

Catalysing sustainable agriculture and nutrition...



Nigeria's Mechanization Landscape

According to the Food and Agriculture Organization (FAO), agricultural mechanization generally refers to the application of tools, implements, and powered machinery as inputs to achieve agricultural production. It encompasses various technologies across the production-processing chain from basic tools such as hoes and cutlasses to motorized equipment such as tractors and grain milling machines.

The Importance of Mechanization in Nigeria

Agricultural mechanization is recognized as the pivot to agricultural revolution in many parts of the world, contributing greatly to the increased output.

Nigeria needs to enhance the number of farmers who utilize mechanical power based mechanization in order to:

- Increase the food production capacity of farmers leading to reduced poverty and improved livelihoods.
- Reduce the drudgery associated with agricultural production.
- Reduce the level of post-harvest losses that occur across different agricultural value chains.
- Increase the prospects of the local agro-allied industry and the conversion of crops and tubers to Value Added Products (VAPs).

According to FAO, there are three levels of agricultural mechanization:

1. Human Powered Sources

This is the use of hand tools and manually operated equipment that rely on human power. Most of the activities in the agricultural sector in Nigeria are carried out with traditional equipment such as hoes and cutlasses. Human powered implements are the lowest level of mechanization, and result in limited agricultural productivity of farmers.



Human Powered Implements
Source: <https://stockfresh.com>



Source: <http://www.vironewsigeria.com>

2. Animal Power based Mechanization

This is the use of animals such as horses, oxen, mules, donkeys and bulls to drive primary tillage implements and to transport farm produce. It is the second highest level of mechanization. The quantity of work achieved by draught animals varies considerably, but can be up to 5 to 20 times greater than human labour.



Animal Power based Mechanization.

3. Engine Powered Machines

Engine powered machines are the highest level of mechanization, obtaining energy from sources such as fossil fuels, wind or solar resources. According to FAO, a farmer dependent on agricultural mechanization can provide enough food to feed up to fifty people while a farmer using draught animal power can only feed six people. Given the drive towards attaining food security, there is increasing awareness and investment in the use of engine powered machines across the agricultural value chain in Nigeria.



Nigerian-built tractor by Timothy Addigi Terfa
Source: Nigerian Monitor



Grain Milling Machine. Source: 2SCALE Program

Agricultural Mechanization: Looking Beyond Tractors

Crop Production

Crop production involves labor-intensive activities such as land preparation, planting, weeding, fertilization, irrigation, crop protection and harvesting. According to a study published by the International Conference of the West African Society of Agricultural Engineering, 90% of farmers in Nigeria conduct farm operations using hand tool technologies. This is the case because many farmers lack the resources to acquire agricultural machinery like tractors and ploughs.

Figure 1: Number of tractors per 10,000 hectares of arable land



Source: World Bank, Agribusiness Indicators, 2014

As a result, Nigeria's mechanization rate of 0.27 horsepower per hectare is well below the FAO's recommended rate of 1.5 horsepower per hectare. In fact, for every 10,000 hectares of arable land, farmers have access to 6 tractors. This dependency on human power has not only contributed to low agricultural productivity but also fostered the importation of food from countries like Thailand which have an average of 281 tractors per 10,000 hectares of arable land.

"For every 10,000 Hectares, farmers have access to only 6 tractors in Nigeria..."

Efforts to Mechanize Crop Production

Initiatives such as the Cassava Mechanization and Agro-processing Project (CAMAP), have increased the adoption of mechanization for crop production amongst farmers by providing implements such as cassava planting machines and cassava harvesting machines to farmer clusters in Ogun, Oyo, Osun, Kwara and Kogi. Since inception, the project has not only trained and empowered 250 cassava farmer clusters, but also covered 12,000 hectares of land using mechanization since 2013.



Two-row cassava planting machine.

According to the Country Program Director, Ayodele David, it takes a farmer reliant on hand tool technologies 22 days to plant one hectare of cassava, while it takes a farmer using the two-row cassava planting machine on the same size of land 45 minutes.

Post-harvest Handling

Post-harvest handling involves activities such as cleaning, drying, grading, winnowing and storage. Ineffective post-harvest handling results in the deterioration and loss of crops which reduces farmers output. In Nigeria, post-harvest handling is characterized by manual and archaic methods that result in the contamination and substantial loss of agricultural produce.

