coverage into rural areas. Many mobile operators in these regions have adopted rural rollout strategies to take advantage of the subscriber growth opportunity in underserved areas amid declining growth in saturated urban areas. As a significant proportion of rural population is involved in agriculture and rely on it for their livelihood, mAgri provides an opportunity for mobile operators to engage with their rural-based customers beyond basic services.

Meanwhile, the world’s population continues to grow and is expected to reach over 9 billion by 2040¹. In order to prevent food shortages, agricultural production will need to increase by 70% by 2050². Although the majority of the global agricultural labour force live in developing countries (more than 95%), the productivity level of farmers in these countries is lower than that of their counterparts in developed countries. For example, cereal yield in developing countries, at 3,300 kg/hectare, is 70% of the yield in developed countries, at 4,805 kg/hectare (see Figures 1 and 2). This underscores the need for farmers in developing countries to find efficient ways to increase food production.

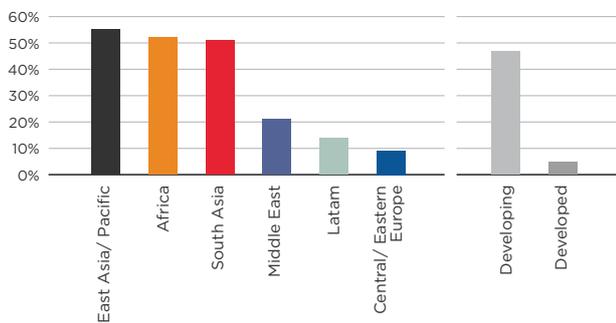


Figure 1: Proportion of Labour force in agriculture, developing economies only, 2013

Source: FAO

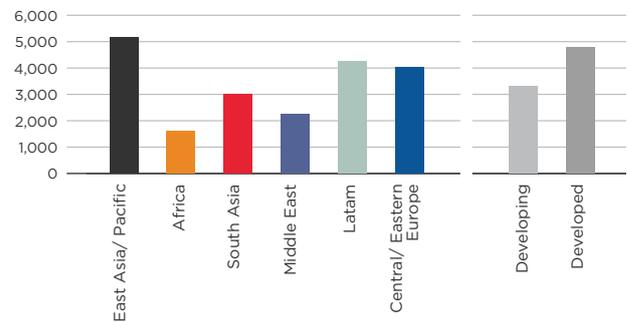


Figure 2: Agriculture productivity (kg/hectare), developing economies only, 2013

Source: World Bank

Presently, the productivity level of farmers in developing countries is stymied by a variety of factors, including; poor farmers’ access to relevant market and weather information, the continued use of inefficient farming techniques, poor infrastructure in most farming communities, lack of access to finance for investment in better agricultural technology and equipment, and inefficiency in distribution and storage systems. The mobile technology is well suited to bridge the knowledge and information gap for farmers and facilitate efficient interaction between key players in the entire agriculture value-chain. This would increase

¹ Source: [World Population Prospects: The 2012 Revision](#), UN Department of Economic and Social Affairs, 2013

² Source: [2050: A third more mouths to feed](#), UN Food and Agriculture Organisation (FAO)

efficiency and boost productivity levels in farming communities and, consequently, increased economic output and greater contribution of the agriculture sector to overall GDP. Agriculture is one of the main drivers of the economy in developing countries, contributing 11% of GDP compared to only 2% in developed countries (see Figure 3). In 2013, agriculture was worth \$515 billion in developed countries, compared to \$2,428 billion in developing countries.

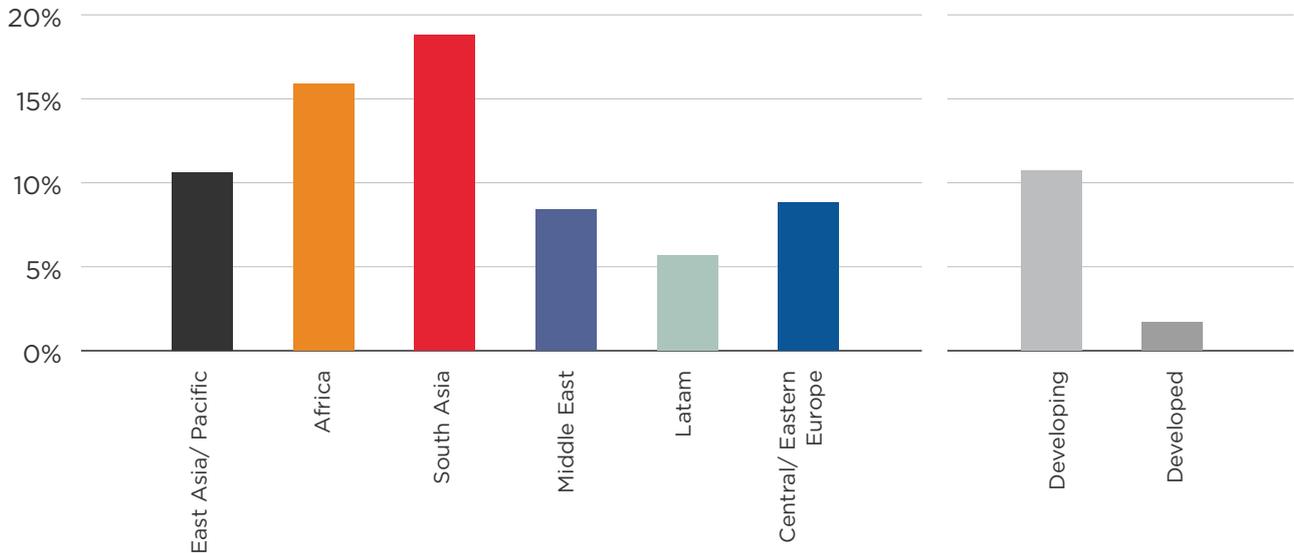


Figure 3: Agriculture, value added (% of GDP), developing economies only, 2013

Source: World Bank

mAgri services can be segmented into three broad categories based on the delivery mechanism, technology involved and challenge addressed (see Figure 4). The first is agricultural value added services³ (Agri VAS). These are based on a machine-to-human interaction (services delivered via mobiles to farmers), and is proving to be effective in tackling some of the factors that limit the productivity level of farmers in developing countries. The second category of mAgri services is based on M2M (machine-to-machine) technology, which connects machines, devices and appliances together wirelessly via a variety of communications channels, including IP (internet protocol) and SMS, to deliver services with limited direct human intervention, transforming them into intelligent assets that open up a range of possibilities for improving how businesses operate. We discuss the application of the M2M technology in agriculture in our report – [Agricultural machine-to-machine \(Agri M2M\): a platform for expansion](#). The third category of mAgri solutions is Agri MFS - mobile financial services tailored for the agricultural sector. In developing countries, nearly 60% of the population is unbanked⁴, and those that do have a bank account mostly live in urban areas. This prevents farmers from having loans, payment facilities, savings and insurance for protection against crop failure.

³ Value added services refers to all services beyond standard voice-calls supplied either in-house by the mobile operators, or by a third party VAS provider

⁴ Source: [World Bank Global Financial Index](#)

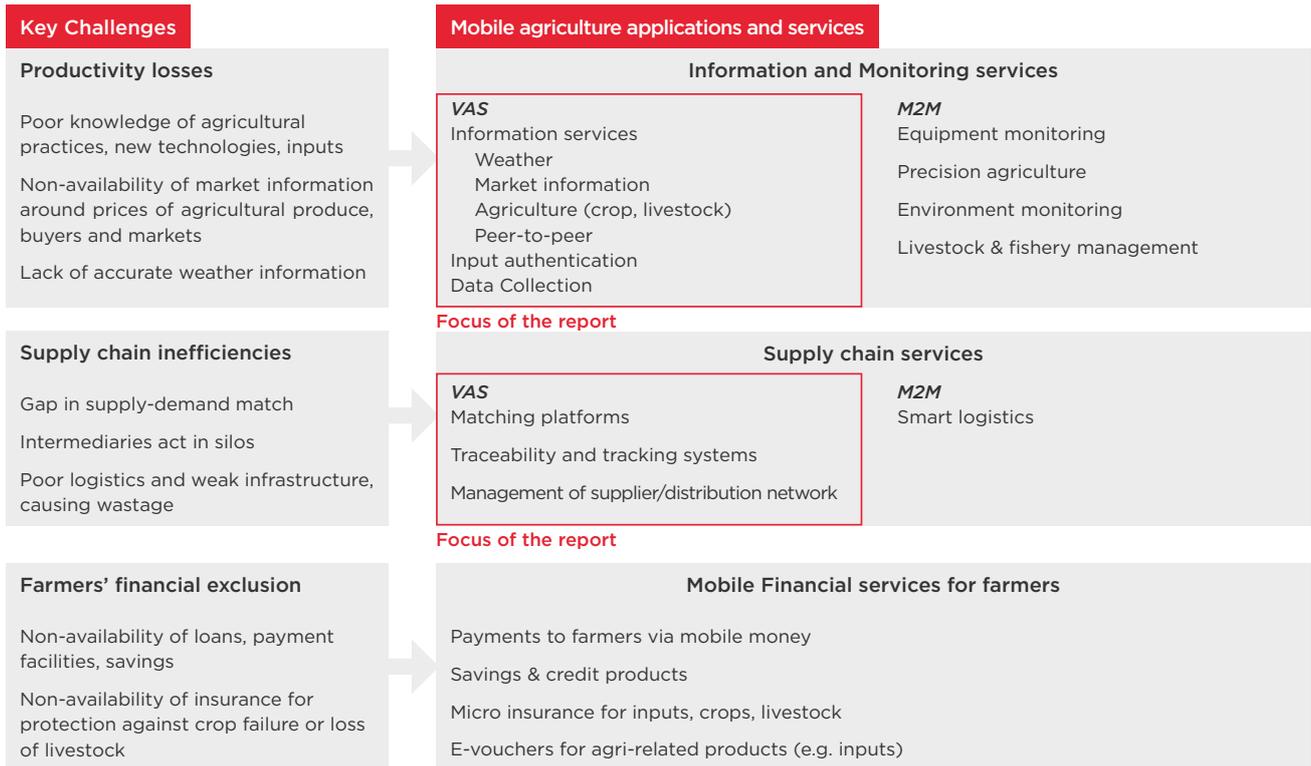


Figure 4: mAgri use cases and benefits – the opportunity for mobile

Source: GSMA Intelligence

In this report, we discuss the various Agri VAS business models and highlight the growth potential of Agri VAS in developing countries, focusing on Asia and Africa, as well as the market opportunity for mobile operators and investors in the Agri VAS space.

Farmers' perspective: The value of Agri VAS

There is a growing evidence that Agri VAS are being adopted by the farming communities and becoming a central supporting tool for decision making. End users of Tigo Kilimo, an Agri VAS in Tanzania, attribute a high value to the convenience of accessing information about farming through the mobile phone:

“Tigo Kilimo has closed a once wide-open information gap, since I now have a reliable source of information just at the touch of my mobile phone. Previously accessing market information was a nightmare to me, but now just by flipping my fingers through my phone, I have it all!”

The service, which launched in December 2012 and reached almost 400,000 users by December 2014, has led to increased cereal yield in repeat customers:

“This year I have transplanted and I applied fertilizer and production has been increased from 15 sacks of maize last year to 25 sacks this year.”

