Leapfrogging for Africa's agri-food sector

Affordable and effective solutions are being applied in a wide range of areas in which Africa has been lagging behind in terms of key development indicators. Development leaps are above all crucial in the fields of health, education, and agriculture and food, our author argues, concentrating on the two latter items.

By Sabine Sütterlin

Sacks made of three layers of polyethylene with an airtight closure can trigger a great leap in development. Purdue Improved Crop Storage bags, or PICS bags, were originally invented to tackle the problem of seed beetles that were ravaging the stored cowpea harvest in Cameroon; they work by depriving the insects of air. PICS bags and similar containers are now available in most African countries, enabling grains, legumes and other crops to be stored without risk of damage by pest or mould and without the use of pesticides until the farmers are able to market their produce at a good price.

This is leapfrogging for Africa: a technically simple, affordable, direct and permanently effective solution to a problem which, according to conventional understanding, requires significant investment and wide-ranging measures. The fact is that up to one-fifth of the food produced by farmers in sub-Saharan Africa is lost before it can fill hungry stomachs. One of the reasons for this is the absence of the technology and infrastructure needed to dry crops and store them safely so that they can later be processed into durable products and transported to consumers.

Leapfrogging is the term used to describe the bypassing of inefficient, environmentally damaging and expensive steps in the development of achievements that improve and simplify people's lives.

Africa supplies some impressive examples of leapfrogging. For example, just 20 years ago telephoning was still impossible for the majority of Africans. Laying cables everywhere would have been technically too demanding. In addition, the investment costs could not be justified given the limited number of users who could afford to pay. When cheaper mobile phone technology arrived, the continent simply leapfrogged the landline era. Today 477 million people in sub-Saharan Africa – 43 per cent of the population – have a mobile phone, while 272 million use mobile Internet. Mobile phones are used not just to make phone calls but also to make cashless purchases and to take out loans and insurance policies.

Leapfrogging is not confined to technical and scientific breakthroughs; it also applies to apparently simple inventions and social innovations. Africa needs leaps of all sorts, because it lags behind almost every other part of the world on virtually all development indicators. At the same time, its rapid population growth often frustrates or even reverses economic development. On top of this there now comes the global health and economic crisis caused by the novel coronavirus. This could hit Africa hardest of all: the impacts are already noticeable.

Development leaps in Africa are particularly crucial in three key areas: health, education, and the agriculture and food sector.

Today, 43 per cent of the population in sub-Saharan Africa have a mobile phone.

Photos: Jörg Böthling

If they are not healthy, people cannot participate in society or access education and employment – and hence contribute to socio-economic development. But some African countries – and rural areas in particular – lack universally accessible and affordable primary health care. Trained lay health assistants can bring about significant improvements, especially if they can keep in touch with experts via smartphone or telemedicine.

Education in turn paves the way for better health; it also makes it easier for people to find work and generate income. But in many African countries neither the number of teachers nor their level of qualification is sufficient to provide primary and secondary schooling across the board. Gaps can be identified using electronic data collection systems and, to some extent, remedied with the help of digital learning aids.

Raising agricultural productivity

Rapid development leaps are particularly needed in agriculture – partly to create food security and partly because a productive agriculture and food sector can become a driver of broader socioeconomic development.

Until the 1960s, Africa's farmers were still able to produce enough food to feed the continent's population, which then numbered around 300 million. Today, Africa has higher rates of undernourishment than any other part of the world. It is estimated that around 20 per cent of the 1.3 billion people in Africa have less food than the amount needed "to lead a normally active and healthy life".

And yet the continent has at least a quarter of the world's agricultural land and pasture, which ought to suffice to feed a sixth of the world population. But for decades government programmes and investment largely ignored the agricultural sector and the modernisation of rural regions. Even now, farming and livestock husbandry largely take place on family-run smallholdings whose yields are far below what could be achieved with modern farming methods.