Generally, farmers and small-scale processors dry produce on village roads and along highways leaving room for contamination by debris, insects and small ruminants. For example, maize is sun-dried using old sacks as the base material, shelled by hand, and stored in rooms with high humidity levels. Poor post-harvest handling practices in Nigeria have led to an alarming amount of food loss.



Sun-drying paddy rice. Source: PropCom

According to the Federal Ministry of Agriculture and Rural Development (FMARD), as much as 20% of fish, 20-30% of total grain production, 50-60% of root and tuber, and up to 50% of fruits and vegetables are lost during post-harvest handling in Nigeria.

Efforts to Mechanize Post Harvest Handling

Agricultural technology for specialized drying, winnowing, cleaning and storage techniques are being used to curb food loss, prolong shelf life and promote good quality agricultural produce. PropCom, a program supported by the UK Government to make rural markets work for the poor, identified a 3,000kg capacity mechanical dryer which effectively removes 60% of the moisture from fresh rice paddy in 6 hours and prevents contamination in the Kura-Kano rice processing cluster of Kano state.

Furthermore, *Coldhubs Nigeria* introduced solar powered cold stations for 24/7 storage and preservation in major Nigerian markets such as the Relief Market in Owerri, Imo state. The cold stations extend the freshness of perishable foods from 2 days to 21 days and reduce post-harvest loss in markets and farms by up to 80%. As a result of this equipment, there is more food available for rural and urban dwellers and the income of smallholder farmers has increased by up to 25%.



Source: ColdHubs, Relief Market, Owerri

Processing

The food processing landscape in Nigeria is under-developed and largely dependent on imported processed foods, due to the minimal investment in technology and knowledge for local processing. For example, the country is the world's sixth largest producer of cocoa beans producing 248,000 tons in 2016; However, only about 74,400 tons (representing 30% of total production) of cocoa beans are processed locally. The remainder is processed in countries such as France and the Netherlands, from which Nigeria imports end products like chocolate and cocoa powder. Similarly, a lack of processing facilities has resulted in Nigeria, the largest producer of tomatoes in Sub-Saharan Africa becoming the largest importer of tomato paste in the region.

Efforts to Mechanize Processing

The International Institute of Tropical Agriculture (IITA) has conducted research and developed simple, cost effective processing machines built to function in the Nigerian landscape. For example, they developed a de-stoner that has the capacity to process and clean 5 tons of grains per hour, and ultimately reduces the drudgery associated with manual de-stoning. In addition, IITA has introduced local processing technologies across the cassava value chain that are driving the processing of cassava into value added products such as gari, ethanol and industrial starch.

IITA EFFORTS IN CASSAVA PROCESSING

TRADITIONAL METHODS

IITA IMPROVED TECHNOLOGIES

PEELING



DEWATERING



FRYING



Key Challenges facing the Adoption of Agricultural Mechanization in Nigeria

1. Local Knowledge

A lack of access to information regarding mechanization limits stakeholders across the agricultural sector from adopting mechanization. To compound this, the extension delivery system is inefficient with a ratio of 1 extension worker to about 4,000 farm families. As a result, extension agents with information on mechanization opportunities are typically unable to transfer this information.

2. Upfront Cost of Machines

The cost of mechanization input for crop production and processing is very high. Moreover, it is difficult for farmers and processors to sustain the recurring costs of operating equipment. Poor access to finance is a major constraint to the adoption of mechanization as it makes it difficult for scaling service providers and new entries to access the capital required to procure equipment.

3. Fragmented Land Holdings

The traditional land holding system in Nigeria has resulted in the partitioning of land based on inheritance. As a result, the average farm size of a smallholder farmer in Nigeria ranges from 0.7-2.2 hectares. Fragmented land holdings often make it difficult to use mechanization and causes inefficiencies in agricultural production. A land holding system that allows for large contiguous land will increase the possibility of farmers' demand for mechanization.

4. Poor Access to Maintenance Services and Spare Parts

A lack of local expertise for the repair and maintenance of machineries is a major constraint to the sustainable use of mechanization in Nigeria. Currently, there are not enough technicians trained to deal with the types and brands of machines available. The poor quality of maintenance services for agricultural machinery is fuelled by a lack of awareness of the benefits of maintaining machines, the lack of commitment to maintenance plans, the high cost of maintenance and poor user habits. Moreover, the market for machine spare parts is flooded with low quality parts which result in the repeated breakdown of machines. Creating a culture of maintenance of agricultural machinery is important because it is indispensable to obtaining the benefits that come with the use of agricultural machinery.

