

Agriculture Sector Viability Report

OpenLMIS Sustainability
September 2019

EXECUTIVE SUMMARY

To achieve sustainability, OpenLMIS must diversify its revenue streams. One avenue of diversification is to capture market share within adjacent sectors outside of health. While Resonance's recommendation is to diversify in the short- to medium-term by expanding into other health customer segments and new geographies (6-18 months), a longer-term strategy may be to expand beyond health and offer a supply chain solution that is based on OpenLMIS' core structure and supports the agriculture sector.

While pursuing customers in agriculture will not be immediate, Governance Committee members and key decision makers have been interested in understanding what possibilities exist within the market to effectively plan for a longer-term OpenLMIS product expansion and investment timeline. Based on our research, we found that entry points do exist within the agriculture sector for OpenLMIS, which would benefit from future exploration. In this report, we lay out our process for determining viability, highlight key insights, market and industry characteristics, potential expansion opportunities, and next steps.

DETERMINING VIABILITY

Understanding the viability of an agriculture offering has three core components: 1) exploring whether there is a need, 2) discovering whether OpenLMIS could fit that need, and 3) mapping the competitive landscape. In this section, we describe our research approach to answering these questions and then move to key insights related to viability.

Research Approach

To gather information on our core questions, we completed desk research and conducted informational interviews with 12 subject matter experts who have experience in agribusiness, agricultural technologies, and cross-sector investments to understand the market and evaluate opportunities for OpenLMIS.

The objectives of these meetings were to:

- Understand the landscape of **agricultural supply chains** and the **role of public/private institutions** at a national and regional level, including the Ministry of Agriculture.
- Strengthen knowledge of **supply chain workflows** and the makeup of effective end-to-end solutions; as well as identify **pain points** and potential **opportunities**.
- Gain awareness of key **agriculture-focused supply chain solutions** in the space, inclusive of commercial products, social enterprises, and/or global goods.

MARKET & INDUSTRY CHARACTERISTICS

Digitalization for agriculture (D4Ag) is a rapidly growing space with an impressive capacity to influence and accelerate agricultural transformation, which continues to be a priority for the low- and middle-income countries that OpenLMIS currently serves. While digitalization in this space is fragmented and can be challenging to break into, it holds the potential to have widespread implications by improving the production of quality goods, building capacity, promoting access to data and inclusion, and increasing food security and nutrition.

Key Insights

- **Complexity** - Agricultural supply chains and agri-food value chains are highly complex and diversified, with industry actors that span rural smallholder farmers to large, Multinational Corporations (MNCs). In many ways, the sector is driven by contributors in low- and middle-income countries, yet service a global population (including the most high-income economies) that are connected by the movement of commodities. This creates a unique dynamic, which balances priorities across the value chain and similar to health, creates an interesting landscape for digitization that spans rudimentary to advanced technology solutions.
- **Inconsistent Growing Cycles** - In agriculture, supply chain flows occur for inputs (e.g., seeds, fertilizer) and outputs (e.g., coffee, tomatoes). As suspected, the most similarities exist between the public health workflows that OpenLMIS currently supports and the agricultural extension services that supply inputs for agricultural production. However, tools to manage these supply chain flows are not only tailored to a specific aspect of the value chain, but often to a particular crop type and/or geography. For instance, dairy farmers sell their product daily while farmers of other commodities (e.g., soya, legumes, maize) only have one or two growing cycles per year. Due to the time horizon between growth cycles, which are considered a “lumpy” sales cycle for certain commodities, tracking solutions often include a feature set that enable farmers to access affordable financing and balance the need for working capital.
- **Fragmentation** - While the agriculture sector is aggressively trending toward digitization, the market is still fragmented, making it difficult to gain traction. A recent report by the Netherlands-based Technical Centre for Agricultural and Rural Cooperation (CTA) states that there are at least 390 distinct, active D4Ag solutions across Africa, of which nearly 60% were launched in the last three years. Of these existing solutions, there is a mix of homegrown and more established supply chain solutions, especially among more mature input suppliers. There is also a trend toward outsourcing supply chain management to third parties.
- **Competition** - Competitors have been innovative in how they create a unique value proposition and bring to market a digital platform that is durable. According to the CTA report, digital agriculture solutions in Africa span five major use cases: advisory services, market linkages, financial access, supply chain management, and macro agricultural intelligence, with 50% of solutions that combine more than one use case. While there are opportunities for OpenLMIS to expand its supply chain management footprint, additional use cases and/or interoperabilities would be valuable to create a competitive advantage. For example, iProcure is touted as a success story for supporting agriculture inputs through its procurement and stock management platform. To achieve this success, iProcure built physical retail stores to ensure the use of its platform. While owning and managing its own inputs stores are far from OpenLMIS’ core capabilities, other entry points into the inputs market may exist.