The farmers work hard but rarely produce more than they need for their own use, which means that they are unable to generate an income. They are trapped in a cycle of poverty and high population growth: without money they cannot buy quality seed that achieves better results than the self-saved seed they have retained from the last harvest. Because they are poor and often have no secure land rights, banks will not give them the loans that they could use to buy fertiliser, hire a tractor or rent additional land. Agricultural services and advice are often lacking.

The situation is exacerbated by the fact that it is in the Global South that climate change is becoming particularly noticeable. Rainy periods are shifting, and droughts, heavy rain, floods and soil erosion are leading to crop failure on a large scale. In the Sahel region, increasing aridity and rapid population growth are intensifying the frequency of conflict between farmers and nomadic pastoralists who are having greater difficulty finding feeding grounds and water for their animals. In many parts of sub-Saharan Africa, armed terror groups and civil wars put agricultural production and farmers' livelihoods at risk. Thirty-four of the 54 (recognised) African countries are currently dependent on food aid as a result of the impacts of climate change, poor economic performance or conflict. Governments spend valuable foreign exchange on importing basic foodstuffs.

A crucial role for smallholders

The continent's small-scale farmers could be the key to food security. They need innovations of all sorts in order to produce more and to farm more efficiently. This does not mean that they should pursue the model of industrial agriculture that is widespread in large parts of Europe, America and Australia. In industrial agriculture, productivity is achieved at the expense of the environment and the world's climate: it involves massive consumption of water and makes a significant contribution to greenhouse gas emissions. In addition, the large-scale use of nitrogen fertilisers, whether mineral or organic, pollutes groundwater and surface waters with nitrates. Monocultures and synthetic chemical pesticides and herbicides drastically reduce biodiversity. And in the former developing countries of Asia, the Green Revolution has led to undesirable developments and damage, such as soil salination as a result of increased evaporation on irrigated fields without adequate drainage.

African agriculture must therefore "intensify sustainably". This means that it must produce more while also being climate-resilient and not damaging the environment. In addition, Afri-

LEAPFROGGING METHODS ARE USEFUL AND PROMISING IF …

- they make the construction of expensive infrastructures redundant, such as the copper cables for fixed-line telephony or large power plants for electricity supply;
- the need is great enough, for example when many people without prior access to a bank branch benefit from mobile banking;
- they can be used in many ways, for example if smartphones are also used for consulting services, e-learning programmes or for collecting medical data;
- they solve problems efficiently and create new opportunities for socio-economic development, for example when learning programmes enable or improve schooling where there is a shortage of trained teachers;
- they promise a direct benefit for the users, for example if herders can find available pasture land via an app;
- they are easy to use and facilitate difficult tasks, such as drones monitoring the ripening progress of crops and the water content of soils or controlling breeding sites of mosquitoes and other disease vectors;
- they rapidly become cheaper, as was the case with the electronic storage of data.

Source: "Leapfrogging Africa" (2020)

High-quality crop storage bags help minimise harvest losses.

Decentralised solar power renders expensive, less environment-friendly energy systems superfluous.

can enterprises must do more to process raw products into marketable foods for the continent's population – especially for the growing cities and their burgeoning middle class. Establishing value chains means creating jobs and sources of income in rural areas. Around primary production there then emerges an agri-food complex that can drive further economic development.

Leaps are possible in all these areas. Many possible innovations are being trialled or are already in use, and there is no lack of further ideas. A lot of ideas come from Africa itself. This is important, because there are rarely one-size-fits-all solutions. The continent is characterised by a wide range of different ecological conditions and specific local needs.

At the very beginning, the smallholders must be enabled to share the existing knowledge on issues such as sustainable, soil-conserving farming methods and marketing channels. This applies in particular to women, since they shoulder the majority of the work but often have little to say and are cut off from information. In many places, universally available agricultural advice services are in themselves equivalent to a leap forward. SMS services such as the Wefarm platform provide relatively simple digital means of communicating knowhow. Wefarm is based on the idea that for almost every problem that arises on a farm there will be another smallholder somewhere who has already found a solution. Questions sent by text message to Wefarm are quickly answered by other farmers who are happy to pass on their experience.

Reliable tractor services can ease hard work in the fields for farmers.

