Agriculture

Access to technology and finance can change agriculture in Africa

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Agricultural production per capita is declining steadily throughout sub-Saharan Africa. At the same time, South America sustains high production after an impressive decade-long sprint to improve productivity and China's yields per capita continue to rise. As a result, sub-Saharan Africa is condemned to food insecurity and an expensive agricultural trade deficit without a revolution in agriculture.

Rather than replacing farm workers, of which there is an abundant supply on the African continent, agricultural technologies will likely help farmers reduce inputs such as herbicides, pesticides and fertilisers through greater precision in their application. Devices such as drones can also help to inspect fields and monitor herd animals. [38] In its 2019 report on the state of climatic conditions in Africa, the World Meteorological Association notes that solar-powered micro-irrigation has the potential not only to offset carbon emissions but also to increase farm-level incomes five to ten times, improve yields by up to 300% and reduce water usage by up to 90. [39]

Mobile technology can alleviate many of the bottlenecks in Africa's smallholder agricultural credit system and enable farmers to access farming inputs at lower costs. For example:

- In Kenya, the company FarmDrive [40] uses machine learning and various data sources to unlock access to credit for smallholder farmers. Once the exact location of the smallholder farm is confirmed, [41] often with reference to a known reference point such as the location of a nearby primary school, the system accesses geospatial information to determine soil quality, weather conditions and market accessibility, and then uses an algorithm to determine a credit score. The associated decision-making tool enables financial institutions to develop small-scale agriculture loan products. In this way, modern technology facilitates a process through which smallholder farmers can access capital to purchase critical farming inputs such as seed, fertiliser and implements that could increase yields and revenues.

- In Ghana, Kenya and Uganda, more than 20 000 farmers have access to affordable insurance contracts (such as against crop failure or the loss of expensive breeding stock) via their smartphones, using blockchain technology. The system uses high-resolution satellite images to detect rainfall and plant growth data and offers advice on what, when and where to plant as well as directing farmers to suitable packaging and distribution centres. [42]

- The World Food Programme's Rural Resilience Initiative (R4) is also helping to implement innovations in finance and insurance to increase food and income security and reduce the climate-related farming risks. Their efforts reached more than 57 000 farmers in Ethiopia, Senegal, Malawi, Zambia and Kenya in 2018. [43]

Over the last decade, the Alliance for a Green Revolution in Africa (AGRA) has invested hundreds of millions of dollars in improved seeds and has doubled maize yields in the 18 countries where they work [44] (although detractors are opposed to these green revolution programmes, [45] calling them efforts to promote industrial agriculture).

These examples reflect some of many emerging African solutions that can help the continent's estimated 50 million smallholder farmers change a traditional farming mindset to one focused on practising agriculture as a business. However, a lack of access to electricity in rural areas and low Internet penetration are major obstacles to applying modern technology in agriculture (also see Theme 7).

Improving soil fertility is another important aspect of improved agricultural production. The use of fertilisers, whether organic or human-made, has greatly boosted yields. Usage in Africa is generally lower than elsewhere in the world despite the soil being poorer than in most other continents. [46] With the limited use of fertiliser soil fertility depletion generally continues unabated. The challenge is that both the manufacturing and application of fertilisers (generally in the form of ammonia as nitrogen supplement) has a heavy carbon emissions toll. [47]
The reason for low fertiliser use in Africa is that prices are far more expensive than elsewhere in the world because the continent generally imports fertiliser instead of manufacturing it. Although the delivered cost at the port is similar to that for other importing countries, the cost of distribution in Africa is higher, reflecting the continent’s poor transport infrastructure, the lack of competition and inappropriate regulations. [48]

Despite a strong lobby against more intensive fertiliser use, various efforts are now underway to increase production of fertilisers on the continent. For example:

• The Indorama Eleme public-private fertiliser plant, which was completed in 2016, intends to turn Nigeria from a large fertiliser importer to a self-sufficient producer and eventually a net exporter. [49]

• Morocco’s OCP Group, which holds 75% of the world’s phosphate reserves (an essential ingredient for phosphate-based fertilisers), has announced plans for a US$1 billion industrial investment in fertiliser plants in Nigeria while constructing a massive plant in Dire Dawa in eastern Ethiopia, at an estimated cost of US$3.7 billion. [50]
Endnotes


5. T Lewis, *Transatlantic slave trade*, 2018


14. World Bank, *Aggregated LPI*

15. World Bank, *Aggregated LPI*

16. Embassy of the DR Congo, *Invest in DRC, Agriculture*


19. In 2003, the New Partnership for Africa’s Development (now called the African Union Development Agency) published its Comprehensive Africa Agriculture Development Programme, with ambitious goals, namely to: allocate at least 10% of national budgets to agriculture; reach rural growth rates of 6% annually by 2015; integrate and invigorate regional and national agricultural markets; significantly increase agricultural exports; transform Africa into a ‘strategic player’ in global agricultural science and technology; practise sound environmental and land management techniques; and reduce rural poverty (see: M Fleshman, *Boosting African farm yields*, 2014).

