E-commerce in agriculture: new business models for smallholders' inclusion into the formal economy

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GSMA AgriTech Programme

We bring together and support the mobile industry, agricultural sector stakeholders, innovators and investors in the AgriTech space to launch, improve and scale impactful and commercially viable digital solutions for smallholder farmers in the developing world.

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Contents

	Summary	**2**
1	**Context: e-commerce and the impending disruption of the agriculture value chain**	**6**
	1.1 E-commerce in agriculture	9
2	**Evaluating the agri e-commerce opportunity in developing regions**	**12**
	2.1 The agri supply value chain and potential for e-commerce disruption	14
	2.2 Agri e-commerce enablers	16
	2.3 Benefits of agri e-commerce	20
3	**Emerging agri e-commerce business models**	**22**
	3.1 Market segmentation	23
	3.2 Operational functions	26
	3.3 Revenue models	31
	3.4 Business model analysis	32
	3.5 International markets	47
	3.6 Role of mobile operators in agri e-commerce	50
	3.7 Risks to outlook	54
4	**Recommendations**	**56**
Appendix	**Market Attractiveness Index assumptions and methodology**	**60**

Summary

This report examines the market opportunity in agri e-commerce, with a focus on Sub-Saharan Africa as well as developing countries in Asia and Latin America. It highlights key emerging trends, business models and recommendations for stakeholders to maximise the agri e-commerce opportunity. As part of the research, we interviewed 21 businesses across Sub-Saharan Africa, Asia Pacific and Latin America. Three of these companies (AgroCenta, Farmcrowdy and Twiga Foods) have received grant funding through the GSMA's Ecosystem Accelerator programme in recent years. Interviewees included agri e-commerce businesses, mobile operators and mobile money providers.

Agri e-commerce can disrupt traditional agricultural value chains

Traditional agricultural value chains involve multiple intermediaries between farmers and consumers. Typically, farmers sell their produce at the farm gates to middlemen. Produce then passes through multiple intermediaries before reaching the end customer. As a result, farmers receive only a small proportion of the price paid by the end consumer as each intermediary in the value chain earns a margin.

Agri e-commerce provides an opportunity to streamline the agricultural value chain and reduce inefficiencies in the distribution of farm produce. It represents a new way for farmers to sell their produce to an array of buyers, including agri businesses, retailers, restaurants and consumers. Agri e-commerce also increases farmers' access to new markets and adds transparency to the value chain. It enables farmers to bypass several intermediaries, resulting in higher income for the farmers, reduced wastage, and the potential to deliver fresher produce to customers. Such benefits are especially significant in developing regions, where more than 97% of people employed in agriculture live and where the sector's contribution to GDP is in double digits.

GSMA's agri e-commerce Market Attractiveness Index highlights the maturity of key markets

Agri e-commerce is an emerging opportunity in developing regions. However, there is considerable variation in the readiness of developing countries in regards to agri e-commerce. These differences are examined in our Market Attractiveness Index, which ranks countries according to a number of agri e-commerce enablers.

Our research identified seven enablers for agri e-commerce in any given market. One of the foremost enablers is internet connectivity, allowing buyers and sellers to perform key tasks over online platforms. Logistics is another key agri e-commerce enabler. National infrastructure (such as roads) in addition to delivery services and purpose-built facilities (such as warehouses) allow agri e-commerce businesses to transport produce between farmers and buyers more cost effectively. Countries that have high mobile internet penetration and improving logistics infrastructure, such as Malaysia and Thailand, score highly on our Market Attractiveness Index.

Business models must fit local market conditions

To maximise the emerging opportunity, agri e-commerce businesses require scalable and sustainable business models. The choice of business model depends on the operational functions the agri e-commerce business performs in the context of their local market. It also depends on factors such as product category and the strategic objectives of the business. A sustainable business model balances these considerations to build trust and increase user loyalty.

The business models of agri e-commerce businesses in developing regions can be grouped into five levels. Each is defined by the operational functions and capital intensity of the business model, with businesses that perform the least functions at level 1 and those with the most integrated approach at level 5. Asset-light business models are less capital intensive but – in the context of developing markets – have a higher potential for farmer and customer churn. Conversely, asset-heavy business models are more capital intensive but enable the agri e-commerce business to have greater control over key elements of the service, including customer experience, product quality and packaging, and farmer education.

Mobile operators can add value to agri e-commerce businesses in several ways

Mobile operators can play a central role in the emerging agri e-commerce space. At a foundational level, mobile operators provide the connectivity that enables online services and, increasingly, facilitates digital payments through mobile money. Beyond connectivity and payments, there is scope for mobile operators to leverage other key assets, such as APIs, investment capital and distribution channels, to increase their footprint in agri e-commerce.

As mobile operators are increasingly participating in both agriculture and e-commerce segments – by launching their own products and working in partnerships – the emerging opportunity in agri e-commerce is a key strategic consideration. The integration of operator-led mobile money services into agri e-commerce platforms can increase mobile money adoption and usage by meeting the demand for digital payments. Mobile operators' scale and existing relationships with customers could serve as a platform to expand services more quickly for agri e-commerce businesses. In addition, agri e-commerce can deliver benefits to operators' core services in rural areas through improved customer acquisition and retention, as well as increasing network usage and ARPU.

Stakeholders must align to fulfil the agri e-commerce opportunity

Agri e-commerce is at a nascent stage of development, especially in developing regions. However, the commercial opportunity and potential social impact are not in doubt. Apart from agri e-commerce businesses and mobile operators, governments and investors can tap into this opportunity to drive growth in the agricultural sector and improve the livelihoods of farmers.

The development of the agri e-commerce ecosystem requires government ministries and regulators to establish an enabling regulatory environment. Government ministries can further support agri e-commerce businesses by supplying information on local farming regions and holding events to raise farmer awareness of agri e-commerce opportunities. Donors and investors also have an important role to play – for example, through investing in agri e-commerce businesses that have a sustainable competitive advantage and potential to scale. This means understanding local market dynamics and the level of development of the key agri e-commerce enablers.

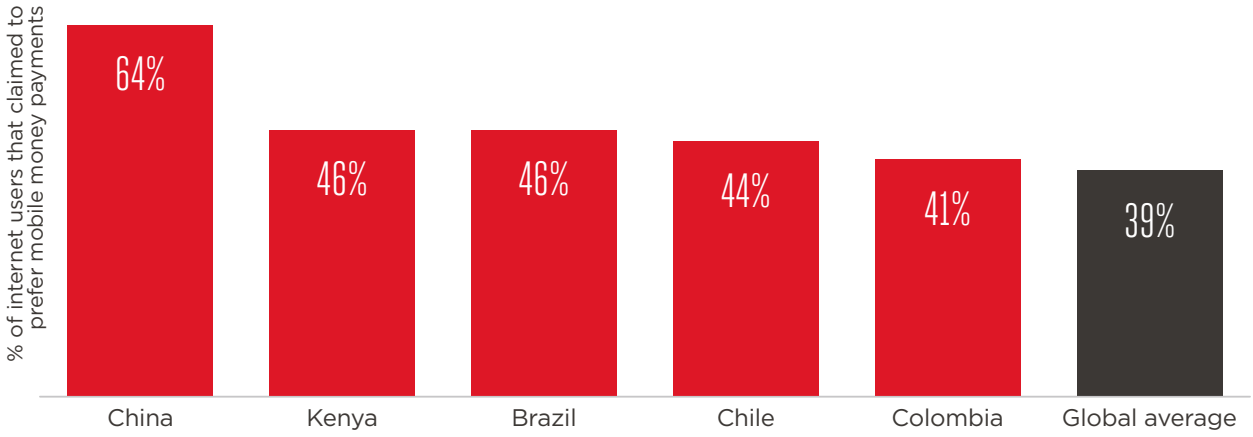
1 Context: e-commerce and the impending disruption of the agricultural value chain

The last two decades have seen significant growth in e-commerce.[1] Global retail e-commerce sales are now valued at around $3 trillion[2] and continue to grow rapidly. E-commerce sales accounted for 11.9% of all retail sales worldwide in 2018, a figure expected to reach 17.5% in 2021.[3] This growth is underpinned by a number of factors. These include shifting consumer preferences, growing internet adoption and ever-improving delivery options. For buyers, e-commerce offers a more convenient way to purchase goods and services, while also providing more choice and better deals.

Rising smartphone adoption is having a significant impact on e-commerce. This is especially true in developing regions where mobile internet is the primary form of connectivity and smartphone adoption has tripled over the last five years to 56% of total connections.[4] Mobile platforms also facilitate digital payment solutions – a key e-commerce enabler – for many users. In 2018, e-commerce transactions facilitated by mobile money grew 79% in value.[5] In Pakistan, for example, Telenor's Easypaisa and Jazz's JazzCash mobile money services enable online transactions for buyers without access to bank-issued payment cards or online payment services, such as PayPal. Tigo Money offers similar functionality for its users across Latin America and Sub-Saharan Africa, along with several other mobile money providers. These factors are driving growth in e-commerce services in developing regions, with countries in Asia, Latin America and Sub-Saharan Africa among the fastest growing e-commerce markets globally.

Figure 1

Nearly half of internet users in many developing markets prefer mobile payments



Source: eMarketer, Kantar TNS, Statista

The global retail e-commerce landscape is dominated by global players, such as Amazon, eBay and Alibaba, which operate country-specific websites in several countries, as well as international shipping services to reach buyers in many other countries around the globe. In many developing countries, however, regional- and national-level e-commerce businesses play leading roles in the domestic e-commerce market, leveraging their local knowledge and the limited presence of global players. These include Jumia, Africa's largest e-commerce company with operations in 14 countries, and MercadoLibre, which operates in 16 countries across Latin America. Russia's largest e-commerce service, Ozon, operates domestically – as do Flipkart, Snapdeal and PayTM in India.

1 Buying and selling of goods and services over the internet
2 statista.com/statistics/379046/worldwide-retail-e-commerce-sales/
3 Statista
4 Excluding licensed cellular IoT
5 GSMA Mobile Money State of the Industry Report 2018

MOBILE OPERATORS IN E-COMMERCE

Beyond connectivity, mobile operators play an increasingly active role in the e-commerce landscape, a trend that is set to continue with the surge in mobile e-commerce. Mobile operators are well placed to capture incremental revenue and subscriber value from the growth in e-commerce transactions over mobile channels by leveraging key assets, such as ownership of customer accounts and billing infrastructure, to increase conversion rates for merchants. Examples of operator e-commerce ventures include the following:

- SoftBank has invested in several e-commerce businesses around the world, including Alibaba and Flipkart.
- MTN owns a 40% stake in Jumia, while Millicom and Orange have acquired smaller shares in the company.
- In Russia, MTS spent $75 million on a 10.8% stake in Ozon in 2014, investing a further $30 million in March 2018 to increase its stake to 13.7%.
- Telekom Indonesia announced Blanja.com in 2014, as part of a joint venture with eBay. Blanja.com sells eBay products and is the e-commerce platform for state-owned enterprises in Indonesia.
- In early 2019, Reliance group companies, Reliance Retail and Reliance Jio, announced plans to jointly launch a new e-commerce platform, which could leverage the mobile operator's extensive distribution network.
- In 2014, Ooredoo partnered with Germany-based start-up incubator Rocket Internet to develop e-commerce services in Asia.

Safaricom's Masoko

In November 2017, Safaricom became the first mobile operator in Africa to launch an independent e-commerce platform, as part of plans to grow revenues outside its core connectivity business. The e-commerce platform, Masoko, builds on the reputation and trust of Safaricom's successful mobile money proposition, M-Pesa, which can be used to complete transactions on the platform. Safaricom also offers other payment methods (such as VISA and MasterCard) but does not offer the payment option of cash-on-delivery. As a payment service provider itself, Safaricom can guarantee payment for an order the moment it is placed – a core added value.

Masoko follows the marketplace model used by Amazon and Alibaba. While it screens merchants and provides e-commerce enablement services (such as payment processing and customer support channels), it operates on an asset-light basis and does not own the inventory on offer. With regards to logistics, Safaricom leverages its sizeable mobile money agent network (160,000+) as delivery and collection points, as well as multiple delivery partners. This approach enables Masoko to deliver products to 45 of 47 counties in Kenya.

By November 2018, Masoko had 120 (pre-approved) active vendors and more than 30,000 stock keeping units (SKUs) on the website. This includes Masoko Fresh, a new part of the platform that offers fruit, vegetables and dairy products.

1.1 E-commerce in agriculture

E-commerce has had a significant impact on just about every industry, from consumer electronics and apparel to entertainment and personal care.

The internet has enabled greater visibility into the global supply chain, as buyers and sellers are much closer and more easily connected. Today, most customer journeys in the purchase of products in these segments begin online through search engines, social media recommendations, online reviews or digital advertisements.

The agricultural sector is one of the few remaining sectors where e-commerce is yet to have a significant impact. There are several reasons for this: the agri supply chain is often controlled by well-entrenched intermediaries (middlemen); the logistical challenge of handling perishable products is complex; and most consumers still prefer to buy groceries in-person rather than online, given the inconsistent physical appearance of fresh produce, especially fruit and vegetables.

However, this is changing rapidly as e-commerce solutions that aim to overcome barriers around customer preferences and logistics drive online grocery across the world. In developed markets, online bulk orders of fresh produce are already common among businesses, such as hotels and restaurants. In the consumer market, online grocery orders are also starting to gain traction. In the US, for example, online grocery sales doubled between 2014 and 2018, and now account for around 7% of the total grocery market.[6]

Growth in agri e-commerce in developed markets is largely driven by the emergence of agri e-commerce players under three broad categories. See Table 1.

Table 1

Agri e-commerce market entry strategies in developed markets

Type	Description
Established e-commerce platforms expanding into the grocery segment	Major e-commerce platforms are expanding their online offerings to include grocery products. Amazon has launched its online grocery delivery service, AmazonFresh, in select regions of the US, UK and Germany. Other major e-commerce platforms, including Alibaba, Flipkart and MercadoLibre, also sell groceries online. Some e-commerce platforms have added bricks and mortar stores to complement their online assets. Amazon acquired Whole Foods, which operates 400+ retail stores in the US, while Alibaba plans to open 100 Hema-branded supermarkets in China. Bricks and mortar stores can support online transactions and act as a network of mini distribution centres or collection hubs for fresh produce, to shorten customer lead times.
Offline grocery stores opening online channels	In response to moves by major e-commerce platforms, traditional bricks-and-mortar retailers have launched multichannel strategies. As well as investment in digital platforms, offline grocery stores have made investments to develop logistics networks suitable for e-commerce. Many supermarkets have launched their own delivery services, such as Waitrose's partnership with Ocado in the UK, while smaller retailers have formed partnerships with specialist delivery companies, including HappyFresh in the US and Instacart in Southeast Asia. Offline grocery retailers also use their store footprints to offer click-and-collect services.
Pure-play agri e-commerce businesses	The internet has enabled the emergence of online-only services that connect farmers to consumers. This includes enterprises such as Farmstead, Good Eggs, GrubMarket and Imperfect Produce in the US. These services remain in the start-up phase but are expanding into more US locations having received significant venture capital. In the UK, sales between producers and buyers via the likes of Abel & Cole, Farmdrop and Riverford have also grown but still represent a fraction of the total market. For instance, Riverford generated almost £60 million in 2018, selling around 50,000 vegetable boxes per week. Agricultural producers can also sell produce to third-party merchants who, in turn, sell through e-commerce platforms to end users. This is common in China where major e-commerce companies, such as JD, Pinduoduo and Tmall, benefit from the highly advanced logistics infrastructure in the country to reach consumers with fresh produce. Pinduoduo uses an innovative purchase model whereby users invite their contacts to form a shopping team to get a lower price for their purchase.

Source: GSMA Intelligence

6 Statista

The take-up of agri e-commerce in developing regions is so far less pronounced. This is primarily because the challenges to agri e-commerce adoption are more acute in these regions. For example, there is little in the way of agri produce standardisation (by quality, size or age) and the logistical challenges are more significant. In addition, farmers in these regions often live in rural areas with low levels of critical infrastructure (roads, storage and warehouses, transport, etc.), limited access to a full range of digital technologies, and where powerful intermediaries are keen to maintain the status quo.

Digital platforms – mobile in particular – have positively impacted many areas of the agricultural sector in developing regions; for example, mobile technologies are used to provide valuable farming and market information to farmers, and enable early-warning systems to mitigate the risk of losses due to extreme weather conditions or disease.