5. Poor Status of the Local Agricultural Equipment Fabrication Industry

The majority of agricultural technology used in Nigeria is sourced from India and China. Subsequently, they do not often fit Nigeria's agro-climatic environment. Apart from this, high tariffs and the epileptic supply of electricity contribute greatly to the underdevelopment of the agricultural equipment fabrication in Nigeria. According to the School of Engineering of the Federal Polytechnic, Ado Ekiti, 60% of agricultural equipment fabricated in Nigeria are small household processing machines made by fabricators who are not properly trained. Furthermore, many of the small household processing machines do not meet local demand in terms of quality and productivity.



Local equipment fabrication workshop Source: GIZ

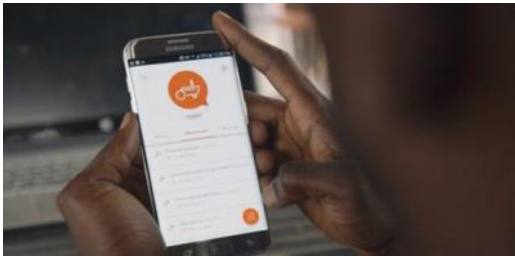
Hello Tractors: Connecting You to Your Tractor and Your Tractor to the World

Interview with Jehiel Oliver, Founder and CEO of Hello Tractors
www.hellotractor.com



Tell us about your organization

Hello Tractor is an agricultural technology company focused on moving smallholder farm families out of poverty by increasing their access to timely tractor services (and eventually other farm inputs). Hello Tractor's technology platform makes it easy and profitable for tractor owners to monetize tractors as business assets while connecting with smallholder farmers in need of tractor services. We commenced business activities in Nigeria in 2014.



How does Hello Tractor operate?

We sell our fleet management monitoring device and apps to tractor owners. To date, we have on-boarded over 500 tractors onto our platform. More than 65 percent of these tractor owner customers have used our app daily between January to November 2017. On the demand side, we coordinate and aggregate farmer demand for mechanization services via booking agents utilizing our booking agent app. To date, we have connected tractor owners with 18,000 farmers

What are the focus of Hello Tractors' activities in the mechanization landscape in Nigeria.

Hello Tractor provides a holistic model focused on the demand and supply side of the mechanization equation. We offer a tractor-agnostic digital platform to tractor Original Equipment Manufacturers (OEMs), tractor dealers, tractor fleet owners and individuals. We provide data analytics to improve customers' business operations while connecting them to farmers in need of tractor service. Most importantly, our services are available to all farmers and all tractor owners, regardless of tractor brand or farm size.

Which states are you currently working?

Hello Tractor has national coverage. However, the bulk of our work is currently in Kaduna, Niger, Sokoto, Yobe, Kano, Nasarawa, Kogi and FCT.

Why is your intervention important in Nigeria?

Agriculture has always been the backbone of the Nigerian economy and more recently, one of its most preferred sources of economic growth and employment. Smallholders comprise 80 to 90 percent of farm production but lack access to the necessary resources to increase their productivity, output, and farming income. Most farmers can't afford to own a tractor and most tractor owners struggle to identify customers within rural, disjointed markets. Collaborative consumption is not a new phenomenon, but collaborative consumption utilizing mobile technology is creating catalytic impact to different industries around the world. By leveraging technology, Hello Tractor is disrupting the agricultural industry across Nigeria and introducing a new shared economy model that can scale across the African continent.

Tell us about the dynamic partnership between your organization, farmers associations and interventions in Nigeria

We work with various groups that have successfully organized and aggregated smallholder farmers into clusters. This forms a very important network driving demand for tractor services on our platform.



Tell us about the "mini tractor for small farms"

The mini tractor coupled with our technology was our initial offering to the Nigerian market. However, over time, we learned that as a company we were adding the most value in the software and data analytics side of our business. On the tractor manufacturing front, there are several willing and capable manufacturers looking to serve the Nigerian market. Hello Tractor, for our part, serves as a market maker for these tractor manufacturers to succeed.

Hello Tractors: Connecting You to Your Tractor and Your Tractor to the World

Interview with Jehiel Oliver, Founder and CEO of Hello Tractors cont'd
www.hellotractor.com



What is your business model; How do you make profit while running a social enterprise?