20. The commitment to devote at least 10% of national budgets to agriculture and rural development was also included in the 2003 Maputo Declaration by African heads of state and reiterated in the 2014 Malabo Declaration on Accelerated Agricultural Growth and Transformation in Africa.

21. On aggregate, Africa spends only 5–7% of national budgets on agriculture, although a 2018 study found that 11 African countries did manage to allocate 10% or more of their budgets to agriculture in some years since 2005, with Ethiopia, Kenya, Mozambique and Sierra Leone achieving 6% agricultural

22. AllAfrica, *Communique: Africa food security leadership dialogue*, August 5, 2019

23. IPPMedia, *Value add in Africa: First steps in a long journey*, 2019; also see: African Cashew Alliance, *About us*

24. The world cocoa industry is worth more than US$100 billion annually; also see: Y Adegoke, *Why Europe dominates the global chocolate market while Africa produces all the cocoa*, 2018; D Philling, The African farmers taking on big chocolate, *Financial Mail*, 16 December 2019; H Fofack, *Overcoming the colonial development model of resource extraction for sustainable development in Africa*, 2019


30. World Bank, *Agriculture in Africa: Telling facts from myths*

31. In contrast to the tripling in growth cited earlier, this was an improvement across the entire country, so the growth is understandably much smaller; see: JY Lin, The Household Responsibility System in China’s Agricultural Reform: A Theoretical and Empirical Study, *Economic Development and Cultural Change*, 36:53, 1988, S199–S224

32. China-Africa Project, Chinese and African agriculture have a lot more in common that most people think: *Interview with Xinqing Lu, Associate Programme Officer for Alliance for a Green Revolution in Africa*, 3 December 2019

33. OEC, Brazil


35. L Abboud, *The robot revolution down on the farm*, 2018


37. R Kimani and P Bosire, *FarmDrive*, 2019

38. J Bird, *'Smart' insurance helps poor farmers to cut risk*, *Financial Times*, 5 December 2018; also see, for example, https://agrocenta.com/ and https://www.zenvus.com/.

44. S Gebre, AGRA plans to invest $500 million in African seed companies, Bloomberg, 7 September 2016

45. The Alliance for Food Sovereignty in Africa and its allied organisations argue that ‘AGRA has unequivocally failed in its mission to increase productivity and incomes and reduce food insecurity, and has in fact harmed broader efforts to support African farmers.’ See: Various co-signatories, Open letter: The Green Revolution in Africa has unequivocally failed, 15 September 2021


47. Ammonia manufacturing contributes 1% of worldwide carbon dioxide emissions. See LK Boerner, Industrial ammonia production emits more CO2 than any other chemical-making reaction. Chemists want to change that, *Chemical & Engineering News*, 15 June 2019


49. Indorama Petrochemicals, About IEPL, Port Harcourt


54. Food and Agriculture Organization, Food wastage: Key facts and figures

55. InspiraFarms, Our team

56. The improvements in yields are similar in magnitude to the improvements seen in South Asia between 1980 and 2020, and in a similar timeframe. Indeed, South America achieved a much more rapid increase between 2000 and 2010, moving from roughly 7.8 tons per hectare to about 11.8 tons.

57. Chart 14 presents the reduction in extreme poverty in African countries across the low- and middle-income categories. The reduction in extreme poverty in Seychelles, Africa’s only high-income country, is negligible.

58. The contribution of agriculture as a proportion of the Seychelles’ economy, the continent’s only high-income island state, was about 4% in 2019.

59. Some of these constraints can be overcome through technology, such as the use of precision irrigation and application of precise amounts of fertiliser exactly where they are required. Then there is also the potential of vertical farming, which could produce 180 m tons of food globally, according to some analysts.


61. Food and Agriculture Organization, Government expenditure on agriculture, 2019


63. Intergovernmental Panel on Climate Change, Working Group II: *Impacts, adaptation and vulnerability*, 2018


65. The International Institute of Tropical Agriculture does particularly impressive work in this regard. See: https://www.iita.org/
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