Private Sector Invests in the Success of Agriculture

Sustainably producing safe, nutritious affordable food and agriculture products for nearly 10 billion people in 2050 is a formidable task.

Producers are the key to meeting this challenge. To be successful, however, they must contend with factors they cannot control, like extreme weather, market fluctuations and political instability. This creates uncertainty in a sector that thrives on long-term planning and predictability.

Photo credit: Neil Palmer/CIAT

Thankfully, **agricultural producers have remarkable capacity for innovation and adaptation.** With the right support, producers will help make the world's food and agriculture systems economically viable, environmentally sustainable and socially beneficial.

The **private sector provides products and knowledge that help producers** decide when and where to invest, and how to manage risk and protect their investments.

Agribusinesses and retailers work directly with producers to select inputs and create farm management plans that generate more output while conserving water resources and protecting soil health. They also provide affordable access to mechanization through financing and rental services.

The **finance and insurance industries** fund and protect the investments that farmers make in the productivity and sustainability of their operations.

Private sector efforts are **supported by the public sector** with policies such as **land tenure reform** and **infrastructure investments** for transportation and communication systems.

This chapter describes how industry and government help agricultural producers invest in success and manage risk to ensure a productive sustainable food and agriculture system.

Access to Mechanization Is a Path to Productivity in Nigeria

Case Study: John Deere

Nigeria is rich in agricultural resources. Its land, rainfall and climate make it an African agricultural powerhouse. Total cereal production has steadily increased from 7.8 million tons in 1960 to 25 million tons in 2016.[1] Even with its oil resources, agriculture is the base of the nation's economy and the largest source of employment.[2]

Yet the agriculture sector has struggled to meet its potential. Agricultural output grew by an average of 1.2 percent per year from 2005 to 2014, not nearly enough to meet domestic demand.[3] In 2016, Nigeria imported 4 million tons of rice, despite being the largest rice producer in Africa. Substantial growth in agricultural output will be needed if Nigeria is to feed more than 300 million people in 2050.

Irrigated rice field in Nigeria.
Photo credit: World Bank/Arne Hoel

One of the reasons for the gap between domestic production and consumption of rice and other cereals is that most of Nigeria's farmers are operating at very small scales, with little access to inputs, such as improved seeds, fertilizer and pesticides, or to mechanization. Mechanization use has increased just two percent annually (2005–2014).[4]

In April 2018, **Alluvial,** a Nigerian company that works with smallholder farmers, and **John Deere** through its distributor **Tata Group**, formed a partnership to lease up to 300 tractors to be used by 100,000 smallholder farmers in the Niger Delta region of Nigeria. Oil wealth dominates the economy of the Delta region, but most people rely on farming

for their food and livelihoods. Rates of food insecurity, malnutrition and poverty in the region are high.

"With the proper inputs and mechanization, farmers could produce more than $300 million worth of rice per year, at current prices," says Dimieari Von Kemedi, founder of Alluvial.[5]

To increase the competitiveness of small-scale agriculture in the Niger Delta region, Alluvial groups together farmers operating on contiguous parcels of land. They aggregate the farmers' output to sell on commercial markets and provide inputs, such as seeds and fertilizer, at competitive prices.

Alluvial's farmers will be able to rent a John Deere tractor to plow, harrow and harvest. The cost per acre for one growing season is around $100. The tractor leasing program will bring mechanization to farmers cultivating 460 square miles of cropland.

The Nigerian government is also investing in mechanization leasing programs. In May 2018, the government announced the purchase of 10,000 John Deere tractors over the next five years. Smallholder farmers will be able to rent the tractors from local service providers for five percent less than the market price for mechanization rental.

"Nigerian farmers are knowledgeable, motivated and passionate. We believe in the country and are looking forward to partnering with Nigeria," said Mark Von Pentz, President of John Deere Agriculture & Turf Division — Europe, CIS, Asia, Africa and Global Tractor Platform.[6]

For small-scale farmers in Nigeria, mechanization service rentals are a path to better land and labor productivity. Expanding access to these technologies will help lift farmers out of poverty while increasing food availability for Nigeria's rapidly growing population.

Photo credit: Rain Vedutti Photography

Land: The Critical Asset

Agricultural producers are, by far, the largest source of private-sector investment in agriculture. Even in low- and middle-income countries, 78 percent of agricultural investments are made by producers in their own operations.[7]

For many producers, **land is their most important asset**. Yet millions of small-scale and emerging farmers do not have legal title to their land.