There is growing potential for these platforms to disrupt the agriculture supply value chain in these regions as investors build on the rising adoption of mobile internet and digital payment solutions by end consumers and farmers to develop new go-to-market models for agriculture produce. This could have a significant impact on the agricultural sector in developing regions. More than 97% of people employed in agriculture live in developing regions, and the sector accounts for a significant proportion of the economy: 16.2% of GDP in Sub-Saharan Africa, 15.9% in South Asia, 8.2% in Southeast Asia and 4.8% in Latin America.[7]

7 World Bank Database, 2019

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2 Evaluating the agri e-commerce opportunity in developing regions

Agri e-commerce – the buying and selling of agricultural produce online – can address notable challenges and inefficiencies in the agriculture supply chain by streamlining farmers' access to the customer and creating new links between steps in the value chain. This is especially true in developing countries where online platforms can enable farmers to bypass intermediaries and sell directly to agri businesses, retailers, consumers and other customer groups, leading to increased efficiency of the supply chain and generating fairer incomes, as well as a transaction history for farmers.

In recent years, a number of agri e-commerce services have been launched across developing countries. These services provide farmers with new ways of selling their produce and reaching new buyers. There is limited research on the proportion of agri sales through these online services, relative to traditional distribution channels. However, insights on the activities of these services, including the number of buyers and sellers and transaction values and volumes, indicate strong growth and potential for the services to scale in the future. Examples include the following:

- **Tanzania** – Ninayo connects farmers with large buyers. In mid-2018, Ninayo reported that revenues are on track to double for the third year in a row, breaking the $100,000 mark.[8]
- **Kenya** – Twiga Foods[9] launched in 2014 with five delivery routes. By the start of 2019, it had expanded to 90 delivery routes, processing around 2,500 daily orders through a network of 17,000 farmers.
- **Pakistan and Thailand** – Ricult connects farmers to buyers at large mills across its two markets. It concluded its agri e-commerce pilot in November 2018, with 10,000 farmers on its platform. As of March 2019, the service had grown to around 35,000 farmers across Thailand and Pakistan. It aims to have more than 100,000 farmers using the agri e-commerce service by the end of 2019.
- **China** – Since 2015, James Tyler – an agri e-commerce service that provides fresh seafood, dairy, meat and summer fruit from Australia directly to consumers in China – has fulfilled more than 140,000 orders.
- **Indonesia** – Eragano launched its agri e-commerce service in 2015, selling a range of produce including coconuts, chillies and potatoes. It now has 7,000 active farmers and 25 large industrial buyers on its platform, served by 25 full-time staff and 50 agents. It plans to extend its service beyond Java into other regions of Indonesia that meet its expansion plans.
- **Colombia** – Frubana is an online platform that enables farmers to sell directly to restaurants in Bogotá. It launched in 2018 and served 200 restaurants in its first three months, providing ingredients for more than 1 million dishes.
- **Gambia** – FarmFresh launched in 2014 and accumulated 50 customers in the first few months. By 2018, the agri e-commerce business served around 300 customers and had 20 farmers registered on the platform.
- **Nigeria** – In April 2019, Nigerian agri-tech startup Farmcrowdy launched an agricultural commodities marketplace. This builds on the online platform it created in 2016, which connects individual investors to farmers through sponsorship packages that fund higher yields for a share of the returns. Farmcrowdy[10] has empowered more than 12,000 farmers across 14 states.

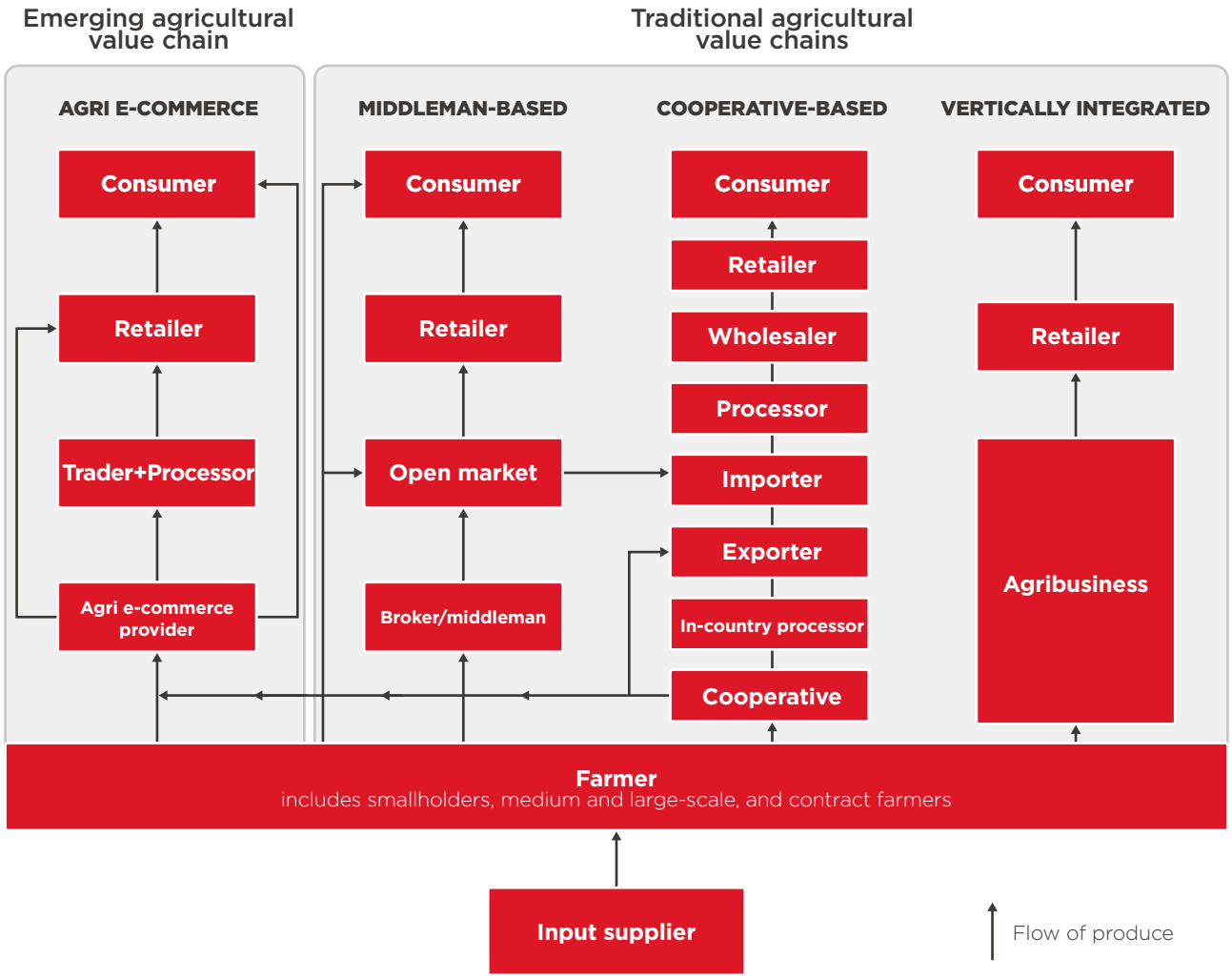
8 "Meet NINAYO, the digital marketplace for agriculture!", medium.com, June 2018
9 Twiga Foods received grant funding in April 2017 from the GSMA Ecosystem Accelerator, supported by the UK Department for International Development (DFID). gsma.com/mobilefordevelopment/wp-content/uploads/2019/04/GSMA-Ecosystem-Accelerator-Innovation-Fund-Start-up-Portfolio.pdf
10 Farmcrowdy received a grant from the GSMA Ecosystem Accelerator Innovation Fund in February 2018, supported by the UK Department for International Development (DFID). gsma.com/mobilefordevelopment/wp-content/uploads/2019/04/GSMA-Ecosystem-Accelerator-Innovation-Fund-Start-up-Portfolio.pdf

2.1 The agri supply value chain and potential for e-commerce disruption

We can understand the potential for agri e-commerce disruption by mapping the value chains between farmers and buyers (see Figure 2).

Figure 2

Agricultural value chains



Source: GSMA Intelligence

Traditionally, farmers sell their produce through three main value chains: vertically integrated; cooperative-based; and middleman-based. However, inefficiencies in each of these underpin the potential for agri e-commerce disruption.

Table 2

Agricultural value chains: potential for e-commerce disruption

Value chain	Customer	Description	Potential for e-commerce disruption
Vertically integrated	Agri business	Farmers, particularly cooperatives and large-scale farmers, have contracts to sell directly to agri businesses. This is most common for cash crops, such as sugar, tea leaves, cocoa and beans, which often serve as raw materials to be processed into edible food.	**Low:** Although payments through this value chain are increasingly being digitised, agri businesses often have well established relationships and engagement channels with farmers, reducing the scope for agri e-commerce businesses. That said, agri e-commerce can link agri businesses to new suppliers, which may be essential to their growth plans.
Cooperative-based	Cooperative	Farmers are part of a group owned and operated by farmers that produce similar produce. Through working together, farmers attract new buyers and increase the price they receive for their produce. It also enables them to obtain cheaper agricultural inputs.	**Medium:** Cooperatives can perform many of the functions often undertaken by agri e-commerce businesses. For instance, cooperatives carry out sales and marketing, quality control and even distribution if the cooperative owns transport. However, there is an opportunity for agri e-commerce businesses to introduce cooperatives to new buyers that cannot be reached otherwise.
Middleman-based	Broker/ Middleman	Farmers sell their produce at farm gates to middlemen, who then incur the costs and risks associated with moving the product to buyers in other geographical areas. This accounts for the largest proportion of sales by farmers, but it is also the most inefficient way for farmers to sell their produce. This is because the value chain involves several middlemen between the farmer and consumer, who each take a margin, meaning farmers receive only a small proportion of the final price paid by consumers. Prohibitive transport costs, and lack of infrastructure and storage results in a high risk of post-harvest wastage and deters most farmers from bypassing middlemen and selling directly to the market or consumers.	**High:** Agri e-commerce businesses can streamline farmers' access to buyers, creating new links between stages of the value chain. Agri e-commerce businesses can also help farmers overcome problems with transport and post-harvest wastage through arranging delivery, storing produce and generating demand through sales and marketing. As a result, agri e-commerce has the potential to increase value chain efficiency and transparency, boost farmers' incomes and improve productivity levels over time. However, faced with problems of aggregating smallholders' produce, agri e-commerce providers may turn to middlemen (local aggregators) to satisfy demand. This reduces agri e-commerce's impact on the initial stages of the value chain between the farmer and middleman.

Source: GSMA Intelligence

2.2 Agri e-commerce enablers

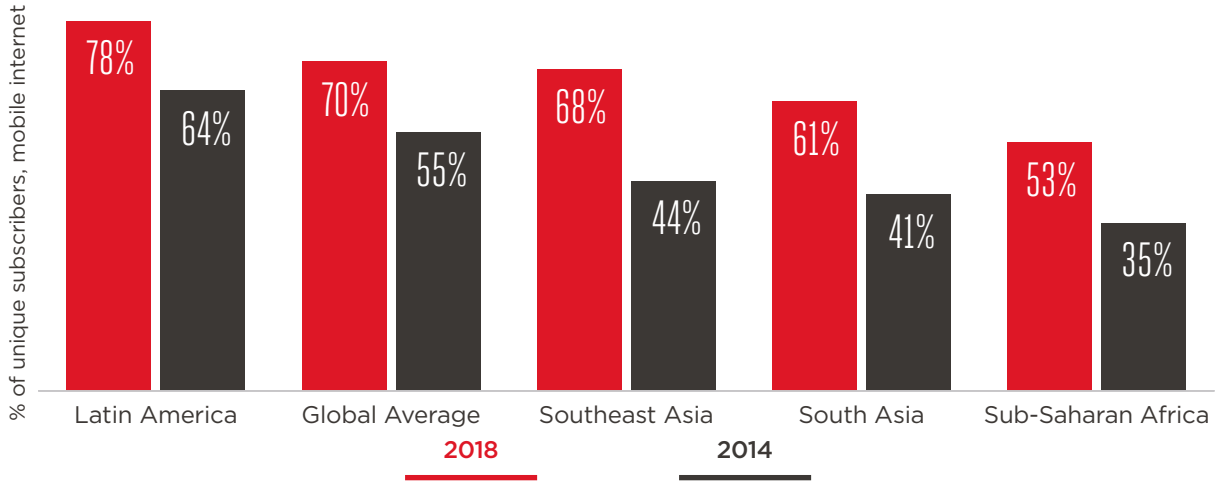
The size of the agri e-commerce opportunity in a given market depends on a number of enabling factors, which can have a significant impact on the sustainability and scalability of an agri e-commerce service. Some of the factors, which are external to the agri e-commerce business, could also influence the business model (see Chapter 3) for a specific market. From our research, we have identified seven key enablers of agri e-commerce services in any given market environment.

1

Mobile internet penetration: Connectivity enables buyers to access online services, including agri e-commerce services. There are 2.5 billion mobile internet users in developing countries, while smartphone penetration is currently at 53.8% in these regions.[11]

Figure 3

Growing mobile internet penetration allows more users to access agri e-commerce services



Source: GSMA

2

Logistics networks: Logistics is a critical factor for buying or selling any physical product online. This includes national infrastructure, such as roads, as well as haulage services for first- and last-mile delivery. Markets with a developed logistics infrastructure and addressing system are better suited to e-commerce and, by extension, agri e-commerce. Although agri e-commerce businesses can own their logistics infrastructure, this can be capital intensive and could have significant implications for the business model.

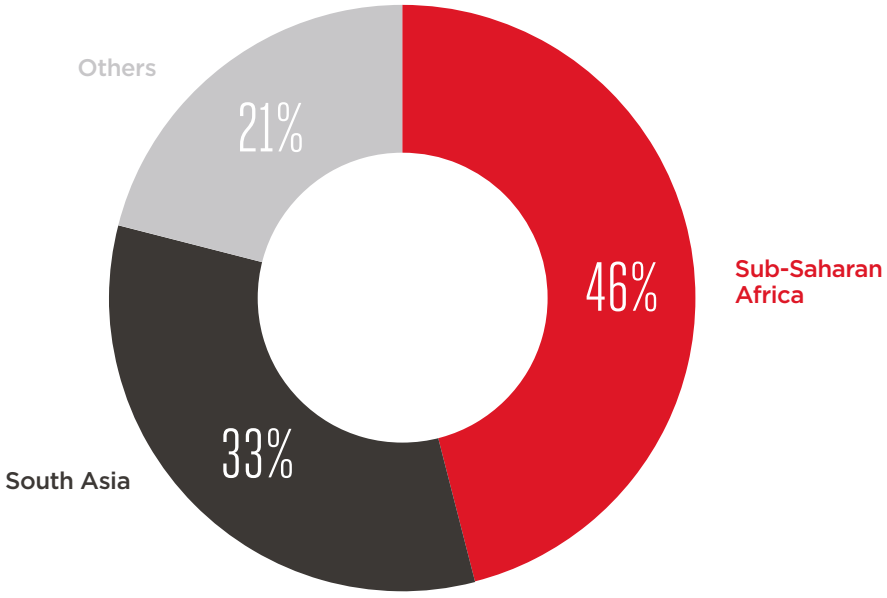
11 GSMA Intelligence

3

Digital payments: E-commerce services in general are facilitated by digital payment solutions. In developing countries, where debit and credit card penetration is relatively low, mobile money is a useful payment solution for various transactions, including online payments. Digital payments accelerate the transaction process and avoid the problems associated with cash-on-delivery, such as fraud, delays to the transaction fulfilment, and the time and cost of paying the suppliers. By the end of 2018, there were 868 million registered mobile money accounts globally, with the majority of them in developing regions.[12] Despite this, there remains an issue around financial literacy in developing regions. In some cases, users continue to perceive digital payments as unsecure and show distrust in e-commerce and online payments – both factors are limiting for e-commerce scale and adoption.

Figure 4

Sub-Saharan Africa and South Asia account for the majority of registered mobile money accounts globally



Source: GSMA Note: Percentage of total number of registered mobile money accounts

4

Agricultural readiness: To succeed, agri e-commerce providers require the agricultural sector to be equipped for e-commerce. This means that agricultural workers have access to mobile devices, to receive notifications of orders and perform key tasks, such as uploading details of produce for sale. It is also beneficial for farmers to have some experience with formal value chains, understand quality standards and have relatively high productivity, so that they have sufficient produce to sell through the online channel. To increase agricultural readiness, Indonesian agri e-commerce business Eragano employs field agents to teach smallholders about mobile technology at local workshops. These activities have enabled the company to retain more than 7,000 active farmers on its platform.