Other benefits reported included greater knowledge about farming, and better ability to plan farming activities through weather forecasting.

Farmers in Machakos County, Kenya, identify multiple sources of agricultural information, but do not feel sufficiently informed on a range of related topics. Farmers particularly need to know how to source capital for use on their farms, and about unpredictable weather events which could have a huge impact on their livelihoods. Although these farmers preferred to solve problems through personal interactions with government extension agents or local research institutions, in practice these organisations are often stretched beyond capacity, leaving them to explore other sources of agricultural information such as peer farmers, traditional media and local input vendors:

“Most of these sources have their own drawbacks, for instance [on] the radio there is no direct interaction, that is, I can't ask questions for clarification... in case I need urgent information like there is an outbreak of poultry disease, it would be very hard for me to access the urgent information I need.”

Airtel Kilimo – an Agri VAS service provided by Airtel – aims to close this information gap in Kenya. Although the service is still at an early stage with few users, early adopters ranked it as the most accessible, understandable and affordable source of information available to them.

Growth of Agri VAS

Agri VAS have been developed to overcome the information gap faced by farmers in developing countries as well as connect farmers with other key players in the agriculture value-chain, such as agribusinesses. Currently GSMA Mobile for Development (M4D) tracks 98 live agricultural value added service (Agri VAS) deployments among other mobile agriculture services throughout Asia, Africa, the Middle East and Latin America. 6 of these Agri VAS offer also mobile financial services to farmers. Africa has the most live Agri VAS (52), followed by Asia (37), Latin America (6) and the Middle East (3). Figure 5 and the analysis in this report focuses only on the Agri VAS for which data is available (i.e. the start date).

The number of Agri VAS services has increased by 150% in the last 5 years, indicating an increase in interest by key stakeholders, including MNOs, VAS providers, and farmers. However, there is room for more services, particularly in developing countries, considering the potential size of the market and the massive disconnect between the labour force in agriculture in developing countries and farmers' productivity level relative to developed countries.

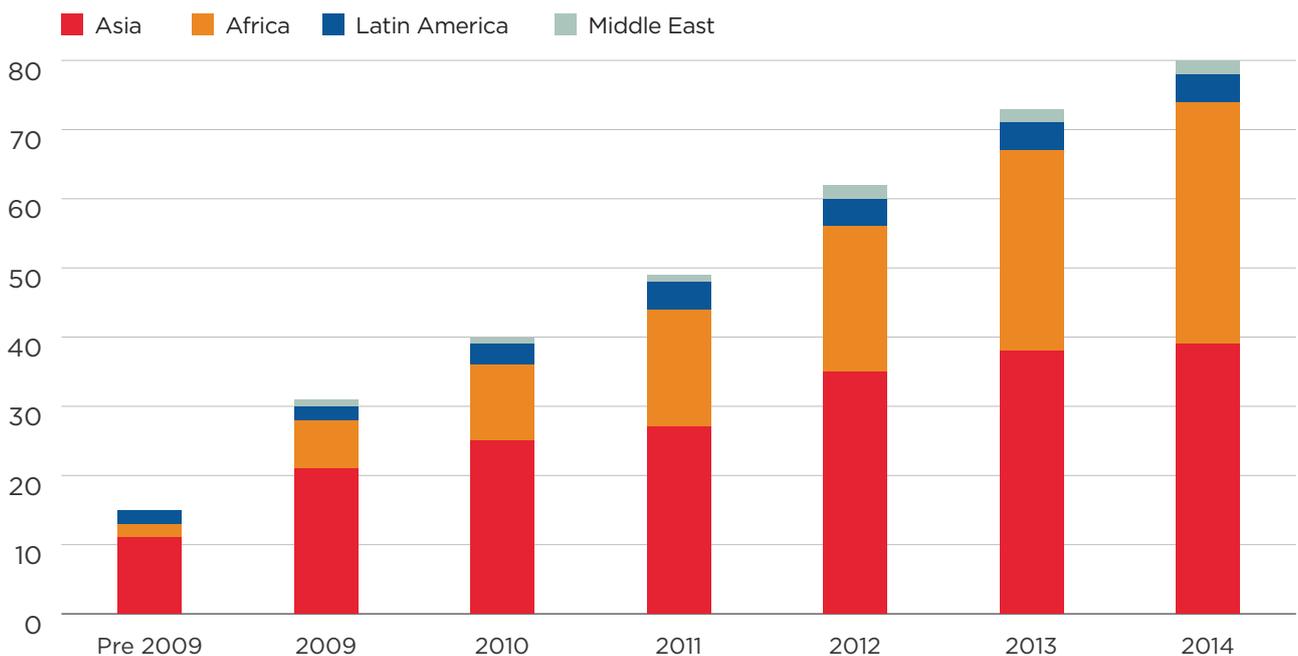


Figure 5: Agri VAS evolution

Source: GSMA products and services tracker

Future opportunity for Agri VAS

GSMA Intelligence has modelled the market size for mobile agriculture value-added services (VAS) to better understand what the potential of this market is, both in terms of the addressable market and annual revenue. The model is based on the intersection of the labour force in agriculture, mobile subscriber penetration and the potential uptake of Agri VAS. For the full methodology and assumption, see the Appendix.

We selected 37 countries⁵ across South Asia and Sub-Saharan Africa on the basis of an agricultural contribution to GDP of at least 10%. The potential number of Agri VAS users has been forecasted to reach 80 million by 2020. Approximately 50 million of the users will be in South Asia and the remaining 30 million in Africa (see Figure 6). Our estimate of unique subscriber penetration among farmers has been used as a proxy to estimate the number of potential Agri VAS users. We estimate that in 2015, across the countries of our analysis, 35% of agricultural workers are potential mobile subscribers, of which 22% are potential Agri VAS users. We estimate the potential agricultural workers with a mobile phone to grow to 47% of the total labour force by 2020, with 30% of them being potential users of Agri VAS.

This projected increase in uptake of Agri VAS over this period has been based on a set of key drivers including: accelerated rollout of mobile networks in rural areas which will result in the uptake of mobile phones by rural farmers, the launch of more Agri VAS solutions, increased awareness of the benefits of Agri VAS, such as increase in productivity and supply chain efficiency, and income growth which will drive users' propensity to spend on Agri VAS solutions.

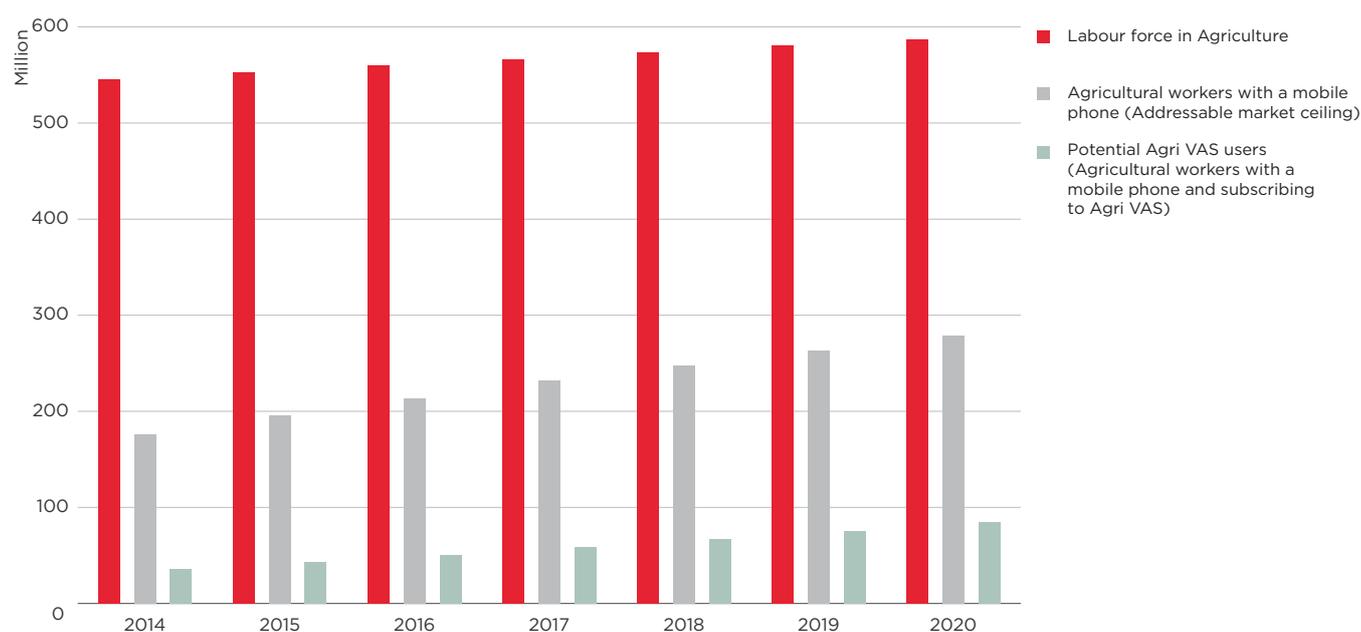


Figure 6: Addressable market for Agri VAS services, South Asia and Sub-Saharan Africa

Source: GSMA Intelligence, World Bank, FAO

⁵ Afghanistan, Angola, Bangladesh, Benin, Bhutan, Burkina Faso, Burundi, Central African Republic, Chad, Comoros, Cote d'Ivoire, Ethiopia, Gambia, Ghana, Guinea, India, Kenya, Liberia, Madagascar, Malawi, Mali, Mauritania, Mozambique, Nepal, Niger, Nigeria, Pakistan, Rwanda, Sao Tome and Principe, Senegal, Sierra Leone, Sri Lanka, Tanzania, Togo, Uganda, Zambia, Zimbabwe

Delivery Technologies

Information and services provided under Agri VAS can be delivered via SMS (short messaging service), MMS (multimedia messaging service), USSD (unstructured supplementary service data), automated voice such as IVR (interactive voice response) or OBD (outbound voice dialling), and online content or apps. SMS remains the most common way of delivering Agri VAS in developing countries. The short-term costs of implementing SMS-based services are generally lower than voice-based services, such as IVR and helplines. However, the addressable market for text-based services is often limited by literacy, both language and technical.

Automated voice channels such as IVR and OBD have the advantage of a larger addressable market (avoiding literacy barriers), the ability to provide richer content and a higher quality of service, and a cost advantage to the service provider in the long term (see [The value of voice – an unsung opportunity](#)). Although helpline services have the advantage of providing more detailed responses to farmers’ request and, consequently, potentially more valuable services, they are generally expensive to set-up and run, and also difficult to scale in a cost effective manner.

A third mode of delivering services is through mobile data, but this has limitations in the short term due to technology literacy, device and data traffic costs, and mobile data network coverage (see Figure 7). However, the declining cost of smartphones, with some Android-based smartphones available for \$30 and Mozilla Firefox smartphones going for \$25, and the growing prevalence of rich media will lead to increased utilisation of this medium in the long term. Agri VAS providers must, therefore, begin to explore opportunities in this channel with a view of taking advantage of the benefits and efficiencies it may provide over the other delivery channels.