Market Drivers & Trends

- ***Technology is a major driver of industry advancement and the emphasis is on increasing yields.*** According to CTA, climate change will cause yield losses of 22% in sub-Saharan Africa by 2050 and, while food shortages are (and will continue to be) a global phenomenon, there is a rising concern for not only enough food, but enough nutrient-dense food. While this is on the minds of donors and governments, ensuring high-quality, consistent yields is also a top priority for MNCs and other organizations whose success is tied to reliable and predictable yields. Most of the top industry innovations are combining technology and data in a unique way that ultimately help smallholder farmers increase yield and bring important information up the value chain.
- ***Emerging market agriculture players are early adopters of advanced technologies.*** There is a strong market for and tendency toward the use of advanced technologies like AI, blockchain, IoT, UAV/drones, and satellite imaging. In many cases, these advanced technologies are bringing information, analytics, and forecasting capabilities to areas that are otherwise underdeveloped when it comes to technology. In essence, the sector is understood to be “skipping a step” and increasingly, more traditional farming tools, such as irrigation, are being paired with solar and cloud services to provide more information for farmers. For instance, Kukua installs networks of low-cost weather stations in Tanzania and other African countries that run on small solar panels and automatically upload weather data to the internet via mobile sim cards. These weather stations serve commercial farmers by enabling better farming decisions and allow access to crop insurance, as well as subsidize forecasts to smallholder farmers via SMS.
- ***Transparency and traceability are often motivators for investments in supply chain solutions.*** There is a trending business, investment, and donor support case for enhanced transparency and traceability, which span many parts of the agricultural value chain. The strength of this trend varies by country and the agricultural product, and the level of granularity demanded varies as well. These needs are driven by import/export regulations, consumer and business expectations, and off-taker sustainability metrics. Upkeep with regulations can be challenging for smallholder farmers and small businesses, increasing the role of aggregator services to ensure adherence.

Industry Characteristics

- ***D4Ag is growing in sub-Saharan Africa, but is still relatively young as a sector.*** Investment in agriculture has grown steadily, with funds predominantly driven by development aid donors and limited private sector support. The number of farmers reached has been growing at 44% per year over the last three years, according to CTA, illustrating the growth of the sector. East Africa— and especially Kenya — has been the frontrunner in terms of solution creation and sustainment. Particularly in food-insecure regions, there is a movement to support innovations, encourage efficiencies and traceability in the supply chain, and ultimately, meet growing populations’ increasing food and nutrition needs in the wake of climate change. The threat of flooding, drought, and other disasters will continue to impact the agriculture sector, demanding that governments and market leaders build climate resistance protocols and policies that protect agriculture systems, farmers, and increase sustainable food security and safety.
- ***Agricultural supply chains and food value chains are fragmented.*** Particularly in low- and middle-income countries, value chains involve a mix of large MNCs, small and medium enterprises, and individual/small-scale actors; but there are often challenges with the linkages between them. This fragmentation also encompasses informal value chains, where commodities

are grown for sale into local markets and more formal value chains are largely inaccessible to small farmers. These disparities create both challenges and opportunities for digital supply chain solutions. While it is difficult to bring together disaggregated players, value chain formalization can accelerate time to market, improve yield, build capacity and trust, and create systems that flow more fluidly. It can also connect actors that may otherwise face deep challenges to reach their market potential.