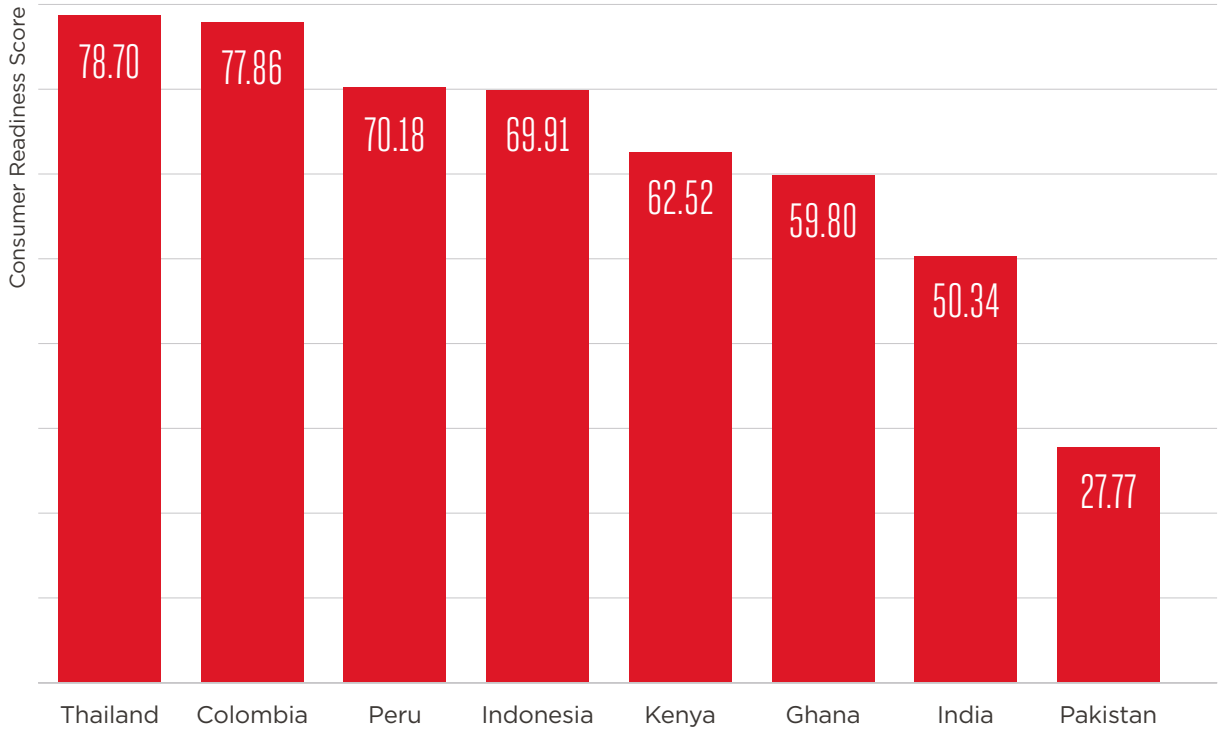
12 GSMA Mobile Money State of the Industry report 2018

5

E-commerce familiarity: Buyers that have used any e-commerce services previously are likely to be more open to emerging e-commerce services geared towards the agricultural sector. Experience of using services also increases consumer trust and appreciation of the benefits of online shopping, such as convenience and choice. Consumer readiness and, by extension, familiarity of e-commerce services are low across many developing countries; this could impact the adoption of agri e-commerce in those markets.

Figure 5

Consumer readiness in selected markets



Source: GSMA Mobile Connectivity Index Note: Consumer readiness measures the level of skills needed to use the internet as well as gender equality.

6

Urbanisation: Currently, 55% of the world's population live in urban areas, rising to 68% by 2050, underpinned by rapid urbanisation in Africa and Asia.[13] A busier lifestyle in urban areas could be a catalyst for consumers shifting to agri e-commerce. An increase in urbanisation has the potential to increase the number of customers for e-commerce services. It can potentially improve the addressing system and reduce the cost of last-mile delivery, which is a key barrier for agri e-commerce services sold directly to consumers.

7

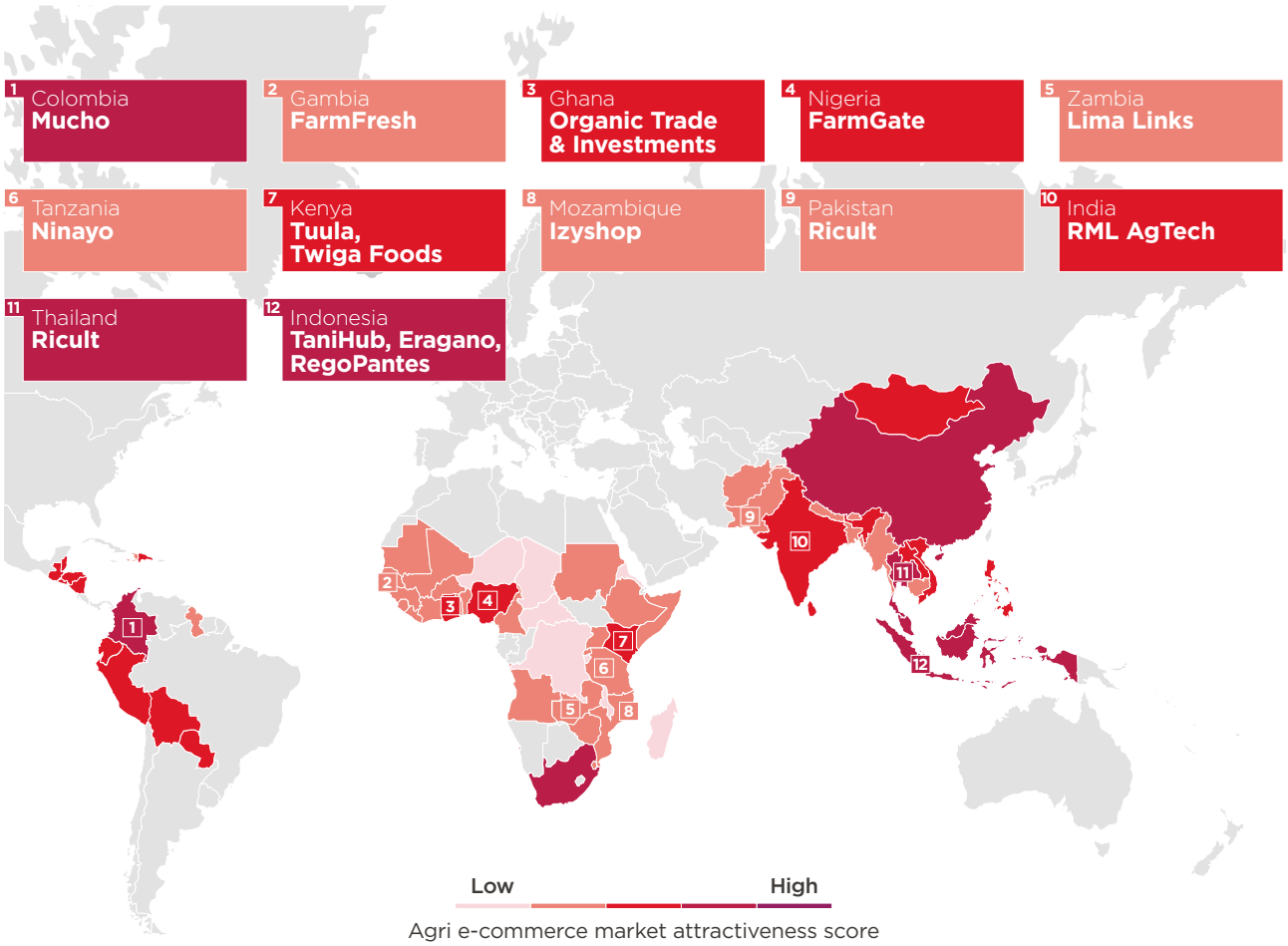
Income structure: The expansion of a social group with a higher amount of disposable income leads to changing food consumption and lifestyle patterns, which agri e-commerce can meet through direct-to-consumer services. For instance, the middle class drives interest in ethically sourced local produce, as well as fresh and organic food.

13 un.org/development/desa/publications/2018-revision-of-world-urbanization-prospects.html

Building on these enablers, we have developed a Market Attractiveness Index with a focus on Sub-Saharan Africa in addition to developing countries in Latin America and Asia.

Figure 6

Market Attractiveness Index



Source: GSMA Intelligence, World Bank, International Labour Organization, UN Food and Agriculture Organization (FAO)

With agri e-commerce at a nascent stage, developing countries have yet to reach the highest score in our Market Attractiveness Index. Among the case study countries, Thailand and Indonesia lead the way with high adoption of mobile internet as well as financial accounts. These are closely followed by Colombia, which has high mobile internet adoption but lower levels of financial inclusion. Overall, these countries have emerged as leaders in the e-commerce sector within developing regions and can translate this to agri e-commerce due to improving productivity in the agricultural sector, supported by the rise in the number of agricultural workers with mobile phones. In Sub-Saharan Africa, Nigeria and Kenya rank among the leading countries in terms of agri e-commerce attractiveness. These countries possess high scores in many of the agri e-commerce enablers, but with mobile internet adoption at 29% and 27% respectively, they trail leading Asia Pacific and Latin America countries in terms of access to e-commerce platforms.

2.3 Benefits of agri e-commerce

Agri e-commerce presents a range of economic benefits to farmers, communities and the wider society, in the form of improved income and livelihood.

This, in turn, generates significant social value for investors, donors, agri e-commerce businesses, governments and other stakeholders around the key targets of the UN Sustainability Development Goals (SDGs), notably SDGs 1, 2, 3, 8, 9, 10 and 12. Key benefits of agri e-commerce include the following:

REDUCE WASTAGE

According to the Food and Agriculture Organization (FAO), a third of food produced for human consumption is wasted. Agri e-commerce services reduce post-harvest wastage through improving market efficiency. For instance, farmers selling fruit and vegetables through Frubana in Colombia record post-harvest losses of 3%, compared with the average of 58% for farmers that sell through traditional channels. As online platforms provide farmers with an alternative, farmers no longer have to choose between accepting low prices offered by middlemen, or searching for a last-minute buyer and increasing the risk of post-harvest losses. Agri e-commerce services also allow farmers to sell directly to buyers. This shortens the time it takes for the produce to reach the customer, leading to lower risk of post-harvest wastage as well as fresher and more nutritious produce.

IMPROVE INCOMES

Online platforms provide greater transparency and visibility of market prices to farmers, resulting in fairer prices compared to those offered by a typical middleman. This is often achieved by eliminating intermediaries in the value chain as well as improving the efficiency of the distribution system. In Mozambique, agri e-commerce provider IzyShop reports that the smallholder farmers that supply its vegetable boxes earn more than $100 per month, compared with an average monthly income of $18-20 for smallholder farmers in the country. The potential for agri e-commerce to improve farmers' livelihoods and reduce poverty appeals to ethical buyers such as urban customers who want to know where their food comes from in order to support their local farming communities and economy.

FINANCIAL INCLUSION

Through mobile money and other digital solutions on agri e-commerce platforms, farmers can build a digital history of their business transactions which, in turn, could allow them to demonstrate their credit worthiness to financial institutions and other financial service providers. In Indonesia, the rise of crowdfunding platforms has enabled individuals to invest in local farmers. For instance, mobile crowdfunding platform Crowde has attracted about 14,000 farmers and 22,000 individuals who have invested $4–5 million. This investment helps farmers gain access to credit and other financial products that can enable investment in farming inputs and equipment to improve productivity. In contrast, informal cash transactions with middlemen do not provide farmers with a record of past sales and usually happen without a receipt of purchase.

INCREASE PRODUCTIVITY

Some of the economic benefits of agri e-commerce to farmers, such as improved incomes, reduced wastage and access to financial services, can serve as an incentive for farmers to increase their on-farm investments and productivity. In addition, buyers have more choice online and, in some cases, can trace the origin of specific supplies, further encouraging farmers to enhance the quality of produce in order to maintain their quality ranking and access to market.

IMPACT ON ADJACENT SERVICES

Uptake of agri e-commerce services can have a direct positive impact on adjacent services, notably mobile services, such as mobile money, and logistics. This is most likely to be witnessed in farmers with higher incomes and greater levels of digital literacy. These early adopters can then drive digital and financial inclusion among poorer farmers. In some instances, agri e-commerce providers have played an active role in driving this inclusion. In Colombia, Mucho worked with NGOs and government agencies to educate farmers on technology and distribute mobile devices. Meanwhile, the volumes and frequency of agri e-commerce transactions increase the commercial viability of dedicated first- and last-mile logistics services that support e-commerce businesses. As customer demand increases for agri e-commerce and other online shopping services, logistics services and infrastructure will attract further investment.

3 Emerging agri e-commerce business models

To assess the emerging business models in agri e-commerce, it is important to understand the characteristics of agriculture produce, the different farmer and customer segments, and the potential operational functions of an agri e-commerce service. These factors underpin the cost structure of the service which, along with reliable revenue streams, impact the sustainability and scalability of an e-commerce business.

3.1 Market segmentation

Agri e-commerce businesses need to consider several factors when developing their business models. At a first level, this involves analysing the categories of farmers and buyers that the business wants to target, as well as the type of produce to sell.

Table 3

Market segmentation

Component	Segments	Characteristics
Farmers	**Smallholders**	• There are a large number of smallholder farmers across developing countries. Smallholders supply 80% of the food produced in Asia, Latin America and Sub-Saharan Africa.[14] • Smallholders are most susceptible to middlemen, so more likely to benefit from e-commerce. Consequently, the social impact of agri e-commerce is highest in this segment. • Smallholders produce in smaller quantities and are often more dispersed and in hard-to-reach locations, creating aggregation costs for the e-commerce business. • Smallholders often lack digital literacy and remain excluded from formal financial services, resulting in potentially higher farmer acquisition costs for an agri e-commerce business.
	Cooperatives	• Cooperatives organise large numbers of smallholder farmers into groups, in order to increase collective bargaining power. • Rather than speaking directly to smallholders, agri e-commerce businesses communicate key messages to cooperative leaders, who then relay the information. This enables agri e-commerce businesses to reduce farmer acquisition costs. • Agri e-commerce businesses use cooperatives to raise awareness of their service among smallholders. Cooperatives can teach smallholders how to use agri e-commerce services, holding workshops and training events. They can also aggregate smallholders' produce to fulfil orders.
	Large scale	• Large-scale farmers produce greater quantities of produce than smallholders, using a range of inputs, equipment and machinery to maximise production. • Large-scale farmers often own transport, so they can deliver orders to the agri e-commerce business or end customer, which simplifies the logistical challenge. • Many large-scale farmers already have offtake agreements with buyers, such as agri businesses. This makes them less likely to sell produce to agri e-commerce services. • Dependency on a small number of large-scale farmers increases the risk of being unable to fulfil orders if one of the large farmers drops out.

14 Connecting Smallholders to Markets, Food and Agriculture Organization, 2016

Component	Segments	Characteristics
Buyers	**Individual consumers**	• Agri e-commerce businesses selling to consumers typically use low-cost marketing, such as social media and word-of-mouth. With greater scale, radio and television advertising becomes more viable. • Individual consumers are less particular about product standardisation compared to retailers or other business customers. • The low average order value and dispersed nature of the customer base makes it hard to profitably deliver produce to consumers. • Consumers have a range of alternative options, and many have long-standing relationships with sellers at nearby kiosks and retail outlets.
	Businesses	• Buyers include agri businesses and retailers (shops and supermarkets), hospitality businesses (restaurants and hotels) and public sector organisations (hospitals and schools). • Rather than creating a solution from farmer to end customer, some companies target specific parts of the value chain. For instance, AgroCenta's[15] platform connects farmers selling commodities with business buyers, such as feed manufacturers and breweries. • Usually, businesses are more rational than consumers regarding purchase decisions. Businesses employ dedicated buyers that agri e-commerce businesses appeal to through offering improved convenience, quality or price. • Many businesses also have their own transport, so can collect produce from the farm or warehouse. • Businesses order in large volumes, which improves the economics of transporting produce from rural areas to cities. As a result, many agri e-commerce services selling to consumers also have agreements with business buyers.
	Export	• The majority of agri e-commerce businesses sell to domestic buyers, but agri e-commerce also enables farmers to reach buyers in international markets. • Exporting allows agri e-commerce businesses to sell to a type of buyer, or cater to a particular demand, that might not exist in their local market. • Agri e-commerce businesses that export produce need additional legal resource help with regulation and compliance issues in international markets.