We sell our technology to tractor owners while making it profitable for these tractor owners to serve smallholder farmers, which serve as the core of our beneficiary group. A typical Hello Tractor customer purchases our monitoring device for roughly \$75 and fits it onto their tractor. The customer then downloads the Hello Tractor apps that come with three tiers of users: Hello Tractor Basic, Hello Tractor Premium, and Hello Tractor Enterprise. Hello Tractor Basic customers are provided access to a mobile and web app for tractor fleet management, maintenance monitoring, and activity tracking. This solution is priced at \$15/month. Hello Tractor Premium customers are provided all the features of Hello Tractor Basic along with deeper tractor analytics tool and access to mobile apps for the tractor operators and booking agents. Hello Tractor Premium is priced at \$25/month. The Hello Tractor Enterprise solution is our bespoke offering for tractor dealers, banks, governments and large fleet owners. Hello Tractor Enterprise includes all components of the Premium Package but also includes full customization and is billed as a 1-year subscription with annual renewal. Fees are subjected to work requested.

One of the challenges associated with smallholder farmers is limited access to finance. How does Hello Tractor activities address this limitation?

We work closely with microfinance banks and donor funding programs to increase ability of smallholder farmers to pay for tractor services

Which mechanization activities does Hello Tractor currently promote?

Farmers can request all mechanization activities. However, most tractor owners have limited tractor attachment assortments, restricting most of the activities they can deliver to land prep services.

Tell us about the impacts Hello Tractors has made since inception

We make it convenient and affordable for smallholder farmers to receive reliable tractor services. As we grow our footprint of tractors on the platform, we will deepen this impact.

Existing tractor owners in Nigeria have limited access to quality spare parts, Is Hello Tractor

addressing this challenge in any form?

We provide maintenance monitoring to our tractor owners. The ultimate goal is to share this with tractor dealers and Original Engine Manufacturers (OEMs) to help guide spare part supply chains.

How is Hello Tractors supporting youths in agriculture through mechanization?

Young people make up the base of booking agents on our platform. They tend to be more technology savvy, are more likely to use smart phone apps, and are also keen to engage in innovative employment opportunities.

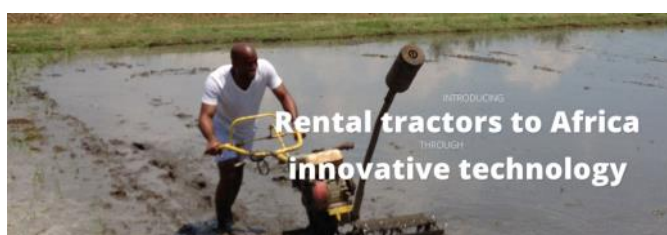


What future innovations or improvements should Nigeria expect?

Hello Tractor is currently working on remote sensing, route optimization modelling, and advanced tools to help connect farmers directly to markets.

What are your plans to expand to other African countries?

We are aggressively expanding into new countries including Kenya, Senegal, Tanzania, South Africa, Mozambique, and Bangladesh. We hope to be a pan African solution in the medium term.



Sahel Events

FAFIN Investors Conference, 2017

Sahel Agribusiness Managers Limited is the fund manager for the Fund for Agricultural Finance in Nigeria (FAFIN), a US\$65.9 million SME-focused agribusiness private equity fund. FAFIN's investors include the African Development Bank, CDC Group Plc, the Dutch Good Growth Fund (*managed by Triple Jump*), KfW Development Bank, the Nigeria Sovereign Investment Authority, and the Nigerian government via the Federal Ministry of Agriculture and Rural Development.

Sahel hosts an annual Investor Conference which serves as a forum for FAFIN's investors to interact directly with portfolio companies, pipeline companies, selected key stakeholders within the agricultural sector in Nigeria, and the Sahel team.

The 2017 Conference was recently held in Lagos, at the Oriental Hotel and Sahel's offices. It was a two-day event from 14th to 15th November 2017 with about 50 participants comprising of representatives from FAFIN's investors, portfolio companies, and pipeline companies; as well as selected guest speakers and Sahel team members. The Conference included detailed presentations and discussions on various agricultural value chains, closed-door sessions with FAFIN's Shareholder Board and Investment Committee, and targeted Environmental Social and Governance (ESG), tax compliance, and HR training for FAFIN portfolio companies.



Cross section of participants, FAFIN Investors Conference, 2017

Sahel at the 2017 World Food Prize Laureate Award Ceremony and the Borlaug Dialogue Symposium

The World Food Prize is the foremost international award recognizing the achievements of individuals who have advanced human development by improving the quality, quantity or availability of food in the world. The World Food Prize annually hosts the Borlaug Dialogue international symposium and a variety of youth education programs to help further the discussion on cutting-edge global food security issues and inspire the next generation to end hunger.