- ***There is prioritized NGO support for smallholder farmers.*** There are many NGOs that work with smallholder farmers to support their access to markets, something that is especially common in countries whose agriculture sector is dominated by smallholder farmers. These smaller farmers which often account for a large portion of a country's employment and GDP, often lack sufficient access to both input supplies and markets due to a combination of barriers and limitations (e.g., lack of awareness/education, financial constraints, infrastructural barriers). For example, both One Acre Fund and MyAgro provide smallholders with input packages, micro-insurance, and supply chain financing. Both have created in-house solutions for inventory management that are specifically designed for use at aggregation points leading up to the last mile.
- ***Development aid donors and programs have a major impact on the private agriculture sector.*** Low- and middle-income countries have a higher reliance on development aid compared to high-income countries, and this elevates the capacity of the private sector. For example, many agricultural cooperatives and farm-to-market programs are funded and managed by international development actors. This underscores the importance of offering a solution that addresses donor organization priorities and adheres to their protocols. Furthermore, in blended finance models and the impact investing space, there is a mindset to prioritize the social return on investment (i.e. SROI) and to evaluate potential net impact per donor dollar. For OpenLMIS, this illustrates the importance of creating a scalable and commercially viable supply chain solution, even if it starts as a donor-supported project.

EXPANSION OPPORTUNITIES

In general, digital solutions for agricultural logistics management are a niche market, especially when considering OpenLMIS' core feature set of stock management and requisitions. While there are opportunities to bring together disaggregated value chains into a single system and create efficiencies, particularly around input supplies, the warehousing and inventory management needs are different in agriculture than in health. For instance, there is a limited need for outbound logistics and storage for produce and other fresh products.

Currently, OpenLMIS manages and automates logistics processes at 11,000 public health facilities across 10 implementations in eight geographies across Africa. Given OpenLMIS' extensive experience working with Ministries of Health and its implementer network, there is an opportunity to build on its current relationships and support Ministries of Agriculture. While public sector opportunities would be a more seamless transition for OpenLMIS given its current relationships and experience in the public health market, there is a risk of Ministries of Agriculture being unwilling or unable to pay. Expanding to the private sector would encourage the generation of independent revenue and ultimately, help achieve sustainability.

As OpenLMIS explores a cross-sectoral expansion into agriculture in the future, it is important to note that there are potential opportunities in both the public and private sectors. The opportunities outlined below represent a snapshot given the current use of technology and its existing feature sets.

- ***Inbound logistics.*** Many governments in low- and middle-income countries set a controlled use of farm inputs (e.g., seeds, fertilizers, herbicides, pesticides) and offer subsidy programs to manage soil fertility levels and promote consistent yields. In addition, Ministries of Agriculture often have strong extension services networks and farmer trainings. There is an opportunity for OpenLMIS to support this market and potentially interoperate with other offerings to promote data sharing, education, and increased supply chain efficiencies. For instance, UK-based Primary Commodity Research has an application that is used by farmers to diagnose and treat infected crops. This type of application could be combined with an inbound logistics version of OpenLMIS to seamlessly diagnose and treat an infected crop, which would leverage its existing strengths of requisitions and order fulfillment.
- ***Vaccines for livestock.*** According to *Science Advances*, 75% of the population in sub-Saharan African is engaged in small-scale farming, and 80% of these households keep livestock. These animals are important providers of both food and income for families and smallholder farmers. Especially for pastoralists, livestock represent a critical asset that is at risk and faces constraints due to infectious disease. One of the ways to increase healthy livestock is to improve access to vaccines through a digitized supply chain that links wholesalers, rural retailers, animal vaccinators, and smallholder farmers.
- ***Outbound logistics, including traceability, aggregator services, warehousing, and/or transportation.*** Another potential area for OpenLMIS to expand is to create a solution for post-harvest supply chain management and logistics, which may encompass aggregation and quality checks, traceability tracking, cold chain monitoring, storage, and/or transport. Smallholder farmer products are often collected and stored at a central point and distributed to larger points for domestic consumption or export. At these stages, there is a need for data standardization, adherence to specific export requirements, quality control, and metrics tracking that would benefit greatly from digital supply chain management solutions. As such, if OpenLMIS were to operate in this space, it would add more value if it encompassed specific data and/or export requirements, and were paired with a tracking mechanism for transportation, a customized ordering/resupply functionality, and/or components that ensure traceability and quality control (e.g., anti-corruption, anti-counterfeit mechanisms).
- ***Data for good.*** If OpenLMIS were to collect and provide data on aspects of the agricultural value chain (e.g., animal vaccines, yield) to Ministries of Agriculture or suppliers in the space, this would be an interesting value proposition. While this opportunity diverts from OpenLMIS' current protocol and policies for data, the use of data to forecast and predict trends is valuable to governments, suppliers, and other market players. The data may be even more useful when combined with Ministry of Health data to showcase a macro view of the country, which could provide governments with a cross-sectoral view of relevant high priority indicators and potentially influence policy decisions.