15 AgroCenta received a grant from the GSMA Ecosystem Accelerator Innovation Fund in November 2018 to further develop and scale its financial solution, AgroPay, supported by the UK Department for International Development (DFID) gsma.com/mobilefordevelopment/wp-content/uploads/2019/04/GSMA-Ecosystem-Accelerator-Innovation-Fund-Start-up-Portfolio.pdf

Component	Segments	Characteristics
Produce	**Perishables**	• Perishable items include dairy products, fresh fruit and vegetables, meat and poultry, and seafood. • To maintain freshness and prevent post-harvest wastage, these items need to be kept in appropriate conditions, and may require agri e-commerce businesses to invest in cold storage.
	Non-perishables	• Non-perishables, such as pulses and rice, can be stored at lower costs than perishables. This simplifies the distribution process for the agri e-commerce business. • There is less time pressure on the agri e-commerce business to complete, as the produce has a longer expiration date.
	Agri raw materials	• This category includes produce used as raw materials to manufacture other items. • Rather than individuals, buyers are businesses that purchase agri raw materials in bulk. This makes it more economical to transport the order to the buyer, compared with orders consisting of a small number of items. • Agri raw materials tend to be less variable than other types of produce. Agri e-commerce businesses therefore require less stringent quality control measures when selling agri raw materials.

Source: GSMA Intelligence

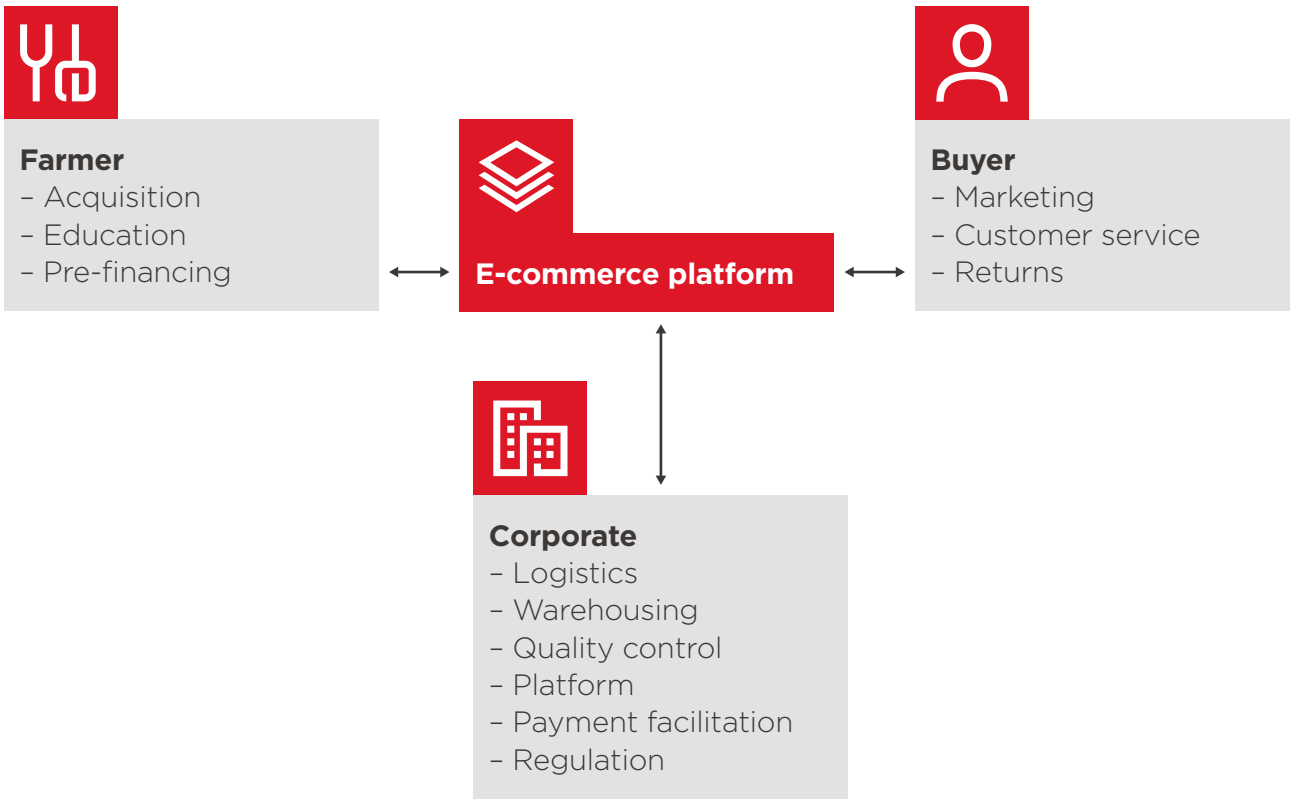
Besides perishability, agri e-commerce businesses also need to evaluate seasonality when considering what type of produce to sell. If an agri e-commerce business relies too heavily on seasonal produce, it risks under-utilising its capital assets (such as storage facilities and vehicles), which leads to cash flow problems. As a result, agri e-commerce businesses often supplement seasonal produce with high-volume crops, such as bananas, to smooth volatility.

3.2 Operational functions

With an appreciation of the various farmer, buyer and agri produce segments, agri e-commerce businesses may need to perform a variety of operational functions to bring their proposition to market. We have split functions into three categories: farmer, buyer and corporate. See Figure 7.

Figure 7

Agri e-commerce operational functions



Source: GSMA Intelligence

FARMER

Farmer acquisition (Selection)

Agri e-commerce businesses need to raise awareness of their service among farmers. This may involve employing field agents to visit farmers to explain the business model and benefits, or partnering with separate organisations, such as co-operatives, farmer societies or governments agencies. In Trinidad and Tobago, D'Market Movers has increased the number of farmers on its platform through farmer-to-farmer recommendations and referrals with the help of farmer leaders. Farmer acquisition is a crucial function given that an agri e-commerce platform needs a critical mass of farmers to fulfil customer demand.

Farmer acquisition (Contracting)

The nascent stage of most agri e-commerce services means platforms often rely on informal agreements to secure offtake arrangements. For instance, many agri e-commerce businesses use demand-based sourcing, whereby platforms receive orders from buyers then

instruct farmers to fulfil the request. This is useful when agri e-commerce services are less certain about future demand, but it creates uncertainty around the reliability of future supply. An alternative is to agree contracts that provide a legal guarantee in regard to a minimum offtake. Kenyan agri e-commerce business Tulaa implements this approach, with farmers signing a short-term contract with Tulaa agents. Likewise, in Ghana, farmers that supply to Organic Trade & Investments (OTI) sign purchase obligations and a supplier's Code of Conduct (CoC) with the agri e-commerce business. Both approaches help to build trust between agri e-commerce businesses and farmers.

Farmer education

It may be necessary for agri e-commerce businesses to educate farmers on the use of their service. This is particularly important in developing countries, where digital literacy is often low and farmers lack experience of e-commerce services. In order to educate farmers, agri e-commerce businesses employ local field agents to teach farmers about key tasks such as grading, packaging and uploading details of produce they wish to sell. While effective at upskilling farmers, these activities require many employees and extensive travel to reach farmers that live in remote areas. As a result, several agri e-commerce businesses use alternative training methods to reduce expenditure.

In Indonesia, government ministries arrange events to educate farmers on agri e-commerce and facilitate introductions between farmers and agri e-commerce businesses. Through the support of such initiatives, agri e-commerce business RegoPantes has reduced its farmer acquisition costs from $20 per farmer to less than $1 per farmer. Other platforms work with local farmer leaders and train them to teach other farmers, or hold educational camps where they train numerous farmers at the same time. Both of these alternatives reduce labour and travel costs, but also reduce agri e-commerce businesses' control over the education process. In addition, there is a risk that farmer leaders simply take the role of the middleman, aggregating and selling smallholders' produce via e-commerce platforms. This reduces the income of individual farmers and limits the margins of agri e-commerce businesses.

Pre-finance

It may also be necessary for the agri e-commerce business to help farmers secure financing to boost quality and productivity, and become less reliant on high-interest finance from middlemen. Agri e-commerce businesses can enable farmers to access credit from partner organisations. For instance, AgroCenta's financial inclusion platform (AgroPay) allows lenders to disburse farmer loans and more accurately evaluate risk through accessing data from AgroCenta's online trading platform (AgroTrade). This helps AgroCenta secure contracts with large commodity offtakers before obtaining supply from farmers. For the 2019 cropping season, more than 5,000 smallholder farmers are to receive micro loans via AgroPay.

Other agri e-commerce businesses, such as TaniGroup's TaniFund, have created platforms to connect farmers and individual lenders. This approach, known as crowd-lending, allows individuals to earn a return on their investments by receiving a share of the profits when farmers sell their produce. Partnership and platform-based models enable agri e-commerce businesses to support farmers, without committing significant resources.

Kenyan agri e-commerce business Tulaa adopts an alternative approach. It has become a financial lender and underwrites loans to farmers, in order to accelerate the lending process. However, this requires capabilities in putting together credit scoring models, which typically takes considerable time, knowledge and resource, as well as substantial capital. This can impede the scalability of agri e-commerce businesses, highlighted by Indian agri e-commerce provider RML Ag Tech, which closed its service due to the level of capital required to guarantee financial transactions.

BUYER

Marketing

Agri e-commerce businesses use marketing to raise awareness and drive usage of their platform. In particular, services heavily promote the benefits of agri e-commerce, which often include convenience, fresher produce and improved incomes for farmers compared with the traditional value chain. This is a critical function in agri e-commerce, where the service provider must stimulate demand to avoid post-harvest wastage and meet the supply of goods, especially perishable items.

AgroCenta's 'buyer-first' solution avoids this problem. It secures contracts with large offtakers before instructing farmers to begin their harvest. However, this model is not suited to solutions targeting individual customers, who purchase small volumes. In these cases, agri e-commerce businesses can advertise their service to business buyers to supplement consumer demand. For instance, agri e-commerce businesses Mucho and RegoPantes target restaurants in addition to individual customers. The bulk orders from restaurants make the delivery of produce from farmers more economical, while consumers are often willing to pay a higher price per unit and represent a longer-term opportunity with rising mobile internet adoption.

Customer service

Agri e-commerce businesses may need to provide customer service to buyers that require assistance with issues, such as delivery and payment queries. This helps the agri e-commerce business improve customer satisfaction among existing users. To provide this support, larger platforms have a customer service line or in-built chat function, such as Farmdrop in the UK. This provides customers with multiple channels to reach dedicated teams that can answer their questions. In contrast, support is more informal within smaller agri e-commerce companies, though it remains a key customer requirement. For instance, Gambian agri e-commerce business FarmFresh relies on email and WhatsApp to provide customer service, with responsibility for checking these channels shared between team members.

Returns

A high rate of customer returns harms the reputation of an agri e-commerce business, and increases customer service costs in terms of hiring staff to handle complaints. There is also the cost of delivering a replacement item or providing a refund. Agri e-commerce businesses may therefore need to establish a returns policy with farmers. For instance, TaniHub absorbs the cost of returns so they can quickly resolve a buyer's issues. Other platforms, such as RegoPantes, charge farmers if buyers request a refund or replacement when they receive defects. This can require negotiations with farmers, which might extend the returns process but saves money for agri e-commerce businesses. It also incentivises farmers to make improvements, helping to prevent the shipping of further defects. If farmers continue to supply defects, agri e-commerce services can provide extra training or find alternative suppliers.

CORPORATE

Logistics

In the traditional agri supply value chain, intermediaries handle the logistics from the farm to the buyer. By taking the place of intermediaries, the agri e-commerce business may need to also take on the logistics tasks. This may be done through partnerships with third-party logistics providers or by investing in logistics assets. Contracting third-party delivery services to fulfil orders, rather than owning delivery assets, reduces upfront costs and provides greater flexibility to meet demand. However, it can be challenging to define the right partner and contract terms, while this approach often requires the agri e-commerce business to still perform some level of product verification and fulfilment.

To take control of customer experience, agri e-commerce businesses can also own logistics assets. This increased level of integration can help it meet delivery times and quality standards. However, it risks low utilisation during off-peak times. As the agri e-commerce business gains further control of logistics, it also requires more staff to perform this function.

Warehousing

This may be required to store agricultural produce, especially for perishable produce that must be kept at certain temperatures. For example, Twiga Foods' cold storage facilities have reduced post-harvest wastage to 3–4%, compared with the market average of 30–40%.

In addition to storage, agri e-commerce businesses use warehouses to conduct a number of other activities, such as packaging and aggregating produce from different farmers. This enables agri e-commerce services to fulfil large orders, where there is insufficient supply from one farm. It also enables orders that require produce from different farms to be fulfilled in the same delivery. This is particularly important when selling to buyers such as restaurants, retailers and consumers, which often buy multiple products in the same order. Agri e-commerce services may also use warehouses to grade and package produce ready for transportation to the buyer. However, warehouses represent a significant cost for an agri e-commerce business, with regards to both the building and operational staff. It is possible to reduce this outlay through renting warehouse space within a purpose-built facility.

Quality control

In the traditional agricultural value chain, intermediaries usually take responsibility for quality control. For instance, middlemen reject any produce with obvious defects that they receive from farmers. Likewise, distributors and retailers do this when they acquire produce from sellers. Because agri e-commerce services bypass some or all of these intermediaries, quality control often becomes the responsibility of the agri e-commerce business. Maintaining quality standards is required for high reputation and loyalty in order to acquire and retain customers. Buyers quickly lose trust in platforms that sell defective produce, and bad experiences can spread quickly on social media.

Agri e-commerce businesses can conduct quality control on an individual basis with all farmers, or when they aggregate produce at a purpose-built facility to reduce travel costs. Quality control enables agri e-commerce services to grade produce and discard any defects. Agri e-commerce businesses that connect buyers and sellers, but do not handle produce, may use alternative methods for quality control. For example, they can employ a verification team to check the authenticity of platform listings and contact sellers if they have concerns. This helps to ensure quality, but, as with quality checks at the point of receiving produce, is a labour-intensive process. As a result, platforms such as Izyshop and Lima Links outsource quality control to farmer leaders and farmers. This incurs fewer labour costs, as once platforms train farmers to recognise defects, they become responsible for quality control. However, the risk is that less-skilled farmers do not spot problems and ship low-quality produce, which harms the reputation of the service.

Platform

Several channels may be used to provide customers with access to agri e-commerce platforms. While web and app-based solutions are most common, unstructured supplementary service data (USSD) channels enable agri e-commerce businesses to reach customers that use feature phones. Agri e-commerce businesses require IT capabilities to build and maintain the technology platforms that enable users to buy produce online. Founders of agri e-commerce enterprises, such as FarmFresh and Ricult, have an IT

background – helpful in developing their e-commerce platforms. These skills can reduce IT costs in the initial phase, but platforms must hire more staff with technical skills as the business grows. Moreover, even in the early stages, agri e-commerce businesses need to work with specialist companies that provide data storage and analytics support. This enables agri e-commerce businesses to make data-driven decisions in a range of areas, including customer service, marketing and product development.

Payment facilitation

Another function an agri e-commerce business may perform is payment collection (buyers) and payment distribution (farmers). Primarily, agri e-commerce services push buyers and farmers to use digital payment methods, which helps to streamline the transaction process and reduce the settlement period.

On the buyer side, digital payments provide a quick and convenient way to handle the reversal of payments, which helps agri e-commerce businesses build trust and save money. Nevertheless, online payments increase platform costs through the need for technical integration and commercial arrangements.

Despite rising adoption of mobile money services, financial inclusion remains limited in many developing countries. On average, only 33% of adults in Sub-Saharan Africa have an account at a financial institution.[16] While this figure is higher in Latin America (53%), user distrust restricts mobile money usage. As a result, agri e-commerce businesses may need to make cash payments to farmers and allow buyers to use cash-on-delivery payments. This expands the addressable market and reduces platform costs, but presents other operational challenges. For instance, buyers can return products without making any payment, and there is the risk of theft as delivery drivers carry extra cash. Buyers also delay the delivery process if they are not at home or do not have the cash when the order arrives.

Payments to farmers in cash also come with security and logistical challenges, especially considering farmers' preference for immediate payments. As a result, online represents the preferred payment collection and payment distribution method of agri e-commerce businesses.

Regulation

Agri e-commerce businesses have to comply with the regulatory environment of the countries in which they operate, with agricultural value chains often subject to regulation and government involvement. For instance, the Indian government sets a minimum price on certain agricultural products and requires legal separation between e-commerce businesses and their suppliers. In Indonesia, new legislation requires e-commerce platforms to record the revenue of third-party merchants that use their platforms, then share this data with the authorities. Agri e-commerce businesses may require legal expertise or work with specialist partners for these purposes. This may impact profitability and deter agri e-commerce businesses from attempting to disrupt particular agricultural value chains.