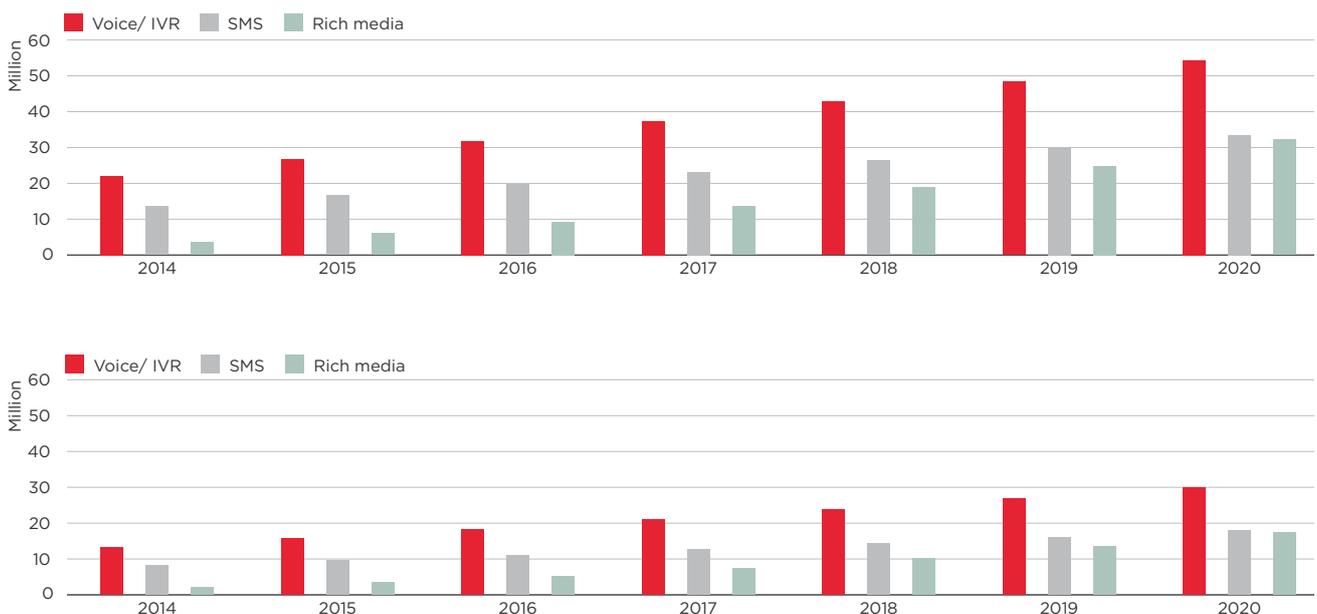


Figure 7: Potential users by delivery channel, Asia (top), Sub-Saharan Africa (bottom)

Source: GSMA Intelligence, World Bank, FAO

Business models

Agri VAS services can be led by mobile operators or third-party Agri VAS providers, such as NGOs, technology vendors, VAS providers and government/regulatory agencies, often in partnership with mobile operators. As before, of the total 98 live Agri VAS deployments, the following analysis focuses only on Agri VAS for which all the data is available (i.e. lead organisation). Globally, mobile operators lead 28% of total tracked Agri VAS deployments, while NGOs and foundations lead 16 of them, or 20%. Looking at the regional split, in Asia, mobile operators dominate the Agri VAS space with 13 of the 39 deployments, equivalent to 33% of the total regional deployments, followed by NGOs and foundations with 6 deployments, or 15% of total deployments. In Sub-Saharan Africa, NGOs and foundations account for 9 out of 35 deployments, or 26% of total services in the region, followed by mobile operators and technology vendors with 23% (See Figures 8 and 9).

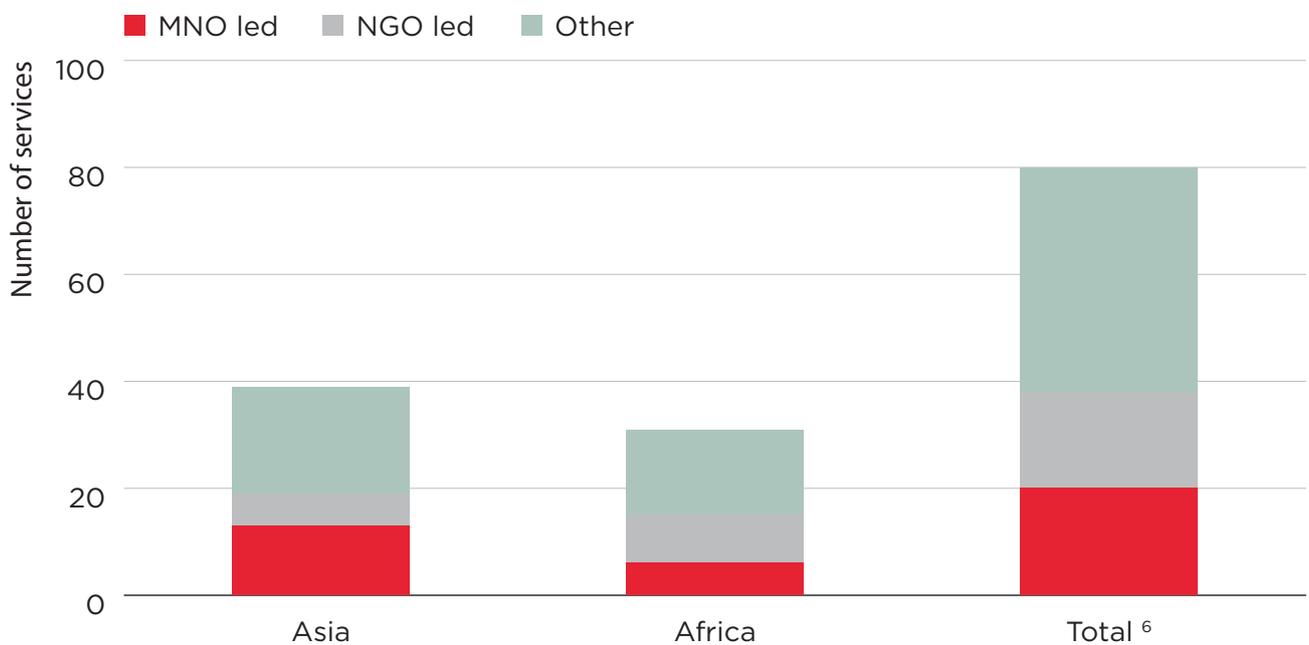


Figure 8: Stakeholder involvement in Agri VAS⁶

Source: GSMA products and services tracker

⁶ Total includes Asia, Africa, the Middle East and Latin America

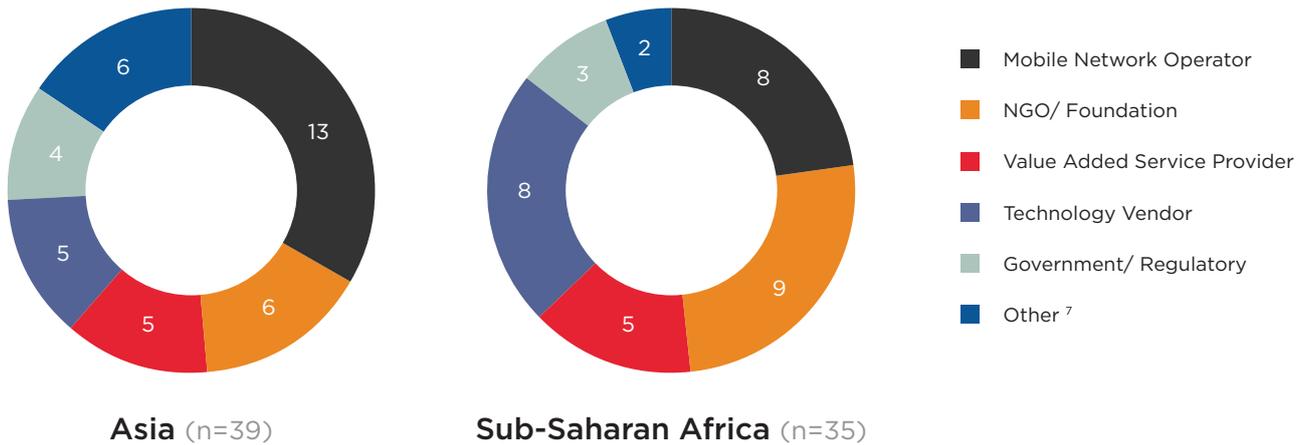


Figure 9: Lead organisation involvement in Agri VAS⁷

Source: GSMA products and services tracker

Note: A value-added service provider offers additional services using the channels of MNOs. It includes value-added resellers, companies that add features or services to an existing product which are then resold (usually to end-users) as an integrated product or complete “turn-key” solution

The level of engagement of a mobile operator in the Agri VAS space depends on whether it wholly owns the service or its relationship with a third-party Agri VAS provider, which is usually governed by a set of agreements that define each participating organisation’s responsibilities. In operator-owned services, the mobile operator receives all the benefits – direct and indirect – from providing the service and is mainly responsible for the operational elements of the service, including marketing, content sourcing, development of delivery channels, and customer care. Although mobile operators play a more passive role in Agri VAS initiated and owned by third-party Agri VAS providers, they also derive various benefits from delivering the service. The relationship between the mobile operator and the third-party Agri VAS provider is usually based on a pre-defined agreement around certain factors, such as shared ownership of the Agri VAS, a revenue sharing formula for direct benefits, shared marketing and customer care responsibilities, and the realisation of specific KPIs by the operator.

Irrespective of the ownership structure, it is essential that the Agri VAS operates on a financially sustainable business model that will support long-term growth and the realisation of the overall objectives for providing the service. This will justify continued support from the mobile operator in an operator-led service and attract much needed investments and funding through critical phases of the business development cycle for third-party Agri VAS services. Although many Agri VAS services in South Asia and Sub-Saharan Africa receive ‘seed’ funding from donors and NGOs for their initial piloting and product launch stages, we believe, from our research and discussion with industry players, that the majority of existing services are yet to reach break-even. While there is limited data on the position of Agri VAS services on the funding curve, an assessment of a sample of existing services in both regions show that majority of the services are in the seed phase and only a few have progressed to the growth and expansion phase (Figure 10).