Furthermore, akin to its use in public health, OpenLMIS' value is realized when used by a network, scaling as the operation increases. For instance, a single agriculture storage warehouse – just like a single clinic – can get by with tracking everything on paper. In contrast, a company operating a network of warehouses is much more in need of a solution to manage its inventory.

It is also important to note that agriculture is not a fully private sector-led market; and an expansion strategy that targets the private sector would likely still need to adapt to the areas of the industry that are overseen by the Ministry of Agriculture and/or other regulatory bodies.

Comparison to Private Health

Agricultural value chains share the following key characteristics with health:

- **Complexity:** The agricultural ecosystem encompasses a vast variety of crops, as well as services, tools, and amenities that contribute to food security, health, and the global economy. Agricultural actors simultaneously operate as part of multiple supply chains, ranging from local to international.
- **Advancing technologies:** Investment in development of new technologies and innovations in the sector enables, and often requires, agricultural actors to continuously adapt.
- **Private-public partnerships:** While private sector actors play a major role in agricultural markets, governments can exert heavy influence through policies and regulations (e.g., product imports/exports and programs to address challenges of disadvantaged regions or populations).
- **Lack of efficiency and transparency is a common problem:** The nature of these complex, diverse and rapidly changing markets often results in supply chain inefficiencies, including bottlenecks, redundancies, and underreached regions or populations (i.e. last mile needs).
- **Counterfeit products:** By increasing access to reliable information, improved supply chain management helps safeguard against counterfeit products, promoting quality assurance and protecting farmers and agrobusinesses.

More so than health, agricultural markets can be volatile due to macroeconomic factors. While demand is often steady and predictable, changes in weather/climate and political and socioeconomic landscapes can make supplies more inconsistent, causing shock waves and shortages throughout supply chains.

Competition

Similar to public health, some may consider Logistimo to be a direct competitor in the agriculture sector. Logistimo is an interesting case study, as it spans both sectors though there are mixed opinions about its success. Depending on the nature of OpenLMIS' expansion and the specific supply chain management features it pursued, additional competitors in this space would likely include homegrown systems, a combination of paper-based and Excel-based solutions, as well as more advanced solutions like iProcure and ERP systems (e.g., SAP, Farmforce, mFarms, CropIn, and eProd).

CONCLUSIONS & NEXT STEPS

While this report is only meant to serve as a baseline, Resonance recommends that the OpenLMIS community consider expanding into agriculture as part of a longer-term strategy, rather than in the short term. Although similarities between health and agriculture supply chains exist, the differences are substantial enough to warrant extensive workflow analysis for any customer in the agricultural sector. While there are enough parallels between the health and agriculture sectors to make a compelling case for why OpenLMIS could successfully expand, there are several considerations that should be addressed prior to expansion.

- As with all software, creating modifications to OpenLMIS will require financial investment. In addition, OpenLMIS does not have the same level of familiarity with this market and has not yet established networks and partnerships in this sector to the extent that it has in the health sector. For these reasons, expanding into agriculture will be costly and it will be essential to involve agriculture experts and local partners to support ideation, product development, implementation, go-to-market, and adoption.
- Rather than creating a specific product customized to a sub-sector within agriculture, OpenLMIS should consider the investment case for developing a generic supply chain solution, which could be part of a “stack” of services that could be leveraged in any sector.
- Prior to expanding into agriculture or targeting any new customers, it is essential that OpenLMIS find a more permanent “home,” which can support its long-term growth and sustainability.
- Any future strategy outside of public health should adhere to donor priorities and protocols, ensuring alignment to the core values of the Governance Committee and the mission of the OpenLMIS community.

As a next step, given the nuances of the agriculture value chain described in this report, the OpenLMIS community should conduct an extensive assessment of the relevant agricultural value chain sub-sector opportunities described above. This should include a comparison of OpenLMIS’ feature set to relevant sub-sector workflows. To establish which specific sub-sector would be best served by OpenLMIS, the community should also engage with industry experts to ensure OpenLMIS is the right fit given the future state of the market and competitive landscape. In the appendix, there are lists of notable organizations in this space as well as recommendations for interviewees for a second round of analysis.

APPENDIX A: INTERVIEWEES

Below are individuals interviewed as part of this assessment.