In many countries, the right to occupy, cultivate, inherit, lease, buy or sell land is granted by communal authorities. Communal tenure systems can be dominated by social hierarchies that disenfranchise vulnerable groups. Gender, age and community standing frequently determine the quality, quantity and terms of communal landholdings.

Mama Neema, pictured here, received training on how to pursue formal rights to her land, through a partnership between UN Women and the Maasai Women Development Organisation. "This is my land now; I can show you all the paperwork," she says pointing to her plot.

Photo credit: UN Women/Deepika Nath

Individual landholdings in communal areas may be recognized informally by governments, but without civil legal protections, people have little recourse if their land is re-appropriated by communal or state authorities.

Formal lenders see communal landholdings a risky investment and are reluctant to extend credit to farmers, regardless of the productive potential of the land.

Given the uncertainty of their land rights, communal landholders, particularly women, are less likely to invest in improved inputs, such as seeds, fertilizer or crop protection products. This suppresses their productivity and earning potential, making it difficult to save for capital purchases, such as mechanization and irrigation technologies.

Urban and Informal Food Systems

By 2050, two-thirds of the world's population will live in cities. This has generated renewed calls for the private sector, particularly the finance industry, to **invest in and support small and medium-scale enterprises (SME)** in the food value chain.[8]

In the near term, medium-scale producers, or consortiums of small-scale producers, who have the capacity to expand their operations are more likely to benefit from this new wave of investment. Independent small-scale farmers will continue to rely on the informal food value chain, selling their products in local markets or to traders who supply larger buyers.

Informal markets also contribute to the food security and nutrition of low-income people in urban areas.[9] In South Africa's urban centers, low-income people purchase their monthly supply of staple foods, such as mealie meal, from formal retail outlets, but perishable products and ready-to-eat foods are purchased at local food markets or from street vendors.

South Africa's informal food sector is a significant part of the agricultural economy. It is the country's second largest potato buyer, and **Fresh Producer Markets**, the largest potato buyer, purchases more than half of its supply from informal traders.

Given the importance of the informal food sector to producers, consumers and the economy, policymakers need to consider how to increase the sustainability and safety of food produced and sold informally, and how to improve the working conditions and social protection of those involved in this vibrant and growing part of the food value chain.

Managing Risk Through Productivity Growth

Farmers can manage economic and environmental risks to their operations by focusing on productivity growth. Producers increasingly rely on agricultural retailers as a source of expertise on how to productivity use and wisely manage their land, soils, water and livestock assets.

For agricultural input supply companies and retailers, providing producers with high-quality agronomic services, data and advice is a rapidly growing part of their business model.

Recognizing an opportunity, the **Nutrient Stewardship Council,** a coalition of agribusinesses, environmental organizations and community groups, has created a certification program in nutrient management for agricultural retailers. The 4R Certification Program is available to retailers in the **Western Lake Erie Basin (WLEB)**, which encompasses parts of Ohio, Michigan and Indiana and spans 8.3 million acres.

Producers work with agricultural dealers to identify products and strategies that are tailored to the needs of their farm. (l to r) Crop advisor, Scott Bergsieker, working with Missouri grower Lynn Fahrmeier.

4R certified retailers advise customers on how to use the **right nutrient source**, in the **right amount**, at the **right time** and in the **right place**. This technique has economic and environmental benefits. It helps producers manage costs and keeps nutrients in the soils and plants and out of waterways.

The **certification process includes 44 standards** across three categories: 1) training and education in 4R practices; 2) monitoring 4R implementation; and 3) nutrient and application recommendations. Annual audits conducted by third parties help the retailers maintain and verify their practices.

After just 2 years, the 4R Program impacted 35 percent of the farmland in the WLEB, with the potential to soon reach nearly all farmland in the watershed. Follow their progress, here.

The Mosaic Company and The Mosaic Company Foundation have played an active role in the development, launch and funding of the 4R Nutrient Stewardship Certification Program.

Partnerships for Healthy Productive Soils

Since 2008, The Mosaic Company, The Mosaic Company Foundation and implementing partner, the S M Sehgal Foundation, has worked with farmers in Rajasthan, India, to improve the health of their soils and the productivity of three crops: pearl millet, wheat and mustard.

The **Krishi Jyoti (or "enlightened agriculture") Project** focuses on five key aspects of agricultural production: soil health, seed and fertilizer, water management, agronomic training and market linkages.