⁷ Other includes academia, agri suppliers, consultants, associations and agri financial services products

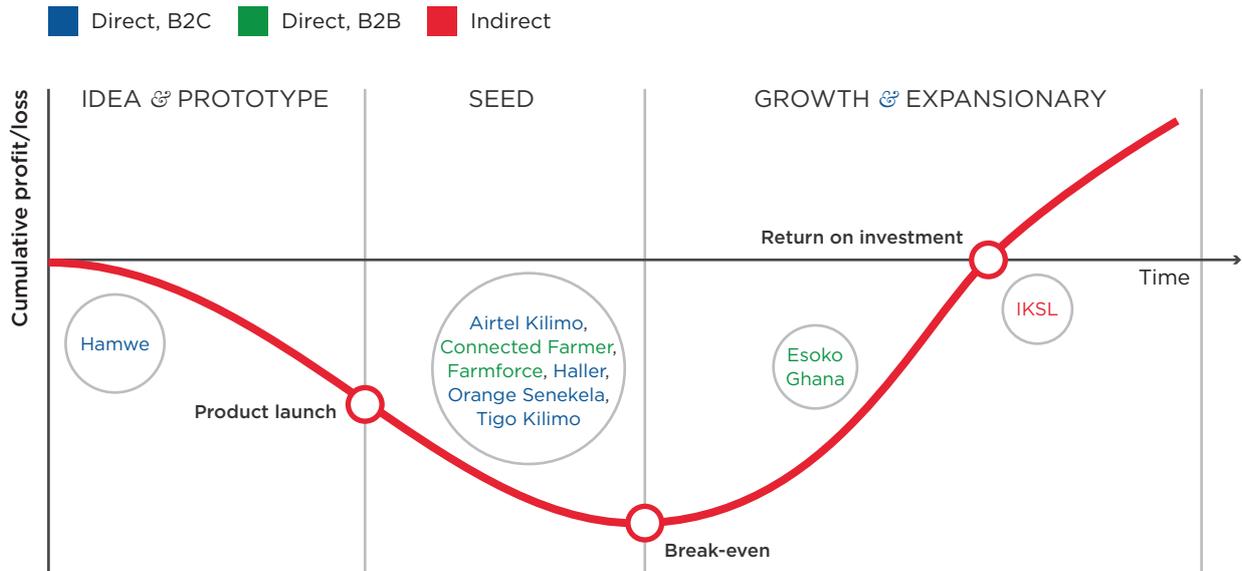


Figure 10: Funding curve
 Source: GSMA Intelligence

It is crucial that these services have the right funding and support in place to navigate through the seed phase, also referred to as the ‘death valley’. In order to attract the required support, Agri VAS services need to establish a business case that:

- Proposes sustainable revenue streams that will, at a feasible scale, eventually offset the costs (opex and capex)
- Creates a unique value proposition for key partners to ensure their continued support

The business model and the environment where it operates are crucial to this process in view of the barriers that Agri VAS would need to overcome on the path to sustainability. We have grouped the business models that existing Agri VAS services are operating on into three broad categories:

- The direct revenue model
- The indirect benefits model
- The subsidised model

The primary distinction between the direct revenue and indirect benefits models is in the nature of the benefits that mobile operators and, where applicable, third-party service providers derive from providing the service. Furthermore, the direct revenue model has three variants - business-to-consumer (B2C), business-to-business (B2B) and hybrid – which are based on the primary source(s) of revenue generation for the Agri VAS.

It is worth mentioning that a service can fall under multiple categories, depending on the context of the service provider. For example, a mobile operator may derive indirect benefits from providing a service while its content partner receives direct revenue based

on the terms of the agreement between both parties (cf. Green SIM by Airtel in partnership with IKSL, discussed under indirect benefits model).

Agri VAS services are susceptible to multiple barriers that could check their progress towards commercial viability. Some of these barriers are specific to some business models (discussed in subsequent sections) while others are more general, cutting across the various business models. Table 1 maps the main barriers against the respective business model categories.

Business model	Key feature	Specific barriers	General barriers
Direct revenue B2C	Smallholder farmers pay a fee to utilise the service	<p>Poor rural smallholder farmers have low disposable income and, consequently, very low ability and willingness to pay (ATP and WTP)</p> <p>High marketing cost to drive initial uptake and maintenance cost to sustain user interest</p> <p>Commoditisation of information as farmers discover cheaper information sources</p> <p>High tendency of farmers to share information among themselves, creating many indirect users</p>	<ul style="list-style-type: none"> • Poor network coverage in rural areas where most smallholder farmers live • Cost of ownership of mobile devices is still prohibitive for many poor rural farmers • High cost of acquiring and maintaining content, particularly in markets with underdeveloped agriculture ecosystems
Direct revenue B2B	Agribusinesses pay for farmers to access the service	<p>Some mobile operators may have limited skills and experience in managing enterprise relationships</p> <p>Market decentralisation if potential clients attempt to reach farmers directly</p>	<ul style="list-style-type: none"> • Forging agreements with critical partners, such as content providers • Language and literacy barriers, especially in multilingual countries
Direct revenue hybrid	Agri VAS generates revenue from smallholder farmers as well as enterprise customers	Creating value for both sets of customers may prove expensive, particularly in terms of content development and delivery	<ul style="list-style-type: none"> • Technology barriers, especially among older farmers in rural areas, leading to high education costs
Indirect benefits	Mobile operator provides support for the service on the basis of indirect benefits around subscriber uptake, ARPU appreciation from network usage and customer loyalty	Difficulty in quantifying indirect benefits to the mobile operator could negate business case for continued support	<ul style="list-style-type: none"> • Forming strategic partnerships between mobile operators and third-party Agri VAS providers to ensure sufficient value creation for both parties
Subsidised model	Donors/NGOs fund the service, mainly for developmental purposes; or private companies fund the service as part of a corporate social responsibility (CSR) drive	<p>Continued support depends on the main donor's primary objectives</p> <p>A change in the main donor's funding strategy could lead to a scaling back of operations or complete closure</p>	

Table 1: Business models features and barriers

Source: GSMA Intelligence

The direct revenue model

The main feature of the direct revenue model is that the Agri VAS generates cash revenue from the end users, usually smallholder farmers and/or third-party organisations willing to pay for farmers to access the service. In operator-led Agri VAS, the mobile operator receives all the cash revenue from providing the service. However, for Agri VAS services initiated and owned by third-party Agri VAS providers the cash benefit to the mobile operator depends on the revenue sharing formula agreed by both parties. Usually, this ranges from 50 - 70% and, in many cases, involves other factors, such as marketing and customer care services.

Direct revenue: business-to-consumer (B2C)

Lack of timely and accurate information on agricultural inputs, new crops, efficient agronomy techniques, weather, market prices and buyers is a major constraint to the productivity level of smallholder farmers in developing countries. Agri VAS providers can bridge this information gap through services provided under the direct revenue B2C model. Market information can be delivered to smallholder farmers through push and pull channels, usually SMS, USSD, IVR, OBD and helplines, for an access fee on a pay-as-you-go or periodic subscription - daily, weekly, monthly or annual - basis. In most cases, the usage fees are deducted from the user's prepaid account by the mobile operator and, where delivered in partnership with a third-party service provider, shared according to pre-defined content partnership agreements. For example, Behtar Zindagi service in India (recently merged with mKisan) offers advice and information on crop agronomy, animal health, weather forecasts and market prices for major crops to farmers in India through SMS (push) and IVR and helplines (pull) for a subscription package of INR 1 (\$0.02) per day, purchasable in packs of 10, 20 or 30 days⁸.

The revenue benefit Agri VAS providers derive from direct revenue B2C services is measurable in ARPU terms, allowing us to estimate the size of the market. From our model of the growth outlook for Agri VAS in South Asia and Sub-Saharan Africa (see Growth of Agri VAS), we estimate the value of the addressable market for B2C direct revenue Agri VAS in both regions at \$200 million in 2014, and forecast this to rise to just under \$500 million by 2020 (see Figure 11). Our revenue model is built up from assumptions at the regional level for ARPU, estimated at \$0.60 per Agri VAS subscriber per month in South Asia and \$0.25 in Sub-Saharan Africa. The difference in ARPUs between the two regions is mainly due to the prevalence of subsidised services in Sub-Saharan Africa, which depresses overall ARPU for direct revenue B2C services.

⁸ See also [mKisan Baseline Report Executive Summary: A snapshot of the mKisan service](#), GSMA mAgri, March 2013 and [mKisan project update: data and insights from the midline](#), GSMA mAgri, October 2014

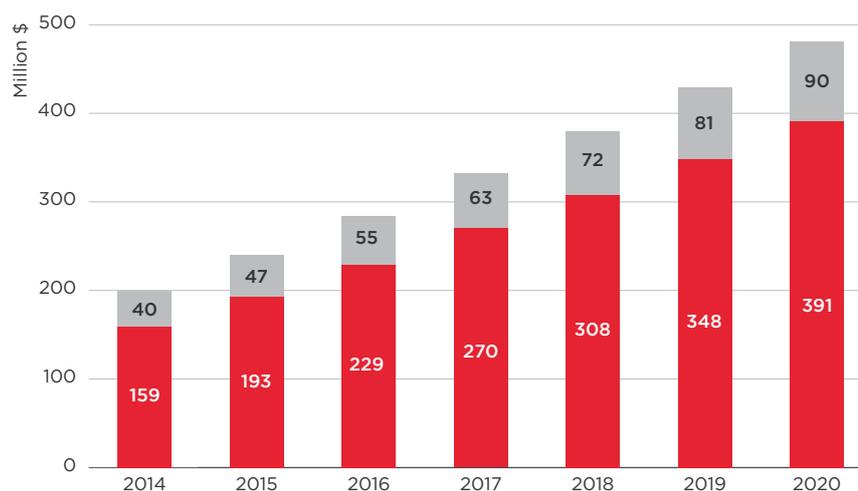


Figure 11: Agri VAS potential annual revenue

Source: GSMA Intelligence

Although the usage fee charged by service providers for direct revenue Agri VAS is relatively low, compared to other mobile-based VAS, due to the low disposable incomes of poor rural farmers, services operating on this model can attain financial sustainability through scale. For example, farmers who subscribe to Kenya-based iCow's Mashauri-Farmer tips, delivered over Safaricom's network, receive 3 SMS tips per week at KES3 (\$0.03) per SMS. But with more than 150,000 users on its database, most of which are regular users, and plans to expand into other markets in the region, the iCow service is on track to achieving financial sustainability.

There is scope for mobile operators to become more involved in direct revenue B2C Agri VAS in view of the revenue growth potential, although we argue that is best done in partnership with a content provider to mitigate the lack of agriculture-specific knowledge and expertise within their organisations. In some cases, this might come at an extra cost if the partnership is commercially based, while in other cases the content provider may be willing to engage with the mobile operator on a non-commercial basis.

There are notable examples of strategic partnerships between mobile operators and content providers for the provision of direct revenue B2C Agri VAS in Asia and Africa. In 2013, Orange launched Sènèkèla in Mali (an information service made up of a call centre manned by agricultural experts and a USSD channel to deliver market prices) in collaboration with the Institute for the Rural Economy (IER), the International Institute for Communication and Development (IICD) and RONGEAD. All the information delivered through the call centre comes from a database developed by IER specifically for Sènèkèla. Smallholder farmers can access the call centre services by dialling a short code at a rate of XOF75 (\$0.130) per minute or half the standard call rate. In Tanzania, Tigo has partnered with TechnoServe (a not-for-profit organisation that focuses on helping smallholder farmers to access profitable value chains), the Tanzanian Metrological Agency (TMA) and NURU (a provider of market price information) to deliver market price, weather information and

agronomy tips via SMS on its Tigo Kilimo Agri VAS⁹. In Sri Lanka, Mobitel has partnered with Hector Kobbekaduwa Agrarian Research and Training Institute (HARTI) to provide daily wholesale price information collected from Pettah, Kandy, Dhabulla, Meegoda, Norochcholai, Thabuthegama, Nuwaraeliya and Kappetipola markets to farmers. The information is fully verified and validated by HARTI and delivered through an IVR channel in Sinhala and Tamil Languages.