- **Amy Coupland**, Consultant, *twentyfifty ltd (formerly GeoTraceability)*
- **Brenna McKay**, Senior Associate, *Resonance Global (formerly Feed the Future)*
- **Emily Romero**, Senior Director, Institutional Relations, *Grameen Foundation*
- **Heath Arensen**, Director of Business Sustainability, *Open Source Center at DIAL*
- **Jurriaan Budde**, Associate, Director of Global Procurement & Operations, *myAgro*
- **Kristin Beyard**, Deputy Director, Agriculture, Competitiveness, & Trade, *Resonance Global*
- **Miguel Granier**, Founder & Managing Director, *Invested Development*
- **Sarah Hylden**, Global Supply Chain Director, *One Acre Fund*
- **Simon Hartland**, Projects Director, New Technologies, *adaptika (formerly Baringa Partners)*
- **Stephanie Landers Silva**, Senior Manager, Agriculture, Competitiveness & Trade, *Resonance Global*
- **Stewart Collis**, Senior Program Officer, Digital Solutions, Agricultural Development, *BMGF*

APPENDIX B: RESOURCES FOR FURTHER INVESTIGATION

The following is a list of notable organizations in the space, which surfaced in the research and are meant to be illustrative examples that may be worth exploring further.

- **CARANA:** Applies its market-driven philosophy to agricultural industries globally, primarily through agribusiness development activities in value chains, quality improvement, and buyer-seller relationships.
- **CropIn:** An agriculture technology solutions start-up offering several farm management software products that enable farmers to optimize agricultural operations, increase climate resiliency, and dial-in output.
- **Esoko:** Pools government and privately held agricultural data and shares it with participating farmers to provide them with vital information about markets and business.
- **FAO:** A partnership with USAID that seeks to strengthen the capacity of developing countries to manage disease outbreaks in farm animals through disease surveillance and forecasting, outbreak response strategies, and more.
- **Farmforce:** Delivers digital solutions to secure sustainable sourcing, improve farmer livelihoods, and protect the environment through a mobile platform that extends digital management to the agricultural “first mile.”
- **FarmGrow:** An online consulting service for Indian farmers that guides farmers in growing better quality produce through precise nutrient and pest management schedules.
- **Farmerline:** Transforms smallholder farmers in Africa into successful entrepreneurs through improved access to information and markets via mobile phones.
- **Fintrac:** A consulting company that provides technologies and technical assistance to increase yields, build capacity, and improve market competitiveness, thereby strengthening smallholder food security and increasing incomes.
- **GeoPoll:** Provides mobile-based research solutions, including text message and online surveys, in emerging markets throughout Africa, Asia, and the Middle East.
- **GeoTraceability:** Supports origin transparency of natural resources and crops by offering specialized tracking and data collection with technologies including GPS mapping, GIS, and mobile phone and barcoding systems.
- **iProcure:** An agricultural supply chain platform in rural Africa that provides services in procurement and last mile distribution, business intelligence, and data-driven stock management.
- **MyAgro:** A mobile layaway platform that allows farmers to save money for seed and fertilizer using their mobile phones.
- **Nafundi:** Creates technologies that help customers collect data quickly, accurately, offline, and at scale in challenging environments with a focus on the Open Data Kit ecosystem, which the company’s CEO co-founded.

- **Ninjacart:** A business-to-business (B2B) fresh produce supply chain company in India that connects farmers, manufacturers, and brands to retailers directly through a lean and connected supply chain.
- **One Acre Fund:** Supplies financing, training, and inputs sourcing for smallholder farmers to generate increased income and help farmers grow out of hunger and poverty.
- **Twiga:** Bridges gaps in food and market security through an organized platform for an efficient, fair, and transparent formal marketplace.

Furthermore, the following individuals were recommended by Stewart Collis to inform future investigations into specific agriculture sub-sectors (e.g., livestock vaccinations). Note: These individuals were not consulted as part of this assessment.

- **Lauren Good**, Senior Program Officer, Global Development, Agriculture, *BMGF*
- **Christian Witt**, Senior Program Officer, Soil Health, *BMGF*
- **Alfred de Vries**, Senior Program Officer, Animal Production, *BMGF*
- **Abe Miller**, Deputy Director & Principal Technologist, *BMGF*
- **Yaw Anokwa**, CEO & Founder, *Nafundi*
- **Rafael Flor**, Senior Program Officer, Agricultural Markets, *BMGF*

APPENDIX C: SOURCE LIST

Below are select sources referenced as part of the desk research that went into this report.

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