DR. AKINWUMI AYODEJI ADESINA, the President of the African Development Bank (AfDB), and the former Minister of Agriculture of Nigeria, was recognized as the 2017 World Food Prize Laureate. He received a \$250,000 prize for driving change in African agriculture for over 25 years and improving food security for millions across the continent. Through his roles over the past two decades with the Rockefeller Foundation, at the Alliance for a Green Revolution in Africa (AGRA), and as Minister of Agriculture of Nigeria, Dr. Adesina has been at the forefront of galvanizing political will to transform African agriculture through initiatives to: expand agricultural production, thwart corruption in the Nigerian fertilizer industry and exponentially increase the availability of credit for small-holder farmers across the African continent.

The World Food Prize Laureate award ceremony and the Borlaug Dialogue Symposium held between October 18 to 20, 2017 in the magnificent Iowa State Capitol Building in Des Moines.

The Borlaug Dialogue theme was "The Road out of Poverty" which encapsulates the power of treating agriculture as a business. The theme was drawn from Dr Akinwumi Adesina who has made it his life's mission to promote agriculture, good nutrition, and education as the keys to "uplifting millions out of poverty."

Sahel, as part of our mission to advance agriculture and nutrition in Africa, was ably represented in the events by our Managing Partner, Mezuo Nwuneli.



L-R: Dr Akinwumi Adesina; 2017 World Food Prize winner, his wife Grace Adesina and Mezuo Nwuneli, Managing Partner; Sahel Agribusiness Managers Limited during the award ceremony in Iowa.

Sahel Speaks...

Sahel Capital Partners and Advisory Limited

- **23rd Nigerian Economic Summit:** Ndidi Nwuneli facilitated a multi-stakeholder session on Backward Integration at the 23rd Nigerian Economic Summit themed, *“Opportunities, Productivity and Employments —Actualizing the Economic Recovery and Growth Plan”*, which held in Abuja between October 10 -12, 2017.
- **Committee of Wives of Lagos State Officials:** Ndidi Nwuneli served as a plenary session speaker on *“Agribusiness Opportunities for Women”* at the 17th National Women’s Conference of the Committee of Wives of Lagos State Officials themed *“She Creates, She transforms”* on October, 24, 2017.
- **Union Bank 100 years Anniversary Celebration:** Ndidi Nwuneli spoke on the *“Business of Solving Poverty and Hunger”* on 25th October, 2017 at the event titled *“The Next 100 – A call to Action”* a part of the Union Bank centenary celebration focused on driving economic prosperity through the SDG goals.
- **Scaling Up Nutrition (SUN) Global Gathering:** Ndidi Nwuneli served on a panel focused on *“How can small and medium enterprises be supported to help improve nutrition outcomes?”* on November 7th, 2017 at the SUN Global Gathering in Abidjan.
- **Africa Industrialization Day 2017:** Ndidi Nwuneli served as a speaker during the Africa Industrialization Day, 2017 themed *“African Industrial Development: A Pre-Condition for an Effective and Sustainable Continental Free Trade Area (CFTA)”* which held in the Vienna International Centre, Austria on Monday, 20, November 2017.
- **International Sustainability Conference 2017:** Nathalie Ebo, discussed the topic *“Scaling and Fostering Innovation for Socio-Economic Impact”* on November 21, 2017 at the Lagos Business School.
- **Official Danish Business Delegation Seminar:** Ndidi Nwuneli presented on *“Industrial Farming – Developing Trends in Nigeria”* at the Official Danish Business Delegation Seminar on *“Value Chain Development - Nigeria Food and Agriculture Sector”* on November 27, 2017 in Abuja.

Sahel Capital Agribusiness Managers Limited

- **Nigerian Agribusiness Group (NABG) Conference:** Mezuo Nwuneli spoke on panel titled *“Harnessing Lending, Access to Insurance, and Development of Inclusive Financing Model for Nigeria’s Agricultural Sector”* at the Nigerian Agribusiness Group (“NABG”) Conference on September 26, 2017 at the International Conference Centre in Abuja.
- **African Agriculture Council, Indaba, Cape Town:** Mezuo Nwuneli moderated a panel on *“Implementing affordable finance scheme for farmers and agribusiness SMEs in West Africa”* at the African Agriculture Council Indaba in Cape Town on November 22, 2017.

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