Barriers to success

The direct revenue B2C model is heavily dependent on having a large number of poor rural smallholder farmers that are willing and able to pay for the service. This creates several barriers for Agri VAS services operating on this model, notably:

- Significant investment in uptake marketing (to create awareness and drive registration) and usage marketing (to drive regular usage). Face-to-face marketing is an effective way to educate rural farmers, but this is generally expensive to execute in remote communities across Asia and Africa;
- High input costs in countries with underdeveloped content ecosystems as Agri VAS providers might be forced to inject significant CAPEX and OPEX into sourcing and maintaining relevant content for their services. For example, Orange Mali had to invest in developing the capacity for its USSD-based market price information through partnerships with IICD, which created the network of agents to collect the market price information, and RONGEAD, which is responsible for analysing and checking the quality of the collected raw data¹⁰;
- Need for constant refreshing of content to maintain stickiness could increase the overall maintenance cost of service;
- High localisation and region specificity of services, for example collection of market price information, makes it resource-intensive to replicate the same service in other countries;
- Commoditisation of information; as farmers gain access to mobile data services and are able to find relevant information for free on the internet or via mobile apps, they are likely to become less inclined to pay for VAS that offers similar content. It is worth mentioning that some content which may not be readily available for free on online apps, such as regular market price updates, present more value in the long run and Agri VAS providers should focus on them to mitigate this risk;
- The tendency of rural farmers to share information within their community could lead to many indirect and non-paying users of the service.

⁹ See also: [Tigo Baseline Report Executive Summary](#), GSMA mAgri, March 2014

¹⁰ See also: [Early results from Orange Sènèkèla: data and insights from the baseline](#), GSMA mAgri, November 2014

A combination of low ATP and WTP and high marketing, distribution and content development costs weaken the business case for the direct revenue B2C model. To overcome these challenges, some Agri VAS providers offer the service free of charge for a defined period, for example one month, to create awareness and generate user interest but introduce a charge once the free period is over. Tigo has used this strategy for customer acquisition for its Tigo Kilimo Agri VAS in Tanzania with notable success (see case study below).

Farmers' perspective: Paying for Agri VAS

Insights from Tigo Kilimo

Usage of Tigo's Agri VAS in Tanzania, Tigo Kilimo, was low (around 32,000 users) until they removed the cost of the text based service. Their customer base increased tenfold in the following 5 months, although the change in the pricing structure was accompanied by improvements in service design and a larger scale marketing campaign than previously, all of those factors contributing to higher uptake rates. When asked how much they thought the service should cost, only 20% of Tigo Kilimo users surveyed said the service should be free. Most users who have tried the service and realised its value have shown a willingness to pay for the content. Almost 60% of those questioned stated they would be willing to pay a nominal fee of up to TZS 1,000 (\$0.55) per month, and the remaining 20% said they would pay more than that (see Figure 12).

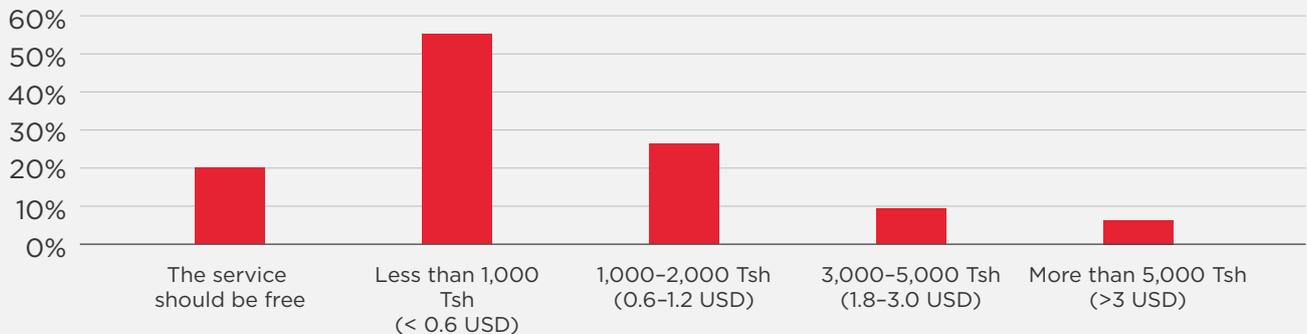


Figure 12: Tigo Kilimo customer's willingness to pay for Agri VAS

Source: Tigo survey

Direct revenue: business-to-business (B2B)

Ensuring that contract farmers are able to produce high quality products and that the production process is transparent, traceable and conforms to food safety and sustainability standards is challenging for agribusinesses. Through direct revenue B2B solutions agribusinesses are able to engage more efficiently with smallholder farmers. Under this model, the Agri VAS provider offers a solution that agribusinesses are willing to pay for. By targeting enterprise customers, B2B Agri VAS providers have greater scope to charge higher prices per end user for their services compared to Agri VAS operating on the B2C model, which are constrained by poor rural farmers' low ATP and WTP. This offers a quicker route to sustainability, compared to the B2C model, with service providers having a higher level of flexibility in terms of pricing structures and value creation for clients; for example, developing more advanced channels such as online portals and mobile apps for greater convenience and usability.

Direct revenue B2B services can be used to address value-chain inefficiencies and create platforms for effective engagement between smallholder farmers and agribusinesses. Organisations in the agriculture value chain, such as agribusinesses, micro insurers and government agencies, can utilise B2B solutions to order bulk purchases or subscriptions on behalf of a particular community of farmers. For example, a food processor or Contract Farming Organisation (CFO) can leverage B2B Agri VAS solutions to ensure that farmers within their outgrower schemes receive the information they require, such as weather updates and farming advice, to increase their productivity level and maintain high food safety and sustainability standards.

B2B solutions that address value chain inefficiencies can be replicated across markets more easily, compared to information services that provide market-specific solutions. The Connected Farmer Alliance (CFA), a partnership between TechnoServe and Vodafone (funded by USAID), provides the Connected Farmer solution (CF) - a platform that facilitates structured communication between agribusinesses and their main product suppliers in three target countries - Kenya, Tanzania and Mozambique.

The CF solution allows agribusinesses to engage more efficiently with farmers in three ways. Firstly by managing data on the farmers, agribusinesses can build data analytics around their supplier network. Secondly, agribusinesses can establish direct lines of communication to farmers by sending them messages or requesting information, for example to understand where different groups of farmers are in the growing season. Lastly, the application facilitates financial transactions between agribusinesses and farmers, such as issuing loans to farmers and paying for crops bought from farmers.

Usage of the CF platform is totally free and device-agnostic for farmers, although they have to be on a Vodafone-owned mobile network (e.g. Vodacom in Tanzania, Safaricom in Kenya, Vodacom in Mozambique) to fully benefit from the transaction feature of the service. The CF charges its agribusiness clients on a monthly basis based on the number of individual farmers on the system. This allows for flexibility, with the level of farming activities and, consequently, usage of the service fluctuating between peak and off-peak farming periods. The CF also offers customisable services with an extra charge for agribusinesses based on the level and complexity of customisation.

In October 2014, the CF announced its first commercial agreement with agribusiness Olam International to support 30,000 Tanzanian coffee, cotton and cocoa farmers. In Kenya, the CFA is working with a multinational beverage firm to manage information and communications with approximately 5,000 mango and passion fruit farmers.

Another example is the Syngenta Foundation for Sustainable Agriculture (SFSA)-owned Farmforce, which helps agribusinesses increase their access to smallholder farmers, improve the effectiveness of contract farming schemes, and provide solutions that address value-chain inefficiencies.

The Farmforce system is composed of a web-interface and mobile application for organisations (companies, cooperatives, governments) working with large numbers of smallholder farmers. For example, field workers employed by a company exporting horticultural products and who contracts 1,000 small farmers to grow french beans would use the Farmforce mobile application to record information related to the farmers' growing cycle, such as planting dates, input loan disbursements, pesticide spraying records, yield forecasts and harvest information. The company managers in the office would view this information via online interface, access forecasts, crop quality and management reports in real time, aggregating all the information obtained from the 1,000 farmers. The solution also enables agribusinesses process payments to farmers on a case by case basis.

Presently, Farmforce has around 30 agribusiness clients in 14 countries and is reaching more than 45,000 farmers. In addition to an initial set-up fee, Farmforce also charges its clients an ongoing fee based on a number of variables, including the number of farmers reached and the set of features deployed for a given agribusiness.

In addition to addressing value-chain inefficiencies, the direct revenue B2B model can be utilised to provide other solutions for enterprise clients within the agriculture ecosystem. Below, we highlight three other solutions that can be provided using the B2B model. It is worth mentioning that a B2B Agri VAS provider can offer these services simultaneously, either bundled into one or more packages or monetised separately:

- **Advertising:** Agribusinesses looking to promote their products and/or services to farmers through targeted marketing campaigns can utilise B2B Agri VAS to achieve this objective. For example, B2B Agri VAS providers can offer input dealers, such as fertilizer, seed and pesticide suppliers, advertising solutions that create better visibility for their products and also establish a communication channel for them to advise farmers on how to use their products as well as get valuable feedback from the field. For example, as part of its market entry strategy into Africa, Novus International, a multinational animal feeds business, utilised the Esoko platform to send SMS messages to farmers in Kenya, Nigeria and Uganda, giving them tips about how best to care for their animals and to reference the new products that they introduced to the market.

The major caveat to advertising solutions, however, is that the Agri VAS would need to have a critical mass of farmers on its database to be able to create sufficient value for its clients and prospects. For pure direct revenue B2B players, this can be built up through contract sales services (described above).

- **Selling data:** Agri VAS providers are well placed to build data analytics around farmers and farming practices from the large amounts of data and feedback they collect from farmers on local farming conditions and farmers' households. These can be synthesised to create valuable information on farmers' needs and production patterns, which can be sold to external clients with interest in those subjects. For example, input suppliers, research institutions and development agencies could obtain useful data on farming communities from Agri VAS providers at a more cost effective rate compared to other sources that may prove expensive and time consuming. In Uganda, the Community Knowledge Worker (CKW) Initiative, a social enterprise that empowers smallholder farmers and rural communities to improve their livelihoods through the utilisation of mobile technologies, leverages its network of knowledge workers and users in more the 36 districts to collect, monitor and evaluate data and produce useful insights for external clients.
- **Market Research Surveys:** In addition to general data analytics, Agri VAS providers can also deliver customised research surveys for external clients by leveraging their relationship with farmers on their database. For example, the New York University Centre for Technology and Economic Development (NYC-CTED) worked with Esoko in Ghana on a customised market research survey to better understand how market prices and marketing behaviour are influenced by transportation costs. As part of the project, Esoko's field team recorded the transport cost of commodities between markets, and delivered this to NYC-CTED in an easy-to-use format.

Barriers to success

The direct revenue B2B business model is dependent on having the right enterprise customers in place, namely agribusinesses, governments and public institutions, commodity traders and trade organisations, who are keen to engage with smallholder farmers. This creates several barriers to success as highlighted below:

- In some of the developing countries having weak agriculture ecosystems, there is a relatively small number of agribusinesses that can be targeted for direct revenue B2B Agri VAS. This creates high entry barriers for later entrants and means that sustainability is dependent on local market dynamics, with countries having a developed agriculture ecosystem or established contract farming schemes best suited for this model. Although government agencies are potential clients in countries with underdeveloped ecosystems and informal distribution channels, there is an element of unreliability in having the government as the primary client in view of possibility of frequent policy changes;
- Overreliance on one major client leaves the service vulnerable to cash flow problems if that client becomes unable to pay or terminates their engagement. This risk is higher for services that have government agencies as their major client for reasons explained in the previous point;
- There is a growing risk of market decentralisation, which stems from agribusinesses and government agencies establishing alternatives channels to reach farmers directly, thereby by-passing existing Agri VAS solutions. Some major CFOs in developed countries have created channels to engage with farmers directly, leveraging solutions

from software companies such as SAP. Although mobile operators may still benefit from the usage of their networks to deliver some of these services, for example network charge for SMS-based or online content-based services, they lose out on the potential benefits from value addition in the delivery of the service and greater customer engagement;

- Limited skills and experience in dealing with enterprise customers by an Agri VAS provider could affect business relationships and impede the growth of the service.