Over the last 10 years, the project has grown to serve more than 60 villages, reaching 40,000 people and covering more than 16,000 acres. **Farmers participating in the project have seen yields increase by 20-30 percent.**

Photo credit: The Mosaic Company Foundation

Consumers are Nuts for Nuts!

Case Study: Pacific Gold Agriculture

Consumption of this nutrient-dense food is growing globally, particularly in middle- and upper-income countries.[10] The U.S. tree nut industry (as a whole) is a net exporter. Almond, walnut, pistachio and hazelnut orchards in the U.S. depends on exports for more than 50 percent of sales.[11]

Most of these orchards are in California, where climate change and weather variability are making life challenging for growers. Orchards in California face increasing temperatures and multi-year droughts, complicated by a decline in available labor to care for the tree crops as well as export market disruption due to trade uncertainty.

Photo courtesy of Pacific Gold Agriculture

Improving orchard management practices, such as soil management with no-tillage, use of cover crops and soil microbes, optimal fertilization and irrigation management, can help growers produce more while climate-proofing their trees in difficult growing conditions. Orchard owners can increase soil organic carbon and soil health, making their tree crops resilient during drought, while lowering production costs.

Agricultural service providers and advisors are key components of a sustainable agri-food system. Private agricultural retail service providers share the latest advice and innovation technologies such as data management and precision agriculture systems and customized services to boost the productivity of crops, livestock, orchards and fisheries.

Orchard operators, such as **Pacific Gold Agriculture (PGA),** integrate operational and financial management technology to optimize sustainable farming practices. Customized crop plans for each orchard detail cultural practices at the input level, allowing the full crop year (from fertilization, pest control, irrigation, energy, and staffing) to be measured and analyzed.

Using their proprietary technology platform, PGA benchmarks multiple factors impacting productivity and designs plans focused on fiscal, social, and environmental sustainability. This year, PGA received a Specialty Crop Grant from the **California Department of Food & Agriculture** to study the augmentation of water supply through on-farm groundwater recharge.

PGA brings an expertise in orchard management, crop processing and marketing, and asset management driven by land and water stewardship. Their goals are to ensure that orchards move towards energy self-sufficiency, water efficiency, long-term soil fertility and traceability of their products for consumer knowledge.

Managing Risk Through Diversification

For producers who rely on a major commodity crop such as wheat, maize or rice, diversifying into other crops or livestock products is a way to manage the risk from crop failure or low commodity prices. While there are risks to growing unfamiliar products, support from government and the private sector can facilitate this transition.

In India, for example, women farmers are growing vegetables for local markets to earn money for school fees, healthcare and food. In addition to paying for household necessities, it provides another source of income, should the family not earn enough from their cash crop, usually cotton, wheat or rice.

Diversification for Resilience in Vietnam

Vietnam is the world's second largest rice exporter, but rice productivity and output are threatened by climate change.

With its flat terrain averaging less than one meter above sea level, Vietnam and its neighbors in the **Mekong River Basin** are vulnerable to sea rise which is increasing the salinity of the water they use for rice production.

Upstream dams on the Mekong River, are restricting the flow of fresh water, which exacerbates the salinity of the waters downstream and create drought in other sections of the delta.

Catching shrimp in a rice-shrimp field in Vietnam. In Vietnam, 90 to 95 percent of the area under shrimp production and 65 percent of production volume originate with small-scale farmers. Photo credit: Kam Suan Pheng/World Fish

Taken together, these shifts threaten the region's food security and environmental sustainability.

The Vietnamese government is providing new options for farmers to improve their agricultural practices and grow diverse, higher-value crops.

In 2000, the Vietnamese government encouraged farmers to adopt a rice-shrimp rotation system. Farmers raise shrimp during the dry season (February to June) and grow rice in the rainy season (August to December).

The wet season rainfall flushes some of the salinity from the soil during the period between harvesting the shrimp and planting the rice. New rice seed varieties enable farmers to increase yields in soils with higher salinity rates.

Public-private partnerships are also working to improve the quality of Vietnamese shrimp production.

Through training courses sponsored by **USAID**, farmers learn how to select high-quality post-larvae shrimp and to construct a shrimp nursery where young shrimp can be fed with approved nutritious starter feed.