Legislation in the financial sector also adds complexity to the operations of agri e-commerce businesses. For instance, Know Your Customer (KYC) rules limit mobile money adoption among farmers without the necessary identification.[17] For payments to farmers with mobile money accounts, agri e-commerce businesses may also need to comply with strict transaction value limits. This can be challenging for agri e-commerce businesses that trade large quantities of produce. As a result, OTI in Ghana and Tulaa in Kenya use bank transfers for payments that exceed mobile money transaction limits.

16 Global Findex, World Bank, 2017
17 Prerequisites to digitising the agricultural last mile, GSMA mAgri, July 2018

3.3 Revenue models

A consistent and reliable revenue stream is vital in view of the cost of the operational functions that an agri e-commerce business may provide.

Our research shows that the existing revenue streams for an agri e-commerce business can be grouped into five categories: mark-up; commission fees; membership fees; advertising; and insights monetisation.

Mark-up: This is the most common revenue model among agri e-commerce businesses we engaged with as part of this research. Under this revenue model, the online platform applies a margin to the price paid to suppliers. For instance, FarmFresh applies an average mark-up of 10%. By eliminating several intermediaries and improving distribution efficiencies, agri e-commerce businesses using this revenue model are able to offer farmers a higher price for their produce than traditional middlemen, while maintaining the flexibility to target different market segments with differentiated prices.

Commission fees: Agri e-commerce businesses can charge buyers and sellers an additional fee when they complete a transaction on the platform. As commission fees tend to represent a small percentage of the total order value, online platforms require a high volume of transactions to achieve meaningful revenue. For example, RML Ag Tech charged buyers 1–3% of the transaction value during a pilot in India but made the service free for farmers. While this helped to attract a critical mass of farmers onto the platform, it was difficult to retain buyers. After finding reliable suppliers on the platform, some buyers proceeded to make subsequent purchases outside the platform to avoid the commission fees, leading to a decline in transactions on the platform and diminishing the commercial viability of the service.

Membership fees: Although a less common revenue stream in the agri e-commerce sector, services such as RegoPantes offer a membership option for business buyers. This enables buyers to directly access farmers selling on the RegoPantes platform, in order to send specific requests. It is also possible to charge membership fees to sellers, which enable them to list a set amount of products each month, saving them money compared to charging a fee per listing. Membership fees can help agri e-commerce services raise income upfront but can be difficult to sell unless they offer distinct advantages.

Advertising: As well as buyer and seller fees, agri e-commerce businesses can sell product display advertisements on their platforms. For instance, Zambian agri e-commerce business Lima Links sells advertisement space to input companies, which sell products to farmers. Allowing advertisements can supplement or replace other income for agri e-commerce businesses, helping them reduce fees for buyers and sellers. However, advertising is currently not a major revenue source for agri e-commerce services. Most online platforms are in their nascent stage and have insufficient number of users to attract advertisers.

Insights monetisation: The final revenue stream identified in the agri e-commerce sector involves platforms monetising insights from user data for third parties. For instance, Ninayo uses the data it collects regarding a farmer's location, crop type and date of sale to promote agricultural inputs to farmers. The Ninayo logistics team delivers the inputs direct from the warehouse to the farmer, providing high-quality goods at a cheaper price, while collecting a commission. As with the advertising model, this approach allows online platforms to offer a free service to buyers and sellers, helping build a critical mass of users. However, it can take time to build sufficient usage data that can attract third-party companies, many of which want insights from an engaged and loyal user base. A key barrier to this model is the potential for strict customer data sharing laws in some jurisdictions.

A general e-commerce revenue model that could potentially be applied to agri e-commerce is **listing fees**, whereby the agri e-commerce business charges a fee when the seller uploads an item for sale. While this model could provide more certainty around future revenues, given that they are not subject to the completion of a transaction, it is less suitable for agricultural produce. For example, smallholder farmers have limited finances before selling their harvest and are unlikely to be able to afford upfront fees. Ninayo experimented with this revenue in Tanzania but switched to an alternative model.

3.4 Business model analysis

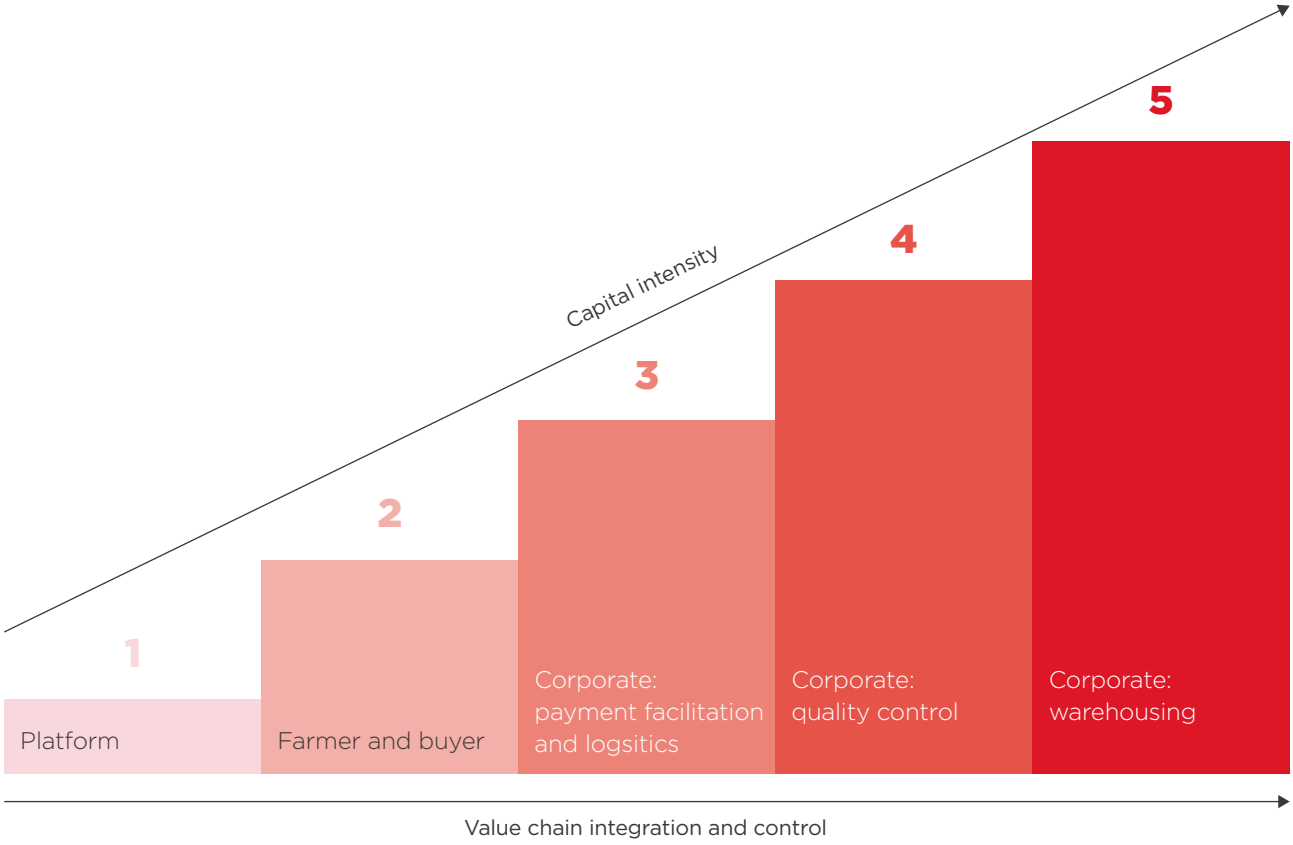
The operational functions of an agri e-commerce business underpin the business model. Specifically, they drive the cost structure and the amount of control the agri e-commerce business has over the value chain, as well as the user experience of farmers and buyers on the platform.

From our research, we have grouped the operational functions and, by extension, business models of agri e-commerce businesses into five levels based on combinations of farmer, buyer and corporate functions.

Most agri e-commerce businesses sit in one of these categories. It is also possible for agri e-commerce businesses to move up or down the scale, depending on market context and commercial objectives.

Figure 8

Business model levels



Source: GSMA Intelligence

Level 1

At the first level, agri e-commerce businesses have an online platform, which provides market linkages between buyers and sellers. Other than this, the agri e-commerce service does not perform any other operational functions.

Pros

- As this business model only requires an online platform, it does not require a large workforce or significant capital outlay. It is therefore very asset-light.

Cons

- Farmers are unlikely to understand or be able to use the service, without outreach activities.
- Higher fraud risk, because payments take place outside the platform.
- Relies on buyers and sellers taking responsibility for key activities, such as logistics and warehousing.

Considerations

- Very difficult to build a critical mass of suppliers and buyers, driven by low awareness and mistrust in the platform. As a result, we did not identify any agri e-commerce services that deploy this business model in our research, highlighting the lack of viability of this model.

Level 2

In addition to providing an online platform, agri e-commerce businesses at this level have staff working on farmer acquisition, as well as marketing and customer care.

Pros

- Build relationships with farmers through acquisition team. Helps with farmer registration and education.
- Higher buyer awareness due to marketing.
- Customer service team helps build user trust.

Cons

- Additional staff raise operational costs.
- Greater risk of fraudulent transactions as payments take place outside the platform.
- Limited control over distribution, with users still responsible for logistics.

Considerations

- Large-scale farmers and businesses often own transport, which can help overcome logistics problems.
- Suitable for commodities, as this type of produce is less variable and often purchased in bulk. This requires less arduous quality control and makes delivery more economical for users, compared to smaller orders.

CASE STUDY

NINAYO

NINAYO

Founded 2015

HQ
Dar es Salaam, Tanzania

Country of operation
Tanzania

Employees
6–20 (depending on season)

Ninayo does not directly generate revenue from the sale of agricultural produce. It does not apply a mark-up to the produce sold on its platform, nor does it charge buyers and sellers a transaction fee. Instead, the business earns revenue through connecting farmers that sell commodities on its platform with input dealers.

Ninayo deploys an asset-light approach to e-commerce; it does not undertake payments, logistics, quality control or warehousing. These functions take place outside the service. Ninayo works with farmers who sell large quantities of crops, such as grain and maize. These crops are well suited to Ninayo's asset-light approach as they are less perishable and variable than other produce. Moreover, agri businesses usually purchase these crops in large quantities and have their own transport.

Farmer acquisition	• Ninayo ambassadors promote and educate local farmers about the service	
Platform	• Ninayo allows users to post buy or sell requests on its platform	• Service connects input dealers with farmers that post sell requests on the platform
Marketing & customer care	• Identifies large agricultural buyers	• Customer service team at HQ in Dar es Salaam

CASE STUDY

Lima Links
live markets. real prices.

LIMA LINKS

Founded 2016

HQ
Lusaka, Zambia

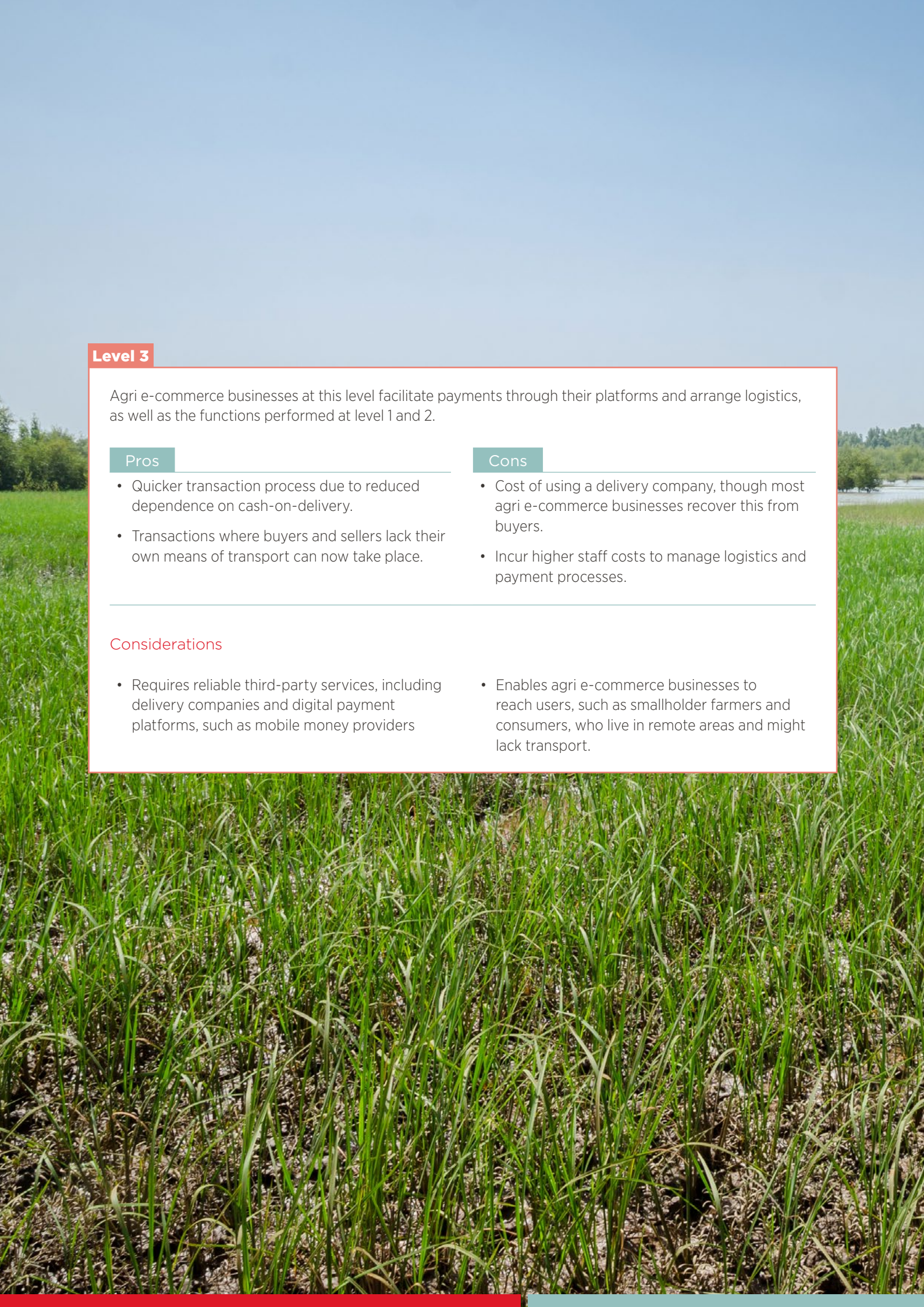
Country of operation
Zambia

Employees
11

Lima Links comprises a market information service as well as an online platform that connects farmers to both input suppliers and commodity buyers of crops. Commodity buyers post their demand on the platform and farmers make contact through the service to initiate a transaction. Building on its initial rollout, Lima Links intends to add features in 2019 to scale the e-commerce service, as it does not yet integrate payment within the platform or arrange order deliveries.

On the input side, Lima Links charges input sellers a subscription fee, which allows them to display advertisements and receive data analytics on farmers' use of the platform. Farmers can request a call back on Lima Links from input companies to arrange an order. Lima Links undertakes field training on its own as well as through partnerships with NGOs and private sector companies.

Farmer acquisition	• With support from local NGOs, Lima Links conducts field training to teach farmers about the advantages of technology and the Lima Links service	
Platform	• Lima Links employs a technology team to build and maintain its platform	• It does not integrate payments within its platform, which remain at the disposition of the buyer and seller.
Marketing & customer care	• Runs marketing campaigns on radio and television	• Customer service team to support users, though logistics and other activities remain outside the platform



Level 3

Agri e-commerce businesses at this level facilitate payments through their platforms and arrange logistics, as well as the functions performed at level 1 and 2.

Pros

- Quicker transaction process due to reduced dependence on cash-on-delivery.
- Transactions where buyers and sellers lack their own means of transport can now take place.

Cons

- Cost of using a delivery company, though most agri e-commerce businesses recover this from buyers.
- Incur higher staff costs to manage logistics and payment processes.

Considerations

- Requires reliable third-party services, including delivery companies and digital payment platforms, such as mobile money providers
- Enables agri e-commerce businesses to reach users, such as smallholder farmers and consumers, who live in remote areas and might lack transport.

CASE STUDY

FARMFRESH

Founded 2014

HQ Serekunda, Gambia

Country of operation
Gambia

Employees 5

KPIs
Over 300 registered customers

FarmFresh is The Gambia's first online grocery store. It sells fruit and vegetables directly sourced from around 20 local farmers to local consumers. More than 90% of FarmFresh's orders come from outside The Gambia, as people living abroad send fresh fruit and vegetables to friends and family living in the country. This allows FarmFresh to negate many of the barriers to agri e-commerce in The Gambia, such as lack of financial inclusion, low mobile internet penetration and the small size of the middle class. Overall, FarmFresh highlights an asset-medium approach, with an innovative marketing strategy to overcome agri e-commerce barriers.