The direct revenue B2B model is at a nascent phase of development in most markets in South Asia and Sub-Saharan Africa, with only a few established providers in that space, but it offers a compelling case for long-term growth and commercial viability considering the predominance of unstructured agriculture value-chains in both regions. In order to take advantage of this opportunity, mobile operators need to leverage their existing enterprise solution capabilities or develop new ones in partnership with competent organisations to build up their B2B solutions portfolio. The upside potential for B2B solutions in developing countries is reflected by the growing trend of large CFOs, who source their raw material from these regions, adopting high food quality and sustainability standards, which requires them to engage more with smallholder farmers in developing countries to monitor compliance with set standards. B2B Agri VAS are well suited to meet this growing need, with the greatest potential in countries with established contract farming schemes and where major cash crops, such as maize, coffee, cocoa and horticulture, are produced.

Direct revenue: hybrid

The hybrid model is a two-way revenue model that combines the B2C and B2B variants of the direct revenue model. Under this model, the Agri VAS provider generates cash revenue from smallholder farmers and third-party organisations through multiple value propositions to both groups. For example, a hybrid Agri VAS may provide market price and weather information to smallholder farmers for a fee and simultaneously sell market surveys and advertising services to agribusinesses. The hybrid model enables the Agri VAS provider to maximise the key benefits of the B2C and B2B models, such as the potential to reach a large number of farmers with B2C solutions and the pricing flexibility and value creation for enterprise customers.

Vodafone Turkey operates a direct revenue hybrid model for its Vodafone Farmers' Club service. The service provides automation and advertising services to agribusiness for a fee, based on customised solutions and special agreements, as well as information and communication solutions to farmers, also for a fee. Vodafone also provides solutions for farmers to share best practices that increase yields and meet high sustainability standards required by CFOs.

Agri VAS that create a platform for different players along the agriculture value-chain, such as farmers and wholesale buyers, can also take advantage of the hybrid model. In Senegal, Mlouma provides a mobile and web platform for smallholder farmers and agribusinesses to get reliable and timely information on commodity prices, various available products and their location for a subscription fee. In Indonesia, 8villages, a mobile social network

for smallholder farmers, offers a mobile phone subscription service called LISA (Farmers' Information Service). By subscribing to LISA, users are put into corresponding community groups based on their crops and location. In addition to a subscription fee for smallholder farmers, the service also provides solutions for agribusinesses, including multinationals, looking for more efficient channels to engage with their suppliers. 8villages works with Telkomsel and Indosat in Indonesia on the LISA Agri VAS and has established content partnerships with Bogor Agricultural University (IPB), the Indonesian Ministry of Agriculture and various international organisations.

Barriers to success

The hybrid model is susceptible to barriers identified for the direct revenue B2C and direct revenue B2B models, although the combination of both models has the potential to reduce the severity of some of the barriers. For example, a service generating significant revenue from enterprise customers can subsidise certain services for smallholder farmers with low ATP and WTP. One notable challenge with the direct revenue hybrid model is the start-up process. Although an Agri VAS can be set up on a hybrid model from the onset, it may be easier in some circumstances to begin with either the B2C or the B2B models before evolving into the hybrid structure. For example, it might be necessary to have a critical mass of smallholder farmers using the Agri VAS in order to justify its value to agribusinesses for certain enterprise solutions, such as advertising services. Conversely, Agri VAS that start off on the B2B model could add on some additional premium services for smallholder farmers for which they will be required to pay a fee.

Indirect benefits model

The indirect benefits business model is applicable only to mobile operators. Under this model, there is no explicit revenue stream from the Agri VAS but the mobile operator is willing to provide continued support on the basis of non-cash benefits, such as subscriber uptake, ARPU appreciation from network usage and customer loyalty (churn reduction).

India's Airtel Green SIM Agri VAS stands out as a successful example of indirect benefits Agri VAS. One of the main success factors of this service is Airtel's decision to partner with Indian Farmers' Fertiliser Cooperative (IFFCO) – an organisation responsible for distributing fertilizers for farmers in India – which has a potential reach of 330 million people. Airtel leverages IFFCO's network to distribute Green SIM services under the IFFCO Kisan Sanchar Limited (IKSL) brand. Green SIM cards users receive four voice messages every day on topics covering agriculture, education, health and employment and one SMS message with information on weather or market prices free of charge. In addition, there is the possibility to access a helpline to get more information charged at Airtel's regular network rates. IKSL has direct revenues through the sale of Green SIM cards and airtime recharges.

In Madagascar, Airtel launched an indirect benefits Social VAS called 3-2-1 in 2010. The service is an on-demand information solution covering a wide range of topics, including agriculture, health, microfinance, water & sanitation, family planning, and land tenure, and is accessible via IVR, SMS and USSD. Airtel 3-2-1 users get four free IVR calls per month,

and unlimited use of SMS and USSD channels. Human Network International (HNI) – a global development organisation – and its partners provide the content to Airtel for free on an exclusivity basis and Airtel, in turn, offers the service to customers free of charge. In addition, Airtel is responsible for marketing of the service, which it has recently extended to Malawi through Airtel Malawi.

There is evidence of benefits to mobile operators from providing Agri VAS based on the indirect benefits model. The most significant benefit from providing Social VAS such as agriculture content services is around decrease in churn rates. In Madagascar, Airtel has recorded a reduction in average churn rates of up to 12-14%¹¹ for Social VAS users. Similarly in India, a mobile operator providing Agri VAS under its brand name has recorded an annual churn reduction of 9.6%. Bangladesh-based Grameenphone, which plans to launch an indirect benefits Agri VAS in 2015, has projected an annual churn reduction rate of 8-12% among Agri VAS users compared to non Agri VAS customers.

There are also other measures of benefits to mobile operators. Airtel recorded an increase in rural market share (5% of all of Airtel's rural acquisitions come through Green SIMs), increased customer loyalty with 60% of customers staying on their Green SIMs for longer than 12 months, and further recognition of its role as a leading mobile operator in India. Those benefits are especially significant considering the scale of the service - in August 2014 there were 3.3 million Green SIM users. In Madagascar, Airtel also recorded KPIs around increased network activity from its 3-2-1 service user base, such as double the amount of outgoing SMS sent by 3-2-1¹¹ users compared to non-3-2-1 users.

One notable advantage the indirect benefits model has over the direct revenue model is that it is relatively easier to build up critical mass of users, especially in markets where poor rural smallholder farmers have very low ATP and WTP and where it might be challenging to find agribusinesses that are willing to pay for enterprise solutions. Many countries in Sub-Saharan Africa fall into this category, a situation that is partly responsible for the large number of donor-funded services in the region. For mobile operators, the build-up of a large user base for their indirect benefits Agri VAS creates further opportunities around cross-selling of other mobile-based VAS, such as health, education, news, and financial services. Secondly, mobile operators can leverage the existing user base of their indirect benefits Agri VAS to offer agriculture-related financial services to farmers, such as savings and credit products, micro insurance for crops and livestock, and e-vouchers for agri-related products (e.g inputs). Lastly, through Agri VAS, operators could benefit by bringing new customers on their network, especially in the currently unconnected rural segment.

¹¹ From July to November 2014

Barriers to success

The indirect business model is dependent on the value of the service to the mobile operator. Therefore, mobile operators need to actively evaluate the benefits they derive from providing the service in order to justify continued financial and operational support. For example, improvement in the operator's KPIs around churn and customers loyalty on account of providing an indirect benefits Agri VAS will strengthen the case for sustained investment in content development, marketing and the enhancement of delivery channels to bolster user engagement with the service.

Secondly, mobile operators may not always have the agricultural knowledge base to implement Agri VAS that can compete with solutions from specialised third-party Agri VAS providers or that provides regularly refreshed content like direct revenue B2C services do. It is therefore essential for mobile operators to form strategic partnerships with content providers to enrich the quality of their offering and sustain high levels of user engagement. Government ministries, research institutions and development organisations are suitable partners for mobile operators as they often have a mandate to develop this content and have vested interest in the efficient dissemination of same to end users. In 2014, Indonesia-based XL Axiata partnered with 8villages and Gajah Mada University's faculty of agriculture to offer farmers information on crop prices, weather forecasts, and farming tips free of charge via SMS.

Subsidised model

In the subsidised model, the Agri VAS mostly relies on NGOs, government agencies or private companies for funds to sustain their operations. Funding from these sources is usually based on set objectives for the agricultural sector in a specific country or region, for example, improvement in the welfare of rural farmers as a result of increased productivity levels and better access to markets. The objectives could be for developmental purposes, as is the case with some international NGOs and government agencies, or as part of an organisation's corporate social responsibility drive. For example, the CocoLink service, which launched in Ghana in 2011 and has now been extended to Côte d'Ivoire, is part of the Hershey Company's social responsibility drive to improve the living standard of cocoa farmers and their families in both countries. As of mid-2014, the program had registered 45,000 Ghanaian cocoa farmers in 1,800 communities. Farmers used 1.2 million free local language texts to modernize their farming practices. CocoLink claims that this resulted in a yield increase of up to 45.6% in the first three years of the service. Since Agri VAS under the subsidised model are provided at no direct charge to the end users, they tend to scale up very rapidly, especially in areas where poor rural farmers have low ATP and WTP as is the case in many countries in Sub-Saharan Africa.

Barriers to success

The subsidised model depends on the paramount objectives of the major donor. A change in these objectives, for example the attainment of set developmental targets, or the donor's ability to continue funding the service could lead to a scaling back of operations or, in extreme cases, a complete shutdown of the service. The weak business case of the subsidised model and the uncertainty of the long-term sustainability of Agri VAS operating on this model informs the GSMA's view that Agri VAS providers should avoid the strictures of donor dependence by implementing solutions that run on commercially viable and financially sustainable business models.

Funding of Agri VAS

In recent years, there has been an increase in investor interest in solutions that leverage the mobile technology to deliver services that fill access gaps in key underserved services areas, such as financial services, healthcare, agriculture, employment and education, for consumers in low- and mid-income countries. From our research and through discussions with industry players, we found that in the current funding landscape mAgri solutions attract considerable funding from donors and impact investors compared to other mobile-based solutions (see Table 2). Within the mAgri space, investors and donors are particularly keen on Agri VAS. This may be explained by the social and developmental benefits that could be generated from improved farmer welfare and productivity as well as the potential commercial value from financially sustainable Agri VAS services. These factors resonate with a variety of funders, including international donors and private investors.

	Name of organisation	Payments/insurance	Health	Agri	Education	Employment	Energy/water access
Donors/Not-for-profit	LUNDIN Foundation	X		X (VAS - Esoko MFS - Kilimo Salama)			X
	Omidyar	X			X	X	
	The Soros Economic Development Fund			X (VAS - Esoko)			
	The Eleos Foundation				X		
	IFC	X		X (VAS - Esoko)			
	USAID		X	X (VAS - CFA)	X		
	Praekelt Foundation		X				
	Gray Ghost Ventures	X				X	X
VC/PE/Impact Investor	LeapFrog Investments	X					
	Acumen		X	X (VAS - Esoko)			X
	Invested Development	X		X (VAS - iProcure)			X
	D.O.B Equity						X
	Novastar Ventures			X (VAS - M-Farm)	X		

Table 2: Sectors of investment of VCs and Impact investors

Source: Organisations websites and interviews

The chart below highlights the investment ranges of donors and private investors in the Agri VAS space. It shows a considerable level of funding activities by donors in the idea and prototype phase. This is partly responsible for the large number of Agri VAS services that have progressed beyond this phase into the seed phase (see Figure 13). From our research, the biggest funding gap in the Agri VAS space is in the early seed phase considering that smaller donors that are active in the idea and prototype phase rarely fund operational costs required to scale up services in the seed phase, while bigger donors and private investors are more inclined to invest in services in the late seed and growth and expansion phases following the development of a proof of concept by the Agri VAS.