This boost in the early stage of their life cycle helps shrimp grow more quickly to full weight and size, as well as become more resilient to sudden water stresses from salinity or temperature changes.[12]

The future of shrimp production in Vietnam depends heavily on fostering their knowledge and use of best practices to boost sustainable productivity.

Insuring the Present and Protecting the Future

Farmers use credit to purchase inputs, buy or rent mechanization, hire labor, install irrigation and acquire more land. They also rely on credit to see them through periods of low crop prices or for purchases between growing seasons.

In **India**, farmers use both formal and informal credit sources to increase their net farm income.

A national survey of India's agricultural households found that **52 percent of farmers tap into formal or informal credit markets and 85 percent of agricultural credit is used to purchase inputs or to rent mechanization.**

The survey reveals a positive correlation between access to credit (formal and informal) and an increase in net farm income. People who borrowed from institutions, such as banks or farmer cooperatives, realized 17 percent more net farm income than people who borrowed from moneylenders, friends or relatives.

The link between institutional credit and higher net farm income is largely due to the characteristics of formal borrowers. They are more likely to be experienced farmers, with more education and business experience, and have larger landholdings to use as collateral.

The total amount of agricultural financing from formal lenders in India has increased four-fold in the last decade, but institutional credit still disproportionally benefits medium and large-scale farmers.

Most small and marginal borrowers rely on informal sources, which typically charge higher interest rates, driving up the cost of their investment.

Financing for Tenant Farmers in Bangladesh

BRAC, the world's largest development organization, is working with tenant farmers in Bangladesh to provide access to financial support and technology through the **Borgachasi/Sharecropper Union Programme (BCU) Project.** BRAC provides credit to farmers for purchasing inputs, tools and irrigation equipment. They also provide technical support to address farmers' production and post-harvest challenges. With the support of Bangladesh's largest banks, BRAC hopes to reach 300,000 sharecropper/tenant farmers with credit and proven agricultural technologies.

Coping Strategies with Generational Consequences

During periods of prolonged drought, small-scale farmers are faced with difficult choices.

Those with more assets raise cash by selling cattle and equipment or by leasing their land. The poorest farmers, with fewer assets, cope primarily by reducing their consumption, particularly of food.

Both coping strategies have generational consequences for the health and economic prospects of the family and the productive capacity of the land.

Crop and livestock insurance can stabilize farmer incomes and food security during times of crisis. It also ensures they have enough resources and assets to improve their productivity once the crisis subsides.

Small-scale dairy farmers in Kenya can purchase livestock insurance through their local co-operative. The average dairy farm in Kenya has less than 10 cows and the loss of one cow to accident, death or disease can have a devastating impact on household income. Livestock insurance enables farmers to replace this expensive capital asset relatively quickly and minimize the income loss. Photo credit: ILRI/Paul Karaimu

Investing in Infrastructure for Agriculture

Productive sustainable food and agriculture systems need efficient, affordable and up-to-date systems for transportation and communications.

It takes well-constructed, properly-maintained and interlinked infrastructure to move goods to markets efficiently, while preserving freshness, quality and safety of food and agricultural products.

Road and railroad improvements enable more farmers to get their products to market. Reliable telecommunications systems provide farmers with market and agronomic information and support the use of precision and data technologies.

Modernization and maintenance of this these systems ensures a smooth functioning agricultural value chain and expands trade capacity. It also reduces costs and risk, which benefits everyone from producers to consumers.

The private sector has a vitally important role to play in ensuring that the critical infrastructure for agriculture are developed and improved. Accordingly, **policymakers should look for opportunities to leverage private sector capital and expertise** to share risk and generate greater returns than either sector could achieve independently.

Photo credit: Graham Crough/World Bank

Transporting Food From Field to Plate

Local, regional and global food and agriculture systems rely on roads to transport from farmers all the way to consumers.

Yet investments in the world's road infrastructure is woefully underfunded. Of the estimated $15 trillion infrastructure investment gap, $8 trillion is for roads alone.[13]

For small-scale farmers, the lack of year-round access to an efficient rural road network is their greatest market access barrier. When roads are impassible, it is difficult for farmers to access inputs or bring their products to market. Consumers in poor rural areas must rely the on food they can produce themselves, limiting the diversity of their diets.

Rural roads in Zambia during the rainy season. Photo credit: Ann Steensland/GHI

As a public good, transportation networks are the primary responsibility of governments. Installing, repairing and replacing roads requires significant, sustained investments. This is especially true in rural areas which are less likely to attract private investment.