Farmer acquisition	• Staff visit farmers to explain their service and highlight the necessary quality standards	• FarmFresh applies a 10% mark-up on the price it pays farmers for produce, to cover the cost of delivery to consumers as well as other overheads
Platform	• Buyers access FarmFresh's website to purchase produce from farmers	
Marketing & customer care	• Uses social media and word-of-mouth to target family and friends of people living in The Gambia that have moved abroad and send remittance back home	
Payment facilitation	• FarmFresh integrates a range of online payment methods into its platform, including PayPal	• Customers can also pay cash-on-delivery
Logistics	• FarmFresh arranges two local delivery services to collect orders from farmers twice per week and deliver straight to consumers	• Farmers responsible for quality control and packing

CASE STUDY

RICULT

Founded 2016

HQ Boston, USA

Countries of operation
Pakistan and Thailand

Employees 36

KPIs 35,000 registered farmers

Ricult is an end-to-end platform that supplies farmers with agricultural inputs and credit, as well as access to buyers at mills. Farmers use the Ricult app to send a map of their farm, as well as GPS location, which Ricult uses to receive satellite imagery of the farm. This information enables Ricult's algorithm to then recommend the optimal types of input based on local conditions, in addition to specific agricultural advice at the time of planting. This customised approach, designed by Ricult's team of MIT graduates in the US, allows farmers to increase productivity and maximise production volumes. Through the data it collects, Ricult knows when a farmer is ready to harvest and uses this information to help fulfil buyers' orders for commodities, such as maize, wheat and cassava.

Farmer acquisition

- Employs operational teams in Pakistan and Thailand, supported by partnerships with local stakeholders such as mobile operators and banks, to oversee farmer selection and education

Platform

- Farmers access the Ricult platform through an app, which lets them view agronomic advice, request loans and acquire agricultural inputs
- Buyers use the platform to view stock and place orders

Marketing & customer care

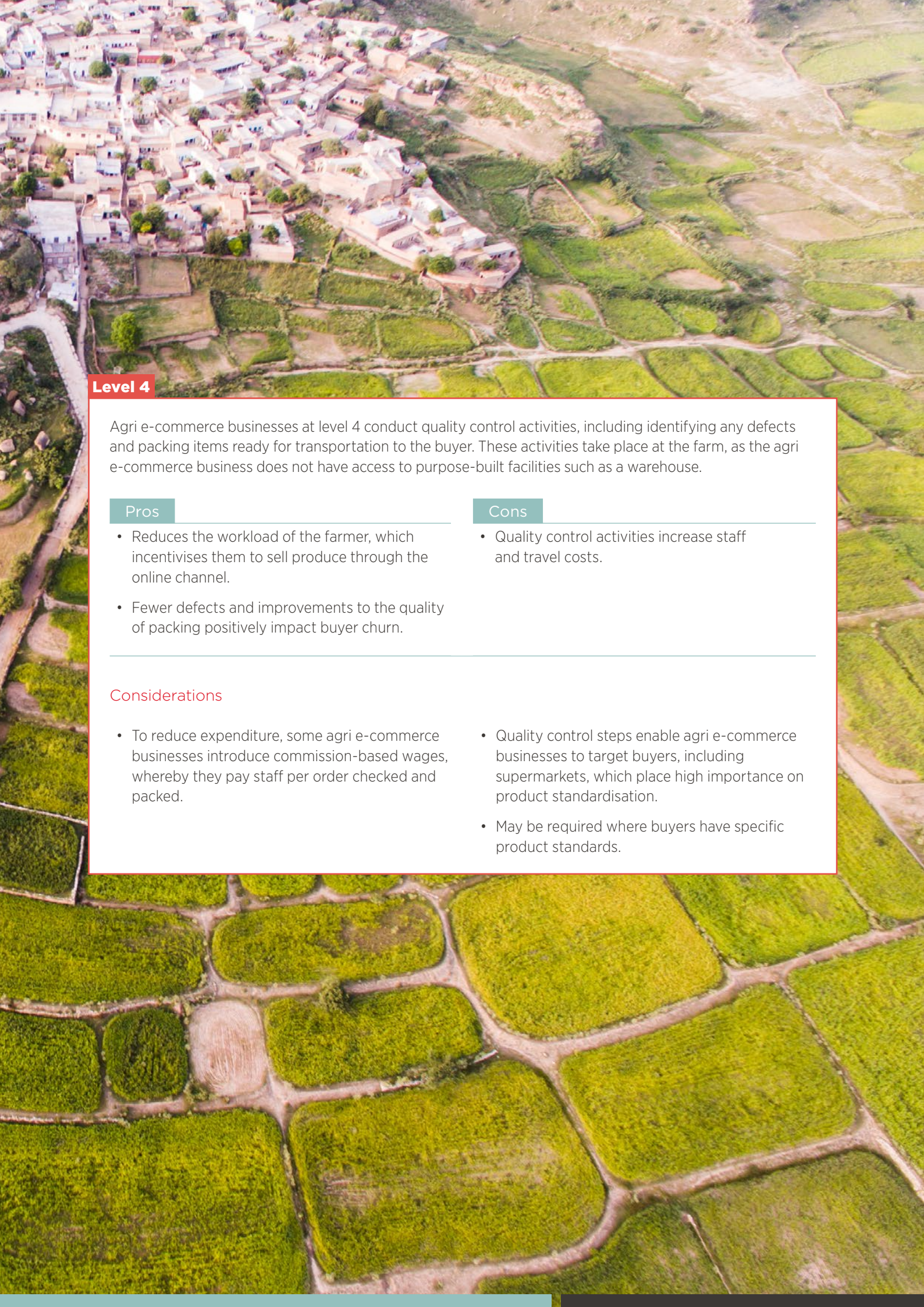
- Launched SMS marketing campaigns, as well as TV and radio advertisements
- Operational teams also assist with customer service

Payment facilitation

- Ricult's application facilitates mobile money payments to farmers and buyers

Logistics

- Ricult uses third-party logistics services to pack and deliver items
- Buyers on Ricult bear the cost of logistics



Level 4

Agri e-commerce businesses at level 4 conduct quality control activities, including identifying any defects and packing items ready for transportation to the buyer. These activities take place at the farm, as the agri e-commerce business does not have access to purpose-built facilities such as a warehouse.

Pros

- Reduces the workload of the farmer, which incentivises them to sell produce through the online channel.
- Fewer defects and improvements to the quality of packing positively impact buyer churn.

Cons

- Quality control activities increase staff and travel costs.

Considerations

- To reduce expenditure, some agri e-commerce businesses introduce commission-based wages, whereby they pay staff per order checked and packed.
- Quality control steps enable agri e-commerce businesses to target buyers, including supermarkets, which place high importance on product standardisation.
- May be required where buyers have specific product standards.

CASE STUDY

TULAA

Founded 2017

HQ Nairobi, Kenya

Country of operation
Kenya

KPIs 15,000 registered farmers

Tulaa provides smallholder farmers with inputs on credit, agronomic advice and market linkage. The company currently focuses on horticultural crops such as potato, tomato and onion. Tulaa's approach layers its online platform, which enables farmers to order inputs and buyers to place orders for produce, onto networks of commissioned agents with Tulaa's Android application. These transactions are also supported by a call centre in Tulaa's headquarters. Tulaa's main fixed costs are staff and the development and maintenance of its technology platform. Most other costs are variable, such as agent commission.

Since launch, Tulaa has sold more than $500,000 in agricultural inputs. It aims to issue 4,000 loans to smallholders in 2019 and record over 300 transactions with buyers.

Farmer acquisition	• Tulaa's field agents identify farmers that can fulfil orders, many of whom have already taken loans from Tulaa for inputs	
Platform	• Buyers use the platform to make orders, while farmers receive notifications via the app	• Tulaa's agents use the online platform to identify suppliers, negotiate prices and sign short-term contracts to fulfil orders
Marketing & customer care	• Tulaa's head office team raises awareness of Tulaa's service among potential buyers of agricultural produce	
Payment facilitation	• Buyers pay Tulaa through bank transfer or mobile money	• Tulaa uses mobile money to pay farmers and agents
Logistics	• When the buyer is unable to provide transport, Tulaa arranges logistics with	third-party delivery services and includes that cost in its pricing
Quality control	• Tulaa's agents oversee the harvest, as well as packing and processing of orders.	This takes place at the farm, because Tulaa does not own a warehouse, to remain asset-light

CASE STUDY

IZY SHOP

Founded 2015

HQ Maputo, Mozambique

Country of operation
Mozambique

Employees 12

KPIs 153 registered farmers

Izyshop is Mozambique's first online supermarket. It lists a wide range of food and drink on its website, and sells fruit and vegetable boxes sourced directly from farmers. Consumers purchase these boxes on a subscription basis, receiving on average two boxes per week. Produce purchased through this method is fresher than supermarket produce that passes through several intermediaries, and also helps support rural farmers in Mozambique that must compete with produce imported from South Africa. It is also more convenient for the consumer, with the boxes popular with the middle-class urban population.

Smallholder farmers that sell produce via this method earn more than $100 per month, compared to the average monthly income of $18–20 for smallholder farmers in Mozambique.

Farmer acquisition

- Izyshop works with farmer leaders to reach local farmers and educate them about the service

Platform

- Consumers make orders through Izyshop's website
- Farmer leaders receive the order on their mobile phones

Marketing & customer care

- Izyshop raises awareness of the service through social media and word-of-mouth

Payment facilitation

- Mobile money is used to pay farmer leaders, who then share it between smallholder farmers

Logistics

- Izyshop arranges for a third-party delivery service to collect the order and deliver it directly to the consumer

Quality control

- Farmer leaders are responsible for quality control. This includes aggregating, checking and packing the produce from different smallholder farmers

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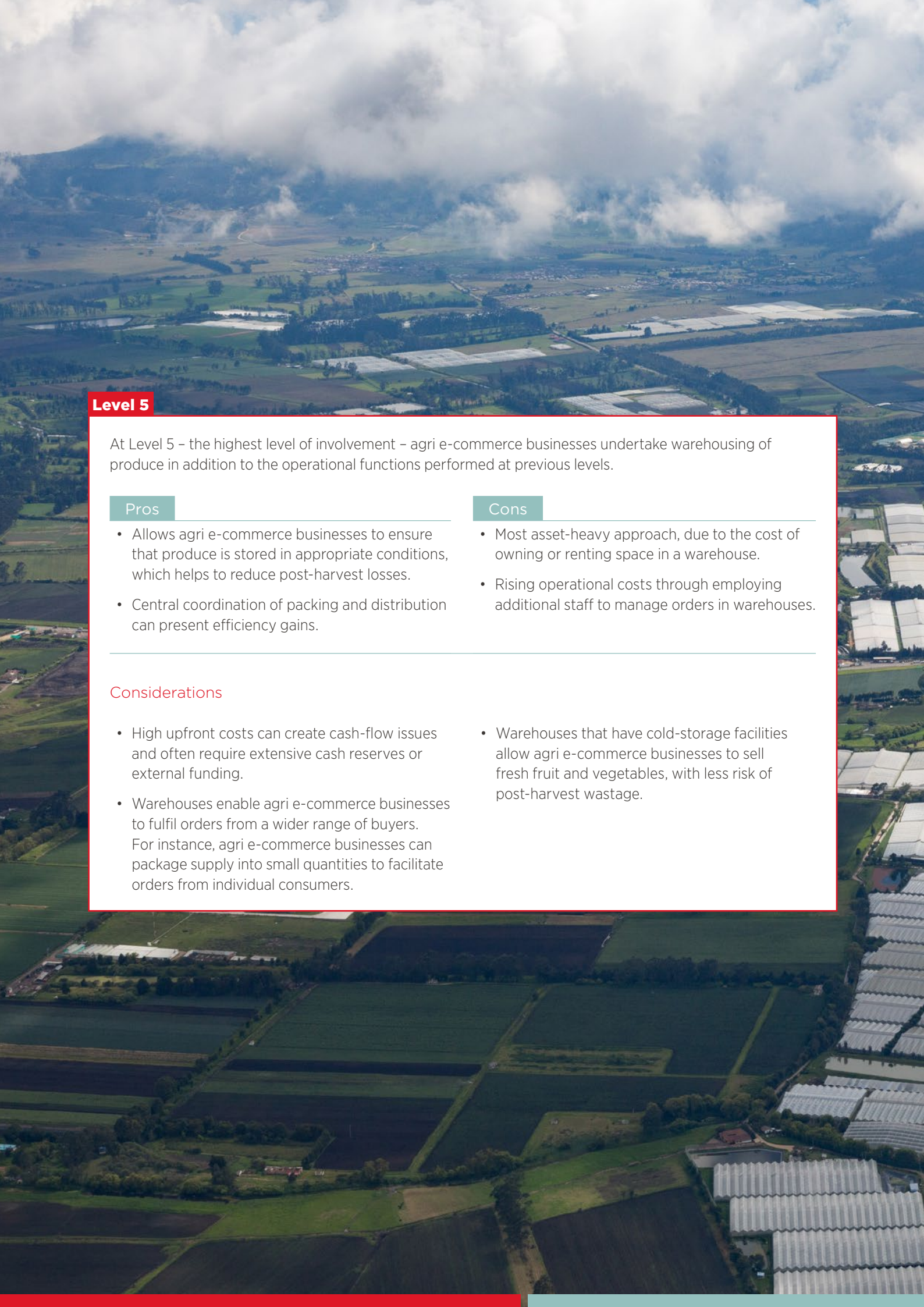

Level 5

At Level 5 – the highest level of involvement – agri e-commerce businesses undertake warehousing of produce in addition to the operational functions performed at previous levels.

Pros

- Allows agri e-commerce businesses to ensure that produce is stored in appropriate conditions, which helps to reduce post-harvest losses.
- Central coordination of packing and distribution can present efficiency gains.

Cons

- Most asset-heavy approach, due to the cost of owning or renting space in a warehouse.
- Rising operational costs through employing additional staff to manage orders in warehouses.

Considerations

- High upfront costs can create cash-flow issues and often require extensive cash reserves or external funding.
- Warehouses enable agri e-commerce businesses to fulfil orders from a wider range of buyers. For instance, agri e-commerce businesses can package supply into small quantities to facilitate orders from individual consumers.
- Warehouses that have cold-storage facilities allow agri e-commerce businesses to sell fresh fruit and vegetables, with less risk of post-harvest wastage.

CASE STUDY

MUCHO

Founded 2014

HQ Bogotá, Colombia

Countries of operation
Colombia and UK

Employees 10

KPIs 66 producers (includes smallholders and farmer associations), 37 active restaurants and over 3000 app downloads (June 2018–March 2019).

Mucho launched in the UK with an app that generates personalised recipe ideas based on lifestyle, health and sustainability criteria, and puts together a corresponding shopping list of ingredients. The app then connects users to online retailers to purchase ingredients. In 2018, Mucho expanded to Colombia where it sells recipe kits and groceries to consumers through the Mucho platform. Unlike in the UK, Mucho's Colombian business sources ingredients directly from producers and takes care of logistics, payments and other operational functions. As well as consumers, Mucho also sells ingredients to restaurants in Colombia. This helps Mucho generate sufficient order volume to facilitate the delivery from producers in rural areas to buyers in Bogotá and Medellin.

Mucho only lists produce on its platform that follows sustainable farming practices, guarantees a fair price to producers and showcases Colombia's biodiversity. Mucho also pays producers within eight days of their order, compared with the typical 30 to 60 day period used by supermarkets. In addition, Mucho helps producers improve their productivity through partnerships with NGOs. As a result, Mucho achieves high retention rates among its producers.