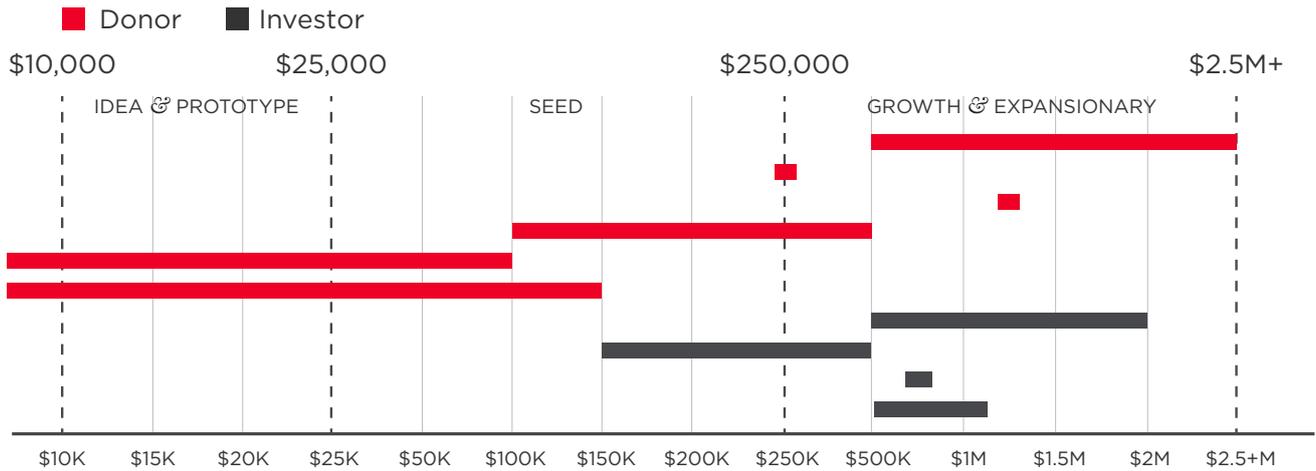


Figure 13: Investment ranges of donors and investors in Agri VAS

Source: Organisation websites and interviews

Note: The bars represent the range of investments for each organisation

The funding gap in the critical phases of the business cycle for Agri VAS services is holding back the full realisation of the social and commercial benefits from the service. From our discussion with industry players, investors agreed that undersupply of investible Agri VAS services with proof of concept and financially sustainable business cases was the major hindrance to investing in the Agri VAS space. This puts into context our analysis of existing business models and the potential of Agri VAS solutions to achieve sustainability based on the strength of the business case within a given environment (see business models analysis). Some investors also expressed concern over the terms of agreement between a third-party provider and a mobile operator, particularly around the revenue sharing formula, with unfavourable terms likely to weigh on their investment strategy. Other concerns include high input costs (content development and marketing), the lack of licensable technology, poor business skills among some Agri VAS entrepreneurs, and, in some cases, the unsuitability of available solutions to tackle the actual challenges within the Agri ecosystem.

Conclusions and recommendations

The market opportunity for Agri VAS in South Asia and Sub-Saharan Africa is significant in view of the regions' unstructured agriculture value-chain, the number of potential users, and the numerous challenges in the agriculture sector that could be solved using the mobile technology. Although there have been multiple pilots across both regions, the debate on the sustainability and commercial viability of services will take centre-stage in coming years as industry players agree that only in developing and supporting services with strong business cases will the developmental and commercial benefits of providing Agri VAS be fully realised.

From our analysis of the existing business models, the direct revenue and indirect benefits business models present credible business cases for financial sustainability. However, the performance of Agri VAS services operating on any of these models depends on local market dynamics. This underscores the need for an Agri VAS provider to match the key advantages and barriers of each model against prevailing factors in a particular country or region in order to determine the most viable option. For example, there is a strong case for the indirect benefits model in markets where poor rural farmers have low disposable incomes and, therefore, low ATP and WTP, and it is challenging to find a critical mass of agribusinesses willing to pay for farmers to access the service, while the business case for the direct revenue B2C model will depend on the availability of a large number of poor rural farmers that are willing and able to pay for the service.

That said, the direct revenue B2B model offers significant growth prospects on the back of two main factors; value-chain inefficiencies in the agriculture sector in developing countries and the need for local and international agribusinesses to increase their level of engagement with smallholder farmers in these countries. Mobile operators need to enhance their capacity to provide enterprise solutions to agribusinesses in order to take advantage of this opportunity. This can be achieved either by acquiring existing platforms with the necessary assets and capabilities or developing these capabilities in-house with a partner who understands agriculture dynamics, for example Vodafone's partnership with TechnoServe to develop the CF solution (see analysis of the direct revenue B2B model).

Meanwhile, there is potential for Agri VAS providers to deploy a 'freemium' model, which essentially is a combination of the direct revenue and indirect benefits model, enabling the service provider to maximise some of the key advantages of both models. Under a freemium model, the Agri VAS provider would deliver basic content with sufficient value to attract users at no direct cost, but with well-defined and achievable value propositions for the mobile operator as described in the indirect benefits model. This would accelerate the take up of the service, particularly among farmers with low ATP and WTP. The basic content would then be complemented by premium content and services, such as customised market information or a helpline service, targeting a segment of the market that are able and willing to pay for higher value content and services. The realisation of a large user base for the service creates further opportunities for B2B solutions, such as the monetisation of customer data and the opportunity to earn additional revenue via advertisements.

In view of the market opportunities in the Agri VAS space and potential for services operating on business models with strong business cases to achieve scale and sustainability, we highlight the following recommendations that should serve as a guide for mobile operators, donors and investors, Agri VAS providers, and other key stakeholders in the implementation of Agri VAS solutions:

- **Develop replicable and scalable solutions:** In developing technology platforms, Agri VAS providers should ensure that their solutions have the flexibility to be replicated and scaled across different markets. The platform owner can then create additional revenue streams by licensing the solution to other Agri VAS providers. The Esoko platform is designed around this principle, with Agri VAS providers – mobile operators, NGOs, agribusinesses, public organisations – looking to provide market information services to smallholder farmers, but lacking the technical capabilities and resources to develop their own platform, utilising the solution on a franchise basis.
- **Manage costs:** Cost is a major factor in the financial sustainability of any Agri VAS, irrespective of the business model or the market it is operating in. While the scope of this report does not include an analysis of the cost elements – CAPEX and OPEX – of Agri VAS services, we emphasise the need for Agri VAS providers to minimise expenses at every opportunity. For example, licensing replicable and scalable platforms as described above, as opposed to developing a new one from scratch, can reduce time to market and technology costs. Similarly, forging content partnerships based on non-commercial agreements with government and international agencies looking for efficient ways to distribute content to smallholder farmers can also reduce content development costs.
- **Build credible partnerships:** Mobile operators lacking the in-house capacity to source and maintain Agri VAS content, like they would for other generic mobile-based VAS, need to form strategic partnerships with content providers or a third-party Agri VAS provider with a compelling solution and strong management capacity to deliver a viable service. Given that the amount of resources required to execute a competitive Agri VAS solution, especially around content development and marketing, specialised content providers are better placed to generate customisable, relevant and timely information, which are necessary to maintain stickiness and user interest in the service.
- **Explore product bundling:** Mobile operators need to adopt strategies that have the potential to increase the appeal of their Agri VAS to target customers. The bundling of Agri VAS with other mobile-based products, such as financial services, can create additional value for end users and stimulate uptake and usage. The CF solution in Kenya, Tanzania and Mozambique leverages both the Agri VAS channel and Vodafone's M-Pesa platform to facilitate loans and payments to farmers by agribusinesses.
- **Use technology effectively:** The delivery channel of a service must match the affordability and usability level of target customers. Agri VAS providers must also build in scalability and flexibility features in their delivery channels in order to offer services that suit different needs and guarantees a wide user base. Meanwhile, the increasing uptake of mobile internet services in developing markets makes it imperative for Agri VAS providers to mitigate the threat of commoditisation of information. While this could be partly achieved by diversifying their offerings and developing content that

would be less susceptible to this threat, such as market price information, it could also involve creating their own online applications with unique value propositions that will sustain user interest in the Agri VAS.

- **Invest in viable services:** Investors and donors need to channel funds to services that present a strong business case for long-term growth and financial sustainability when viewed against key success factors, including the universal and business model-specific barriers to Agri VAS in a given market. This would ensure that potentially viable services are not starved of much needed financial support and that services with weak business cases are fine-tuned to increase their prospects of achieving sustainability.
- **Enhance internal capacity:** Agri VAS providers - mobile operators and third-party service providers - must establish a management team with the right skills and ensure that their solutions adequately address critical needs in the agriculture ecosystem. This is crucial to attracting the much needed investments and maintaining the support of critical partners.
- **Create value for all stakeholders:** Partnership agreements between mobile operators and third-party service providers around revenue sharing formula for direct revenue services should create sufficient commercial value for all participating parties, including external investors. Similarly, there should be a clear process of evaluating the indirect benefits for a mobile operator around important KPIs to justify the continued support of a service that proposes only indirect benefits for the mobile operator.

Appendix: Agri VAS model assumptions and methodology

The regions of focus for the report are Sub-Saharan Africa and South Asia. 37 countries have been selected if the agricultural value add (% of GDP) in 2013 was greater than 10%.