Roads in the U.S. are also in trouble: 21 percent of the nation's highways are failing, according to the American Society of Civil Engineers.

Connectivity for Productivity

In addition to roads, farmers of all scales need a reliable high-quality telecommunications infrastructure.

Mobile phone technology has already revolutionized how farmers around the world access agronomic advice, market information and banking systems.

Extending mobile cellular and high-speed reliable broadband services to agricultural areas will facilitate the adoption of the data and precision agriculture technologies that are the significant drivers of productivity growth in the twenty-first century

Precision systems give farmers the ability to maximize the productivity of their fields. Livestock producers use data to monitor animal health and manage grazing lands. Precision systems also help farmers reduce costs. USDA researchers estimate the cost savings from precision agriculture in corn production ranges from $13 to $25 per acre.

Most U.S. crop and grazing land in the U.S. is not covered by mobile cellular or high-speed, high-quality broadband services.

The 2018 Omnibus Budget allocated $600 million for a broadband pilot grant/loan program to encourage communications companies and cooperatives to extend the broadband infrastructure and provide internet service to rural homes, schools and hospitals. **But the coverage for agricultural land also needs investment**.

Rural America accounts for three-quarters of the country's land area but is home to just 14 percent of the U.S. population. These sparsely populated areas struggle to attract private-sector investments to expand broadband coverage.

The Agricultural Broadband Coalition (ABC), a diverse group of farmer associations, equipment manufacturers and technology companies, is supporting the Precision Agriculture Productivity Act of 2018, which passed the House in June 2018 and will next be considered by the Senate.

The legislation calls for the creation of a task force to study the specific connectivity requirements for precision technologies and recommend policies to deploy high-quality high-speed fixed broadband and mobile cellular service to 95 percent of U.S. agricultural crop and grazing lands by 2025.

This will enable more farmers to adopt precision agriculture technologies and data analytics that boost productivity growth and help ensure the U.S. can sustainably produce food, feed, fiber and biofuel for domestic consumers and millions around the world.

Endnotes

[1] FAOSTAT Online, Nigeria Country Indicators, accessed August 23, 2018.
[2] Nigeria At A Glance: online summary, UN Food and Agriculture Organization, http://www.fao.org/nigeria/fao-in-nigeria/nigeria-at-aglance/en/, accessed August 22, 2018.
[3] Nigeria At A Glance: online summary, UN Food and Agriculture Organization, http://www.fao.org/nigeria/fao-in-nigeria/nigeria-at-aglance/en/, accessed August 22, 2018.
[4] *Mechanized: Transforming Africa's Agriculture Value Chains, Nigeria,* Malabo Montpellier Panel, 2018.
[5] "John Deere and Tata sign potentially groundbreaking deal in Nigeria," *Financial Times*, April 30, 2018.
[66] "Nigeria to procure tractors from agricultural company," Voice of Nigeria, online, https://www.von.gov.ng/nigeria-to-procure-tractorsfrom-agricultural-company/, accessed August 22, 2018.
[7] Sarah K. Lowder, Brian Carisma and Jakob Skoet, "Who Invests in Agriculture and How Much?" FAO, EAS Working Paper No. 12-09, December 2012.
[8] Thomas Reardon, "Growing Foods for Growing Cities: Transforming Food Systems in an Urbanizing World", Chicago Council for Global Affairs, (April 2016).
[9] Etai Even-Zahaz and Candice Kelly, "Systemic Review of the Literature on 'Informal Economy' and 'Food Security'," Institute for Poverty Land and Agrarian Studies, Working Paper No. 35, (July 5, 2016), 14, 16.
[10] Nuts and Dried Fruits Statistical Yearbook 2017/2018, International Nut and Dried Fruit Council Foundation, file:///C:/Users/Ann%20Steensland/Downloads/1524481168_INC_Statistical_Yearbook_2017-2018.pdf
[11] Travis Minor and Agnes Perez. "Consumer demand for fresh fruit drives increases across sector." USDA ERS, Amber Waves, April 2, 2018.
[12] Vile, J. and S. Gustafson, "Adaptation of Rice-Shrimp Farming in the Mekong Delta: How Community Adaptation Solutions Can Inform Landscape Level Change," Published by USAID, March 2016.
[13] *Global Infrastructure Outlook: Infrastructure investment needs, 50 countries, 7 sectors to 2040*, Oxford Economics Global Infrastructure Hub – A G20 Initiative, 2017.