Farmer acquisition	• Mucho works with NGOs, government agencies and chefs to identify local producers with sustainable farming practices	• Mucho staff visit farmers to demonstrate the online platform and identify shortcomings
Platform	• Restaurants order produce through Whatsapp	• Consumers use the Mucho app and website, as well as Instagram, to place orders
Marketing & customer care	• Mucho performs many marketing activities, from social media to events and magazines	• Customer service provided through its online platform
Payment facilitation	• Mucho uses the ePayco payment gateway to facilitate online orders	• It pays producers through mobile banking
Logistics	• Mucho arranges delivery through contracts with third-party logistics services	• It charges buyers a flat fee for delivery
Quality control	• Mucho grades produce in terms of taste, nutrition, social, environmental impact. Mucho aims to make this tool public in 2019	• Chefs at the restaurants that order through Mucho help check the quality of the produce
Warehousing	• Mucho stores fresh produce for a maximum of 2–3 days in its warehouse	

CASE STUDY

TWIGA FOODS

Founded 2014

HQ Nairobi, Kenya

Country of operation Kenya

Employees 600

KPIs 2,500 deliveries per day

Twiga Foods aggregates produce from smallholder farmers, to sell fresh fruit and vegetables to small and medium-sized retailers. It aims to sell produce at a similar price to the market traders where retailers also buy inventory, but with the added benefits of convenience and consistent quality.

Twiga Foods has invested heavily to build its own distribution network, enabling the agri e-commerce service to have greater control over customer experience. This creates a barrier to market entry, helping protect Twiga's long-term position. In order to fund these investments, Twiga Foods secured a $24 million investment from venture-capital funds, following use of grants and other soft finance required to prove the operational model.

Farmer acquisition	• Staff visit farmers to assess quality	• Twiga registers farmers that meet its quality standard
Platform	• Retailers use online platform to book orders	• Farmers receive notifications of orders via platform
Marketing & customer care	• Sales team identify potential retail buyers	• Customer service team at HQ in Nairobi
Payment facilitation	• Retailers pay Twiga through mobile money or cash on delivery	• Twiga uses mobile money to pay farmers
Logistics	• Uses local logistics services to collect produce from farms	• Twiga owns delivery vehicles that transport produce from warehouses to retailers
Quality control	• Twiga Staff receive produce and conduct quality assurance checks	• Grade produce by quality
Warehousing	• Cold storage facilities allow produce to be kept in appropriate conditions	

CASE STUDY

TANIHUB

Founded 2015

HQ Jakarta, Indonesia

Country of operation Indonesia

Employees 138

KPIs 16,000 farmers registered (TaniHub and TaniFund).

TaniHub connects smallholder farmers with a range of business buyers, including hotels, restaurants and retailers. It sells fresh fruit and vegetables, as well as meat and fish. Initially, TaniHub sold its produce on Indonesian e-commerce platforms, such as Tokopedia, before creating its own app for buyers to purchase produce directly from TaniHub. This change increased the importance of TaniHub's sales and marketing activities for directing buyers to its platform.

TaniHub is part of the wider TaniGroup, which includes crowdfunding platform TaniFund. TaniFund links investors to farmers, allowing producers to gain affordable credit to buy agricultural inputs. TaniHub has received funding through angel investors to build its own distribution network.

Farmer acquisition	• Staff visit well-known farmer regions	• Government agencies also connect TaniHub to farmers
Platform	• Online platform connects farmers to business buyers	
Marketing & customer care	• Use sales team, as well as social media	• Promote freshness of its produce, mainly to urban buyers willing to pay more for a premium product
Payment facilitation	• TaniHub allows payments through the platform or in cash	
Logistics	• TaniHub uses a mix of third-party delivery services and its own vehicles to distribute produce to customers	
Quality control	• Staff check quality and grade produce in order to meet buyer requirements.	For example, supermarkets impose strict conditions on size and weight
Warehousing	• After the quality checks, TaniHub packages items ready for delivery	• Packages stored at one of TaniHub's four cold-storage warehouses

CASE STUDY

REGOPANTES

Founded 2018

HQ West Java, Indonesia

Country of operation Indonesia

Employees 16
(70 including 8villages)

KPIs 9,500 farmers registered

RegoPantes operates in Indonesia, where high levels of mobile internet penetration and urbanisation have created a flourishing agri e-commerce industry, with the country scoring highly in our Market Attractiveness Index.

RegoPantes is part of the PT 8villages Indonesia business group, which provides mobile solutions to farmers. RegoPantes is the name of 8villages' e-commerce platform that allows farmers to sell fruit and vegetables. It is free to access for farmers, while buyers pay a transaction fee on each order. RegoPantes targets consumers that want fresher produce and are willing to pay more to improve the lives of local farmers. In 2019, RegoPantes has extended the reach of its platform to business buyers.

Farmer acquisition	• Selects farmers via 8villages' community platform and government agencies	• Farmer acquisition costs less than $1 per farmer
Platform	• Consumers use online platform to order produce	• Consumers can contact farmers directly on the platform
Marketing & customer care	• Relied upon word-of-mouth to date	• Plan to increase marketing spend, driven by social media
Payment facilitation	• RegoPantes pays farmers through bank transfer as well as mobile money	• Online payments and cash-on-delivery option available to buyers
Logistics	• Farmers deliver produce to collection hub or warehouse	• 8villages' logistics platform organises third-party services to transport produce from the warehouse to the consumer
Quality control	• Perform quality checks at warehouse	
Warehousing	• Staff select items from different farmers to prepare orders	• Package items ready for delivery

3.5 International markets

The majority of agri e-commerce businesses sell domestically, but agri e-commerce also enables farmers to reach international buyers. An agri e-commerce business can target a limited number of international markets, or open their business to buyers globally. Opening an agri e-commerce service to the global markets creates opportunities to reach more buyers, though it requires a greater amount of internal organisation and considerations as highlighted below.

Regulation and compliance: Agri e-commerce businesses need to adhere to additional regulation, comply with existing trade agreements between nations, and adhere to food safety standards in foreign countries. In some cases, exporters require certification, such as product visas, which could incur additional processing costs and admin. For example, e-commerce platform James Tyler has a customs and clearance team in China, while OTI employs export managers in Ghana to manage compliance in export markets. To minimise staff costs in this area, OTI works with large companies in export markets that can advise on local laws.

Logistics: The complexity of this depends on the sophistication of the logistics infrastructure in both the local and export market, as well as the volume of goods. Where there is an established trade route between nations and advanced last-mile infrastructure in the export country, it is possible to serve a wide-range of buyers in different locations. For instance, James Tyler sells perishable goods to individual buyers in several parts of China. It benefits from an established trade route between Australia and China, combined with the presence of cold-chain logistics solutions plus regional distribution centres and warehouses. On the other hand, international logistics can be more challenging for OTI's domestic location in Ghana. Air cargo from Ghana to OTI's export markets, such as New Zealand and Turkey, is expensive, so OTI looks to send orders by sea. This has its own challenges due to the lack of direct shipping routes between Ghana and several key countries OTI exports to, meaning deliveries can take up to 60 days.

Building trust and brand awareness: Cross-border agri e-commerce businesses need to win the trust of foreign buyers, which may be challenging where the buyer has an existing relationship with domestic sellers. To overcome this, exporters need to build personal connections through networking events, such as trade conferences. It is also beneficial to have a local team in the export country. For instance, OTI has an office in Saudi Arabia where it supplies cocoa butter and shea butter. Similarly, James Tyler employs brand marketing and customer service teams in China, as well as a network of sellers in Australia that have connections with Chinese buyers. In many cases, agri e-commerce businesses target a select number of countries to start, before expanding to other countries as each export market comes with specific regulation and other challenges.

A key driver of cross-border agri e-commerce is the opportunity to sell to a wider range of buyers, especially when there is greater demand internationally for particular produce than in the domestic market. For instance, Ghana-based OTI perceives the export model to be particularly important for the more niche items it sells, such as fonio,[18] which attracts a higher value among international buyers than domestic buyers. For agri e-commerce businesses in developing regions, international markets may also offer better sales prospects due to more advanced e-commerce enablers, such as internet connectivity and digital payment facilities. Our Market Attractiveness Index (see Chapter 2) highlights how significantly these enablers vary across regions. The success of agri e-commerce services that sell to international markets can spur more enterprises in developing regions to consider an export model, helping develop international logistics networks.

18 A grain with a nutty flavour – a cross between couscous and quinoa. It is often used in salads, stews and porridges.

CASE STUDY

JAMES TYLER

PURVEYORS OF FINE FOOD

JAMES TYLER

Founded 2012

HQ Sydney, Australia

Country of operation China

KPIs 20 registered farmers; 75,000+ unique customers in China

James Tyler sells farm produce from farms in Australia and New Zealand to consumers in China through third-party platforms. It uses a network of Chinese shoppers living in Australia and New Zealand, known as Daigou, to reach buyers in China on third-party platforms. James Tyler anticipates that more agri e-commerce services will use networks like Daigous to sell produce, as individual sellers gain more influence through social media.

Selling on third-party platforms enables agri e-commerce services to forego expenditure on building a technology platform but requires investment elsewhere in order to stand out amid a wide selection of other third-party sellers. Third-party platforms enable agri e-commerce businesses to reach buyers in international markets.

Farmer acquisition	• James Tyler has a network of farmers in Australia and New Zealand	• Farmers contact James Tyler through its website
Platform	• Uses third-party platforms, such as Tencent's WeChat and Alibaba's C2C platform Taobao and B2C platform T-Mall	
Marketing & customer care	• Engages a network of shoppers, known as Daigou, who live in Australia and sell James Tyler produce on Taobao and WeChat	• James Tyler provides 24/7 customer care
Payment facilitation	• Third-party platforms integrate online payments	
Logistics	• Uses a cold-chain logistics solution, which it organises for farmers looking to reach consumers in China	
Quality control	• Perform quality checks in China at the warehouse where it stores produce	
Warehousing	• As well as a warehouse, it operates three regional distribution centres in China	

CASE STUDY

ORGANIC TRADE & INVESTMENTS (OTI)

Founded 2017

HQ Accra, Ghana

Countries of operation Several

Employees 5 full-time staff (+ part-time support team)

KPIs Over 80 clients; 20,000+ products sold

OTI aims to promote Ghanaian produce internationally, selling to distributors in many countries including Canada, China, Egypt, Japan, Mauritius, Saudi Arabia, South Africa and the UK. International logistics can be challenging in Ghana. Air cargo is very expensive for large items, so OTI looks to send orders by sea. This can also be problematic because Ghana lacks direct shipping routes to several key countries, which means deliveries can take up to 60 days. Due to this challenge, in some cases, deals to certain countries have to be cancelled, mostly for perishable goods.

Farmer acquisition

- Identifies large-scale farmers that can meet large volume orders
- A supplier Code of Conduct is signed with farmers / producers

Platform

- Online platform enables buyers to view produce, learn about organic farming and order samples

Marketing & customer care

- Raises awareness through social media, trade conferences and outbound sales

Payment facilitation

- OTI's website allows online payments

Logistics

- Arranges third-party delivery services to collect produce from the farm and transport it to the port or airport

Quality control

- Conducts monitoring and evaluation checks at farms (before sourcing the produce)

Warehousing

- Stores orders in its own warehouse or the warehouses of logistics companies

3.6 Role of mobile operators in agri e-commerce

Mobile operators have been central to the adoption of mobile-enabled solutions in the agricultural sector. In addition to extensive rural connectivity, mobile operators have led the deployment of mobile money and agri tech solutions that provide valuable content, advice and weather information. Mobile operators also participate in digitising procurement from smallholders, creating transparency and digital records in agricultural value chains.

Examples include the following:

- **Pakistan –** Telenor's Khushaal Zamindar voice service, available on short code 7272, provides agricultural and livestock advice, as well as weather forecasts to more than 5 million active users.[19]
- **Bangladesh –** Grameenphone's Krishi Sheba gives users access to seasonal agricultural content, from planting to post-harvest.
- **Malawi –** Airtel's M'Chikumbe provides farmers with information on agriculture and Airtel Money via interactive voice response (IVR) and SMS. It has more than 700,000 users.
- **Myanmar –** Ooredoo's Site Pyo is a weather and agriculture app, with more than 300,000 users.
- **Ghana –** MTN's mAgric is a mobile-based tool that enables the digitisation of the entire procurement process in the agricultural last mile. It supports farmer registration and mobile money payments from agri businesses to farmers, as well as data analytics and monitoring for agri businesses. [20]

Looking ahead, agri e-commerce has the potential to become the next frontier of mobile-enabled solutions in the agricultural sector, with significant benefits for rural farmers and their communities. There are various strategies available for mobile operators to take advantage of this emerging opportunity, as highlighted below.

19 Khushaal Zamindar: A mobile agriculture service by Telenor Pakistan, GSMA, July 2017
20 Digitising the agricultural last mile in Ghana: MTN Mobile Money's mAgric, GSMA, April 2019

A) LAUNCH MOBILE OPERATOR-LED AGRI E-COMMERCE BUSINESS

Mobile operators can launch their own agri e-commerce services. In 2009, Sri Lankan mobile operator Dialog introduced its agri e-commerce service Tradenet, connecting farmers with large wholesale buyers. The service was free for sellers, but buyers incurred a small charge on each transaction. Dialog integrated its mobile money service eZ Cash into Tradenet to support transactions through the platform.

However, after three years, Dialog discontinued Tradenet due to low take-up. While Dialog helped farmers establish pricing on Tradenet through information from GoviGnanaSeva (GGS), a government initiative that provided price information on agricultural items, it required further collaboration in other areas. For instance, it was difficult for buyers and sellers in different parts of Sri Lanka to transact, as Tradenet did not provide logistics support to users. This highlights the need for operators to form credible partnerships in areas that require significant investment, such as logistics. Safaricom in Kenya supports the delivery of fruit, vegetables and dairy products through its Masoko e-commerce marketplace. The service, known as Masoko Fresh, sells produce from a range of third-party merchants, including local retailer Beyond Fruits. Safaricom has already established relationships with third-party logistics services and integrated M-Pesa within the platform, highlighting that some of the key elements are in place to begin selling fresh produce.

Telenor Pakistan's Connected Agriculture Platform for Punjab (CAPP)

Telenor Pakistan launched CAPP in collaboration with Punjab's Department of Agriculture. Introduced in March 2018, the platform provides farmers with a range of digital solutions, including access to agricultural information, financial credit and inputs. CAPP also includes e-Mandi, an agri e-commerce service that allows smallholder farmers to upload details of produce they have for sale.

There are more than 75,000 farmers on CAPP, but only 2,494 items have been uploaded for sale on e-Mandi in the nine months since it launched. The platform currently lacks support for payment and logistics, and remains free for both buyers and sellers to use. While collaboration with government agencies can help build farmer supply, mobile operators also need to select one of the three strategies outlined to develop a commercially viable proposition.

Pros

- Capture the full value of agri e-commerce revenues.
- Full control over key elements, including the business model and revenue streams.
- Leverage existing brand, buyers and routes to market.
- Easier to integrate operator's own mobile money service, which increases adoption and use of operator's mobile money service.
- Acquire new mobile customers through providing relevant services.
- Increase mobile network usage.
- Ability to integrate with other relevant product offerings.

Cons

- Significant capital outlay to introduce new service.
- Lack of organisational experience and knowledge in the agricultural and e-commerce sectors.
- Requires a cultural shift to increase organisational agility and flexibility, due to the pace of change in the e-commerce sector.
- Limited organisational capacity to expand activities beyond core connectivity business. This requires the recruitment of additional staff, particularly during peak times.
- Full exposure to market risks, including reputational risks.

B) FORM A STRATEGIC RELATIONSHIP WITH AN EXISTING AGRI E-COMMERCE BUSINESS

Mobile operators without a financial stake in an agri e-commerce business can also play a role in the space by using their assets to support an existing agri e-commerce business. These assets include an established customer base and distribution network, a reputable brand, local market knowledge, existing relationships with local banks and governments, and customer/transaction data to identify fraudulent transactions.[21]

Pros

- Lower costs for the mobile operator, compared with launching own agri e-commerce service.
- Differentiates the mobile operator's preferred agri e-commerce partner, as it is the only business in the sector with access to the mobile operator's assets.
- Allows the mobile operator and agri e-commerce business to form a deeper relationship, where mobile operators provide strategic support.
- Drive mobile money usage and adoption through service integration.
- Acquire new mobile customers through providing relevant services.
- Increase mobile network usage.

Cons

- Partnering with a single agri e-commerce business could see the mobile operators miss out on more attractive investments in the sector.
- Limits the opportunity to grow mobile money usage if the service is integrated with only one agri e-commerce platform.