South Asia (7 countries)

Afghanistan
Bangladesh
Bhutan
India
Nepal
Pakistan
Sri Lanka

Africa (30 countries)

Angola
Benin
Burkina Faso
Burundi
Central African Republic
Chad
Comoros
Cote d'Ivoire
Ethiopia
Gambia
Ghana
Guinea
Kenya
Liberia
Madagascar
Malawi
Mali
Mauritania
Mozambique
Niger
Nigeria
Rwanda
Sao Tome and Principe
Senegal
Sierra Leone
Tanzania
Togo
Uganda
Zambia
Zimbabwe

Across the 37 countries chosen, the Agri VAS market size was derived from two main factors:

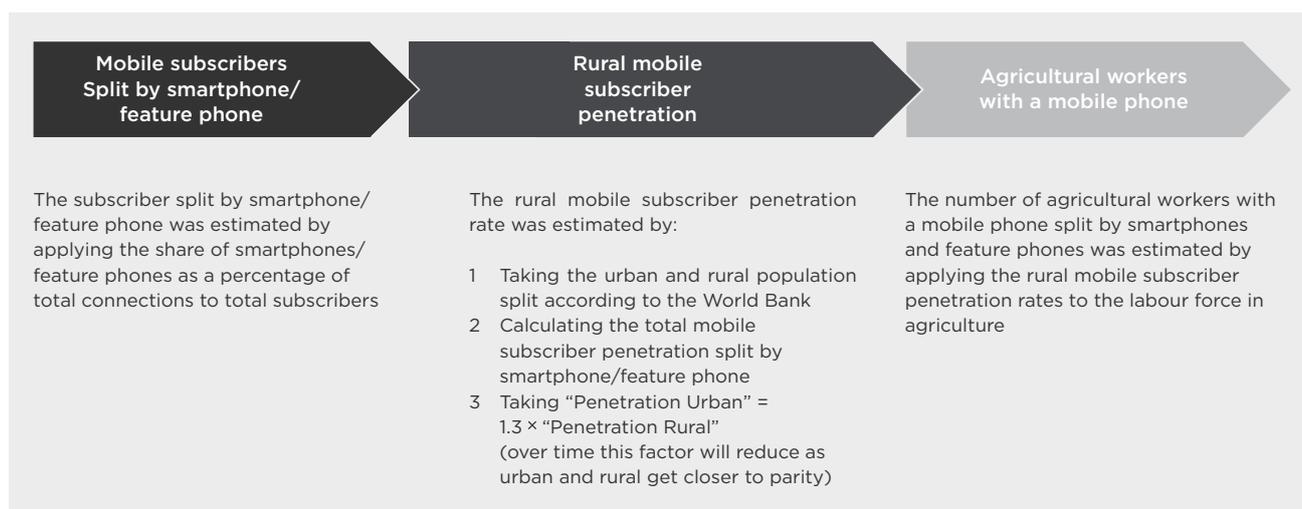
- An estimate of the number of agricultural workers with a mobile phone and subscribing to Agri VAS to get the number of potential Agri VAS users
- An estimate of farmers' expenditure on Agri VAS

The Agri VAS market size was calculated by multiplying these two factors:



Estimating the number of agricultural workers with a mobile phone and subscribing to Agri VAS to get the number of potential Agri VAS users was done in three steps. The first step was to estimate the potential agricultural workers with a mobile phone from the labour force in agriculture. Three steps were followed for each of the 37 selected countries:

1. Mobile subscribers split by smartphone/feature phone
2. Rural mobile subscriber penetration
3. Agricultural workers with a mobile phone



The second step was estimating the adoption rates of Agri VAS. Once agricultural workers with a mobile phone were estimated, all countries in the model were classified according to two metrics, income (to indicate the propensity to spend) and productivity (to indicate improved cereal yield), to establish the potential uptake of Agri VAS. Countries were classified as high potential (more likely to subscribe to Agri VAS), low potential (less likely to subscribe to Agri VAS) and mid potential (see Figure 13). Lower and higher income levels were established according to the UN classification of low income country (GDP per capita < \$1,045). Lower and higher productivity levels were calculated as the average cereal yield of the 37 selected countries (= 2,310 Kg per hectare).

Propensity to spend		Improved cereal yield		Likelihood to subscribe to Agri VAS
Income (GDP per capita) Lower income ≤ \$1,045 Higher income >\$1,045	+	Productivity (Cereal yield) Lower productivity ≤ 2,310 Higher productivity >2,310	=	Potential Potential take-up of Agri VAS
Higher income	+	Lower productivity	=	Higher potential
Lower income	+	Higher productivity	=	Lower potential
Higher income	+	Higher productivity	=	Mid potential
Lower income	+	Lower productivity	=	Mid potential

Table 3: Likelihood to subscribe to Agri VAS

Source: GSMA Intelligence

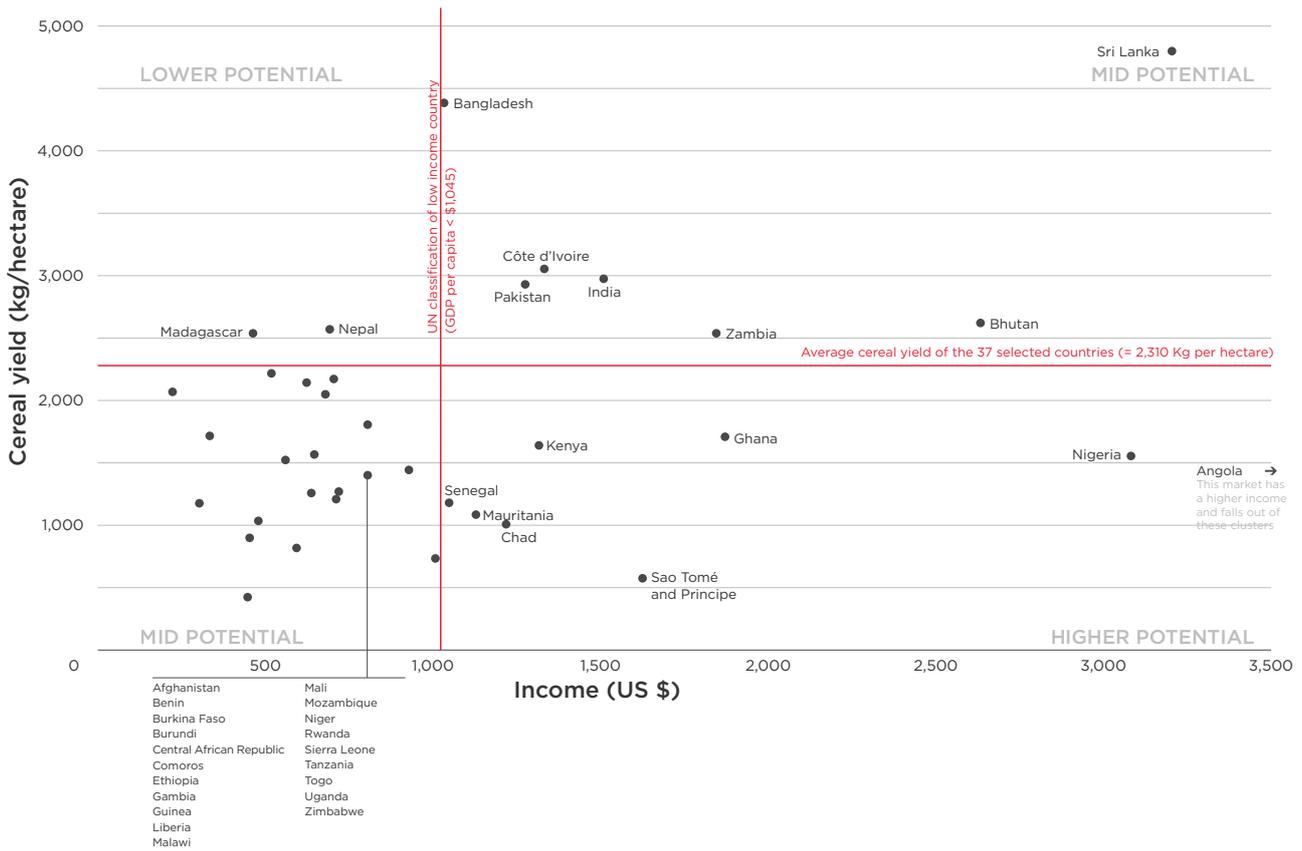


Figure 14: Country split by potential take-up of Agri VAS

Source: World Bank

The last step was to estimate the number of potential Agri Vas users. Based on the classification of countries by their potential up-take of Agri VAS, we estimated the potential adoption rates of Agri VAS. The adoption rates of Agri VAS were estimated by considering adoption rates of other VAS and through discussions with VAS managers in the industry. Given the estimates of adoption rates and the number of agricultural users with a mobile phone, the number of potential Agri VAS users was estimated.

In addition, the uptake of Agri VAS was estimated as a share of unique subscribers for the different country categorizations (high, mid and low potential).

Potential users expressed as a share of agricultural workers with a mobile

	2014	2015	2016	2017	2018	2019	2020
High potential countries	30%	32%	33%	35%	37%	38%	40%
Mid potential countries	20%	22%	23%	25%	27%	28%	30%
Low potential countries	10%	12%	13%	15%	17%	18%	20%

Potential users expressed as a share of total unique mobile subscribers

High potential countries	5%	6%	6%	6%	6%	6%	7%
Mid potential countries	5%	5%	6%	6%	7%	7%	7%
Low potential countries	3%	3%	3%	4%	4%	5%	5%

Table 4: Agri VAS uptake

Source: GSMA Intelligence

Given the number of potential Agri VAS users, the addressable market for different delivery channels (IVR/voice, SMS and rich media) was estimated. The three delivery channels are not mutually exclusive, Agri VAS users can use more than one channel at a time.

IVR/ VOICE	SMS	RICH DATA
The addressable market for IVR/ voice based services is the total number of agricultural workers with a mobile phone and subscribing to Agri VAS	The addressable market for SMS based services has been estimated by using the literacy rates for each country	The addressable market for rich data services has been estimated by applying the percentage of agricultural workers subscribing to Agri VAS to agricultural workers with a smartphone

The second factor which was estimated to derive the Agri VAS market size was the farmers' expenditure on Agri VAS. The ARPU of Agri VAS has been estimated by analysing Agri VAS for which ARPU figures are available, analysing the pricing structure and usage of live Agri VAS and talking to organisations leading the implementation of Agri VAS. The output of this analysis provides a regional weighted ARPU.

<p>South Asia</p> <p>South Asia Agri VAS ARPU assumption = \$0.60</p> <p>Mobile ARPU, by connections= \$2.42 (2013) Mobile ARPU, by subscribers¹² = \$5.58 (2013)</p> <p>Considering the pricing structure of current live services, an ARPU of \$0.60 would give, on average:</p> <ul style="list-style-type: none"> • 20 SMS or 10 minutes IVR call per month in Bangladesh • 25 minutes IVR call per month in Pakistan 	<p>Africa</p> <p>Africa Agri VAS ARPU assumption = \$0.25</p> <p>Mobile ARPU, by connections= \$5.64 (2013) Mobile ARPU, by subscribers¹² = \$10.12 (2013)</p> <p>Considering the pricing structure of current live services, an ARPU of \$0.25 would give, on average:</p> <ul style="list-style-type: none"> • 5 SMS per month in Kenya • 6 minutes of IVR call in Ghana
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¹² Total recurring (service) revenue generated per unique subscriber per month in the period. Different from ARPU by connection, ARPU by subscriber is a measure of each unique user's spend

Given the number of potential Agri VAS users and the regional ARPU estimates, the Agri VAS market size was estimated. The annual addressable market for a given country is given by:



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About GSMA



About Mobile for Development: Serving the underserved through mobile

Mobile for Development brings together our mobile operator members, the wider mobile industry and the development community to drive commercial mobile services for underserved people in emerging markets. We identify opportunities for social, economic impact and stimulate the development of scalable, life-enhancing mobile services.



About the GSMA mAgri programme

mAgri catalyses scalable, commercial mobile services that improve the productivity and incomes of smallholder farmers and benefit the agriculture sector in emerging markets. The GSMA mAgri Programme is in a unique position to bring together mobile operators, the agricultural organisations and the development community to foster sustainable and scalable mobile services that improve the livelihoods of smallholder farmers.

For more information, visit gsma.com/mobilefordevelopment/programmes/magri

About GSMA Intelligence

GSMA Intelligence is the definitive source of mobile operator data, analysis and forecasts, delivering the most accurate and complete set of industry metrics available.

Relied on by a customer base of over 800 of the world's leading mobile operators, device vendors, equipment manufacturers and financial and consultancy firms, the data set is the most scrutinised in the industry.

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