Wefarm was developed by two British development workers. So far, it is used by one million smallholders in Kenya and Uganda alone; according to the platform operators, more than 40,000 questions and answers are shared by the farmers every day.

Minimising risks

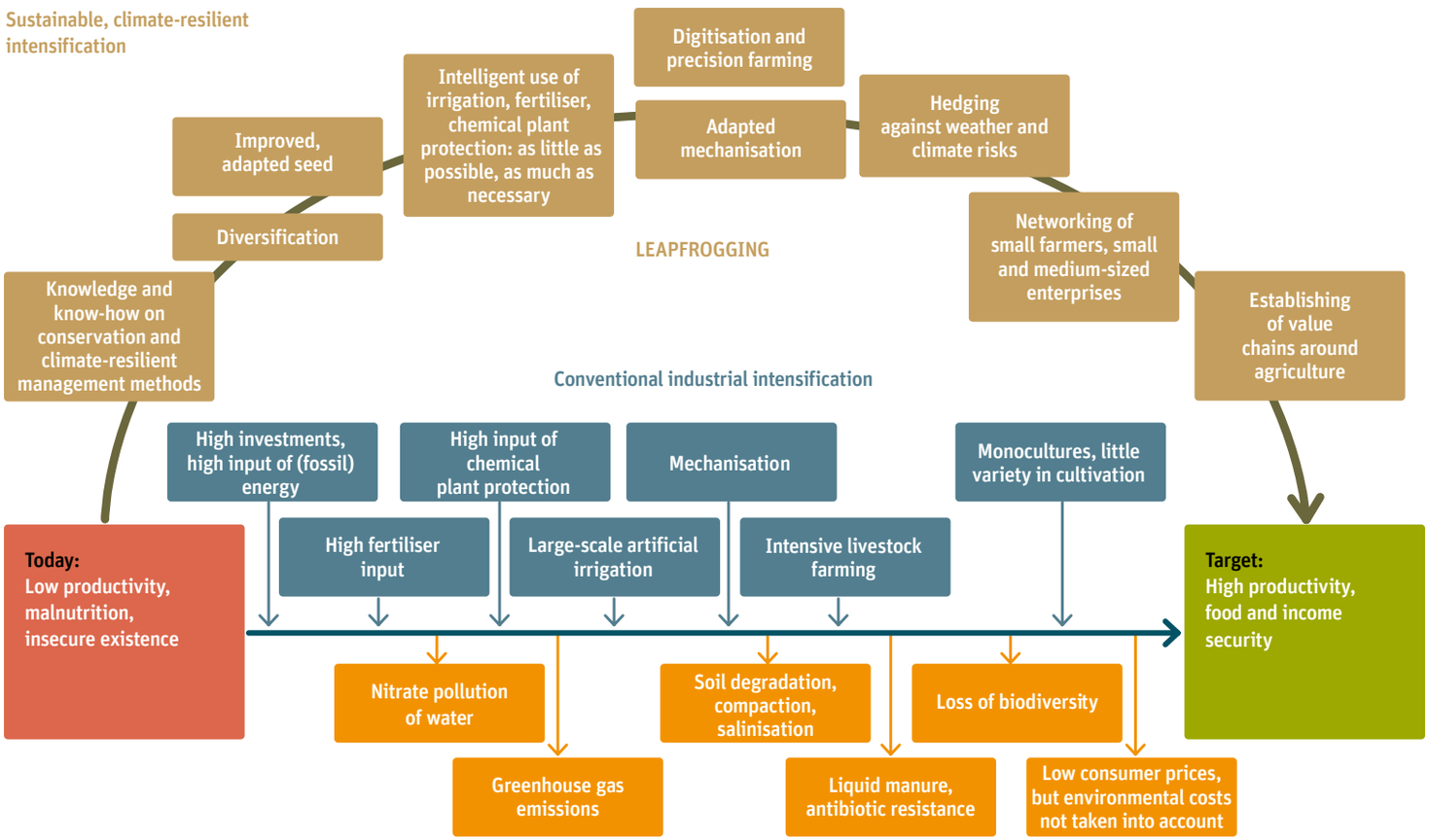
Better weather forecasting and disaster warning systems enable farmers to make preparations and, for example, to adjust sowing and harvesting timetables. Weather data and positioning systems also let farmers insure themselves against risks that they have previously been completely at the mercy of, such as when weather anomalies lead to crop failure, or when their animals starve or die of disease. Until now, agricultural insurance schemes have been virtually non-existent and those that do exist are often rejected by African farmers because they suspect them of being costly and complex to administer. The organisation ACRE Africa (Agriculture and Climate Risk Enterprise) has found a way of overcoming these obstacles: it has developed insurance products based on weather indexing that are tailored to the needs and habits of smallholders, and it sells them partly through the agricultural trade. When customers buy certified seed, they receive a quick code. All they need to do in order to register is send this code by mobile phone to the local insurer. The insurer localises the insured farmer and tracks rainfall in the corresponding area by satellite. If the seed does not germinate because the amount of rain is above or below a certain index value, the insurer refunds the cost of the seed to the farmer or provides a voucher that can be used to buy new seed – all by mobile phone.