There are several examples of where mobile operators and agri e-commerce businesses have collaborated:

- **API integrations:** Several mobile operators, including Airtel Zambia and Orange Senegal, have provided agri e-commerce services with access to APIs to integrate SMS and USSD features into their platforms. This allows farmers without internet-enabled devices to use agri e-commerce services, which is important in countries where the majority of farmers rely on feature phones. USSD is simpler for farmers to use than SMS, but agri e-commerce businesses may be required to pay an upfront cost and regular maintenance fee to mobile operators.
- **Accelerator programmes:** Mobile operators can also support agri e-commerce start-ups through their accelerator programmes. For instance, Colombian agri e-commerce business Agruppa participated in the start-up accelerator of Telefonica Open Future, and in Thailand, Ricult joined a similar programme at DTAC. These programmes provide formal training and support to local start-ups, as well as financial support, helping them finance business plans and grow their customer base. Mobile operators can also use their existing connections to introduce agri e-commerce businesses to other investors and stakeholders in the market.
- **Distribution points:** With large and widespread distribution networks, mobile money providers can position themselves as partners to improve the efficiency of order deliveries. Safaricom's Masako service demonstrates the "order and pick up" model, whereby users order, pay, pick up and return at a mobile money agent outlet.

21 Online Marketplace and Merchant-centric Services as a Driver of the Platform Model, GSMA, March 2019

C) ENABLE SEVERAL EXISTING AGRI E-COMMERCE BUSINESSES

Instead of lending support to only one agri e-commerce business, mobile operators can provide the aforementioned assets to multiple companies in the industry. In Thailand, mobile operator DTAC has provided marketing and product development assistance to Ricult, and supported fellow agri e-commerce business Freshket through its accelerator programme. Mobile operator Moov will apply a similar approach in Togo and integrate its mobile money solution within multiple platforms. [22]

Pros

- Reduces mobile operator expenditure compared to launching operator-led service.
- Enables the mobile operator to work with agri e-commerce businesses that sell different types of produce and target separate customer segments.
- Integrating operator-led mobile money services can drive adoption and usage.
- Acquire new mobile customers through helping to deliver relevant services.
- Increase mobile network usage.

Cons

- Working with several agri e-commerce businesses poses a risk to the mobile operator's brand, as two businesses might not share the same values.
- Additional legal work and due diligence required to enable the right partners and terms.
- Potential conflict of interest if the mobile operator works with several agri e-commerce providers. This prevents deeper collaboration between the two firms.
- Lack of relevant partners in markets where there is a weak agricultural or e-commerce ecosystem.

Mobile money and agri e-commerce

On average, mobile money customers transact $188 per month, driven by cash-in and cash-out transactions as well as P2P transfers. To drive future growth, mobile money providers are looking to new use cases, such as facilitating e-commerce transactions. The integration of operator-led mobile money services is therefore vital to all the operator strategies we have highlighted.[23]

Mobile money enables agri e-commerce businesses to reduce a customer's reliance on cash-on-delivery payments, which are expensive, inefficient and time-consuming for both agri e-commerce businesses and customers. Mobile money presents a compelling solution, particularly in countries with low card penetration. In markets where it is already established, mobile money could become a key enabler of e-commerce payments.

In addition to helping reduce the proportion of cash-on-delivery payments, the successful integration of mobile money services into agri e-commerce platforms builds user trust. For instance, payments via mobile money help streamline the settlement process between customers and agri e-commerce providers. Mobile money services also provide a convenient way to handle the reversal of payments, such as through digital reimbursements into a mobile money account. Providing timely information about transaction limits and account balances allows mobile money services to further increase trust.[20]

As well as customer payments, agri e-commerce businesses use mobile money to facilitate farmer payments, which enables farmers to receive money for their produce more quickly and securely compared with cash payments. Farmers often visit mobile money agents to cash out a large part of their payments to fulfil non-digital transactions. This threatens the liquidity of mobile money networks, though providers can take several measures to minimise risk.

Integration with agri e-commerce platforms provides substantial benefits to operator-led mobile money services. Twiga Foods delivers 2,500 orders per day, with the majority of these paid through Safaricom's M-Pesa, which increases mobile money activity levels and provides a new use case to help with user acquisition. Meanwhile, Ricult has more than 35,000 farmers on its platform in Pakistan and Thailand; farmers are paid through mobile money services within 48 hours of the order.

22 Online Marketplace and Merchant-centric Services as a Driver of the Platform Model, GSMA, March 2019
23 Prerequisites to digitising the agricultural last mile, GSMA mAgri, July 2018

3.7 Risks to outlook

Despite the significant potential of agri e-commerce services, there are notable risks and barriers to success that agri e-commerce businesses and other stakeholders (such as mobile operators and investors) must consider. These include the following;

- **Logistics:** Agri e-commerce requires a logistics network to facilitate the physical movement of goods. A lack of logistics infrastructure increases costs for agri e-commerce businesses and prevents the expansion of services into new regions. The World Bank's Logistics Performance Index highlights that logistics is particularly a problem in developing countries. Sub-Saharan Africa scored 2.45 (out of a possible 5) in 2018, with countries such as Ghana and Nigeria ranked 113 and 125 out of 163 countries, respectively. Logistics is particularly complex for e-commerce businesses in the agricultural sector. The frequency of transactions is greater than in many other industries. In addition, many grocery items are perishable so can only be stored for a limited period of time. Grocery items also degrade in quality during transit, which exacerbates when buyers return products. For these reasons, e-commerce businesses in agriculture usually require scale in logistics at a city level, rather than national level, requiring significant investment and partnerships with specialist delivery firms.
- **Perishability:** Agricultural produce, such as fresh fruit and vegetables, can only be stored for a limited time before it deteriorates in quality. As a result, agri e-commerce businesses must be able to balance supply and demand on their platforms. They require a sufficient number of items to attract buyers, and, at the same, enough buyers to purchase the items for sale before they perish. To achieve this balance agri e-commerce businesses need reliable sellers, as well as an appropriate marketing strategy to stimulate demand.

- **Customer preferences:** Agricultural produce is different to other product categories such as electrical or household items, which are consistent in physical appearance. Fresh fruit and vegetables vary in quality and size, depending on factors such as age, batch and transportation method. Because it is not always possible to examine these differences when shopping online, some buyers are reluctant to switch to agri e-commerce services.
- **Reliance on middlemen:** Farmers depend on middlemen for support beyond selling their produce. For example, many farmers use middlemen to transport their produce to markets and auctions. In addition, middlemen often provide farmers with loans to buy agricultural inputs and cover personal expenses, which further obligates farmers to continue selling produce to these intermediaries. Farmers also have personal relationships with middlemen, who are often important figures in local communities. Overall, the various roles played by middlemen restrict farmers from considering alternative ways to sell their produce. Where smallholders work with farmer leaders to supply agri e-commerce platforms, there is a risk that farmer leaders simply replace the middleman role. This limits the benefits of agri e-commerce for individual farmers.
- **Cash-on-delivery payments:** In many developing regions, there is a high degree of financial exclusion. For instance, less than a third of adults in Sub-Saharan Africa have an account at a financial institution or through a mobile money provider.[24] This indicates low credit and debit card penetration in the region, which is only partly compensated for by the availability of mobile money services. Moreover, even in markets where financial inclusion is high, low financial literacy can limit use of financial services. Agri e-commerce businesses can accept cash-on-delivery, but this adds operating costs, as it requires manual cash management, which is typically more expensive than the merchant discount rate associated with digital payments. In some instances, cash-on-delivery also allows buyers to return products without making any payment, increasing the losses for agri e-commerce businesses. This manual payment process also introduces procedural inefficiencies, such as delays in payment settlement to merchants. To overcome these issues, agri e-commerce businesses can integrate mobile money services into their platforms. With 868 million registered mobile money accounts,[25] mobile money represents a significant opportunity to help reduce the reliance on cash-on-delivery payments.

Agri e-commerce businesses have negated many of these risks in their local markets. This has been achieved through investment in warehouses and quality control, partnerships with logistics services and financial service providers, and effective marketing. Nevertheless, the scalability of these solutions remains some way off. Agri e-commerce businesses have considerable room to grow in their domestic markets, while the same risks await firms if they expand internationally.

24 Global Findex, World Bank 2017
25 GSMA Mobile Money State of the Industry Report 2018

4 Recommendations

Agri e-commerce presents significant opportunities for the agricultural sector and, by extension, the wider society and local economies in developing markets. It has the potential to generate significant social and economic benefits, from improving the livelihoods of farmers and boosting productivity to reducing wastage and driving digital and financial inclusion in rural areas.

To maximise this potential and increase the scale and sustainability of agri-ecommerce services, we highlight the following recommendations for key stakeholders in the agri e-commerce ecosystem.

Agri e-commerce businesses

- **Provide more than a platform:** Agri e-commerce services need to offer buyers and sellers utility beyond just providing a platform to transact. Many agri e-commerce services facilitate payments, plan logistics and provide quality control. This helps to maintain stickiness and user interest in the service, and avoid users taking transactions offline due to limited value of the e-commerce intermediary function. For example, in developing countries where infrastructure readiness is lower, a key value-add of an e-commerce business is logistics.
- **Balance online and offline assets:** Technology is undoubtedly a crucial part of an agri e-commerce service. However, agri e-commerce businesses must blend technology with offline assets, including delivery vehicles, purpose-built facilities and operational teams. This enables key functions to be undertaken to support buyers and sellers, such as farmer acquisition and distribution activities.
- **Build reliable partnerships:** Agri e-commerce entails a wide range of activities – from farmer acquisition, education and pre-financing to logistics, marketing and quality control. It could be expensive for an agri e-commerce business to perform all these functions internally, but costs can be minimised by engaging external partners. For example, an agri e-commerce business can partner with financial institutions to provide loans to farmers, or with third-party logistics services to support order fulfilment.
  - **Replace middlemen services:** As well as buying produce from farmers, middlemen offer a range of other services to farmers, including credit and logistics. Through replicating these services, agri e-commerce businesses can reduce the dependence of farmers on middlemen and integrate them within a formal value chain.

Mobile operators and other mobile money providers

- **Adapt mobile money services:** As agri e-commerce develops, it can become a key driver of mobile money adoption in rural areas. However, depending on the country context and regulation, mobile money charges and transaction limits could make mobile money a suboptimal payment channel for agri e-commerce. Mobile operators can explore innovative solutions, such as mobile wallet to bank integrations, to address these challenges. For example, Twiga Foods has collaborated with Safaricom to send money from M-Pesa to bank accounts, which enables Twiga to make high-value payments to farmers.
- **Use partnerships to leverage assets and minimise liabilities:** Key mobile operator assets include an established customer base and distribution network, a reputable brand, local market knowledge, existing relationships with local banks and governments, and customer and transaction data to identify fraudulent transactions. To build successful agri e-commerce services, mobile operators should partner with organisations that have capabilities in other areas, such as agriculture and logistics. Meanwhile, the cost of building an agri e-commerce platform, along with the associated operational functions, may be much higher when mobile operators work alone rather than collaborating with a partner with the right interest and expertise in the agri e-commerce space. Further, the mobile operator can reduce exposure to reputational and related risks that may be associated with providing the service.

Governments

- **Support farmer operational functions:** Some government agencies, especially in the agriculture and rural development spaces, have extensive relationships with farmers. These can be leveraged to support the operational functions of emerging agri e-commerce businesses, such as farmer education. In Indonesia, government agencies help agri e-commerce businesses, such as RegoPantes, build the supply of farmers on their platforms through farmer visits and events. Government ministries could also give agri e-commerce businesses access to a database of local farmers to facilitate the farmer acquisition process. In addition to helping with farmer selection, there is a role for government ministries to play in teaching farmers about agri e-commerce through awareness campaigns and workshops. Overall, these activities reduce the agri e-commerce business' farmer on-boarding costs and potentially help governments reduce farmer subsidies in the long run.
- **Create an enabling regulatory environment:** Governments and regulators should create enabling regulations to drive mobile money adoption among farmers. An appropriate strategy would be to introduce tiered KYC requirements that permit easier customer identification and verification for the rural population. For instance, mobile money providers could accept alternative forms of identification, such as a letter from an agri business, cooperative or agri e-commerce provider that works with the rural customer seeking verification. This approach should be supported with suitable limits that allow rural customers to receive and handle agricultural payments. Beyond this, rural customers would require more formal documentation for higher value transactions.

Donors and investors

- **Invest in viable services:** Investors and donors should invest in agri e-commerce businesses that have a differentiated proposition to overcome specific market challenges, such as reducing post-harvest losses (Twiga has reduced losses from 30% to 4%) or increasing farmer productivity (Ricult has developed algorithms to customise advice on inputs and planting, as well as links to local food processors). Furthermore, investors should consider the growth strategy of the agri e-commerce business, including plans to expand into new markets and attempts to maximise asset utilisation. For instance, Twiga plans to utilise its logistics infrastructure to supply the fast-moving consumer goods industry. Considering these factors will help investors and donors channel funds to the most viable services and encourage agri e-commerce businesses to adjust their business plans accordingly.
- **Recognise local market conditions:** The Market Attractiveness Index (Figure 6) highlights that Sub-Saharan Africa, as well as developing countries in Asia and Latin America, represent a diverse set of conditions. Investors and donors need to understand the key features of markets they may be interested in, and how this impacts the choice of business models. For example, agri e-commerce businesses that target individual customers will struggle to scale in the short term in countries where there is low mobile internet adoption and financial inclusion, combined with limited logistics. In these regions, it is more viable to focus on other parts of the value chain, such as retailers, restaurants or processors, which are more likely to have access to digital services. The logistics of serving these customers is also more straightforward, as they order larger quantities and sometimes have their own transportation. Starting from the immediately feasible segment (e.g. Twiga's focus on retailers) might enable agri e-commerce businesses to eventually scale the service further to include other parts of the value chain.

Appendix

Market Attractiveness Index assumptions and methodology

The purpose of the index is to estimate the attractiveness of selected countries with regards to agri e-commerce potential, ranging from 1 (low attractiveness) to 5 (high attractiveness).

The focus for the report is Sub-Saharan Africa as well as developing countries in Asia and Latin America. We have selected countries where agriculture is a key driver of GDP, while also considering the presence of active agri e-commerce services.

- **Sub-Saharan Africa:** Angola, Benin, Burkina Faso, Burundi, Cape Verde, Cameroon, Central African Republic, Chad, Comoros, Cote d'Ivoire, Democratic Republic of Congo, Eritrea, Ethiopia, Gambia, Ghana, Guinea, Kenya, Liberia, Madagascar, Malawi, Mali, Mauritania, Mozambique, Niger, Nigeria, Rwanda, Sao Tome and Principe, Senegal, Sierra Leone, Somalia, South Africa, Sudan, Swaziland, Tanzania, Togo, Uganda, Zambia and Zimbabwe.
- **Asia Pacific:** Afghanistan, Bangladesh, Bhutan, Cambodia, China, India, Indonesia, Laos, Malaysia, Mongolia, Myanmar, Nepal, Pakistan, Philippines, Sri Lanka, Thailand, Timor-Leste and Vietnam.
- **Latin America:** Belize, Bolivia, Colombia, Dominica, El Salvador, Ecuador, Guatemala, Guyana, Haiti, Honduras, Nicaragua, Paraguay and Peru.

1 We identified the enablers required for agri e-commerce.

We used information provided by agri e-commerce businesses and non-agri specific e-commerce services, as well as additional desk research, to select seven key enablers: mobile internet penetration, financial inclusion, e-commerce familiarity, agricultural readiness, logistics networks, urbanisation and income structure.

2 We chose appropriate metrics to quantify each enabler.

These metrics were sourced from the following organisations: GSMA Intelligence, International Labour Organization, UN Food and Agriculture Organization (FAO) and World Bank.

- Mobile internet penetration
  - Mobile internet unique subscribers (GSMA Intelligence)
- Logistics networks
  - Logistics Performance Index (World Bank)
- Digital payments
  - Percentage of people aged 15+ that have an account at a financial institution (Global Findex Database, World Bank)
- Agricultural readiness
  - Cereal yield KG per hectare (World Bank)
  - Percentage of agricultural workers with a mobile phone (GSMA Intelligence, World Bank)
  - Formal procurement score (GSMA Intelligence, World Bank)
- E-commerce familiarity
  - Percentage of people aged 15+ that used the internet to pay bills or make a purchase online in the past year (Global Findex Database, World Bank)
- Urbanisation
  - Percentage of population living in urban areas (World Bank)
- Income structure
  - Gross national income per capita (World Bank)
  - Formal employment (International Labour Organization)

3 We assigned a score of 1 to 5 based on a percentile approach for each enabler.

For instance, urbanisation was assigned scores based on the following: the bottom 30% values = 1, percentile between 30% and 45% = 2, percentile between 45% and 60% = 3, percentile between 60% and 70% = 4, top 30% = 5.

4 We estimated the Market Attractiveness Index score as a weighted average of the seven enablers.

Agri e-commerce enabler	Weighting
Mobile internet penetration	20%
Financial inclusion	15%
E-commerce familiarity	15%
Agricultural readiness	15%
Logistics networks	15%
Urbanisation	10%
Income structure	10%

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