Securing income and making work easier

In Nigeria, the social enterprise Babban Gona is utilising economies of scale to help farmers boost their yields and income. By buying in bulk and raising capital, the enterprise enables farmers to acquire fertiliser, quality seed and bags with an airtight closure for the safe storage of produce, all at low cost. Babban Gona also offers advice and collects the bags in central warehouses so that they can then be sold at the best possible price. With the help of Babban Gona, the farmers have on average been able to increase their maize yields to 2.3 times the average national yield.

In Senegal, a young vet has beaten new paths for poor pastoralists in the north of the country

Leapfrogging in agriculture: towards a "greener" Green Revolution



Source: author's own representation

by opening up a market for their milk production. His business collects the milk regularly and takes it to Dakar in refrigerated trucks. There it is made into yoghurt and other products for which there is a ready market in the capital. Using waste from regional rice and sugar production, the entrepreneur has also made additional sources of feed available for the animals. This means that the farmers and their herds no longer need to travel further and further south – and into crop-growing areas – when grass becomes scarce in the north. In addition, the young entrepreneur has introduced new cattle breeds that cope well with conditions in the Sahel but also give more milk. A dairy of its own is an enormous leap forward for the West African country. More than half the milk and milk products that Senegal uses are imported, almost entirely in the form of milk powder from the European Union's excess production.

Various innovations serve to ease the hard work in the fields. One example is Hello Tractor, a sort of "Uber for agricultural machinery" (see also interview with Hello Tractor founder and CEO Jehiel Oliver at www.rural21.com). The Nigerian electronics company Zenvus has developed simple sensors specifically for smallholders. The mushroom-shaped devices, placed in the soil at regular intervals, measure the soil's moisture, acidity and nutrient content at those points. Using solar power, the recorded values are transmitted wirelessly to the main sensor and then to a cloud server. The server processes the data and sends detailed information about the state of the farmland to the farmer's mobile phone.

Taking advantage of innovations

Many ideas for scientific, technical and social innovations can potentially be rolled out on a broad scale. They can serve as a blueprint for other organisations and countries. Benefiting from successful projects and the experience acquired through them is nothing other than successful leapfrogging. However, the conditions must be right: necessary elements are good governance, reliable institutions and legal certainty, the creation of necessary infrastructure (including a distributed energy supply system, roads and an Internet connection), equal rights of access to information and financing instruments, and an investment-friendly and business-friendly climate. It is the task of the African governments to lay the foundations for these things.

"Africa should itself produce what it eats, and it should create added value with its products," says the Nigerian Akinwumi Adesina, who is a farmer's son, an agro-economist and, since 2015, head of the African Development Bank. "I want young people to enter an entrepreneurially oriented agricultural sector. Because nobody drinks oil, nobody smokes gas, but 1.3 billion people eat food. That is the biggest and the most profitable market."

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This article is based on two reports of the Berlin Institute, which Sabine Sütterlin has co-authored, "Leapfrogging Africa" (2020) and "Food, Jobs and Sustainability" (2018).

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