

Smallholder Digitalization in Sub-Saharan Africa — Trap or Trampoline?

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Digitalization has transformed agriculture worldwide for the past two decades. Farmers' usage of digital services has grown by 40 % to 45 % per year over the last three years. Digitalization is often celebrated as a magic bullet for increased agricultural output and productivity — and even sustainability. Smallholder farmers in sub-Saharan Africa, however, face major hurdles in accessing digital solutions. While producing the majority of the food consumed on the continent, their production does often not even cover their own household's needs. They are disproportionately affected by hunger, climate change, and poverty. Without adequate access to digital services, smallholder farmers risk falling victim to the digital divide. This briefing paper argues that digitalization is not a technological fix. It rather represents the potentials and pitfalls — traps and trampolines — of its social, economic, and political underpinnings and power relations.

Keywords: *Digitalization, Africa, Agriculture, International Development Cooperation, Rural Development, Small-Scale Agriculture, Smallholders, Digital Divide*

Digitalization in Agriculture: Prodigy of Productivity?

Digital technologies such as “the Internet, mobile technologies and devices, data analytics, artificial intelligence, digitally-delivered services and apps” (OECD 2018) are deeply transforming agricultural practices and food systems. Digital solutions lay on a spectrum from “low-tech”, e.g. mobile platforms, to “high-tech”, e.g. smart farms. Both rely on **data** as well as create it. As such, data can “enable value creation” upstream of farms, e.g. by precisely tailoring services to farmers, and downstream of the value chain, e.g. by fostering transparency and therefore stakeholder cooperation (OECD 2019: 1).

Researchers argue that a sustainable agricultural transformation is not possible without promoting digitalisation in agriculture (WBGU 2020: 5). They point to digital answers of sustainability questions: **Pixel farming**, a form of precision agriculture, makes it possible to avoid pesticides — while increasing yields by up to 50 %

(WBGU 2020: 168). **Blockchain technology** enable “smart contracts” for farmers, which are linked to automatic payments, increasing access to agro-insurances, traceability, and value chain transparency (WBGU 2020: 173).

In summary, digitalization in agriculture might create a “highly connected, intelligent, real-time agricultural ecosystem that is vastly more productive, efficient, and transparent than ever before.” (CTA 2019: 16-17)

African Agriculture: The Digital Magic Bullet?

Africa faces **unique agricultural challenges**: African countries must import the majority of their food. Crop production

Digitalization refers to the transformation of everyday life, caused by digital technologies such as the internet of things, artificial intelligence, including blockchain, which is considered the fourth industrial revolution (European Commission 2020).

Digitalization in agriculture is the “use of digital technologies, innovations, and data to transform business models and practices across the agricultural value chain.” (CTA 2019: 5) Ideally, this improves “smallholders access to information, inputs, market, finance and training” and creates “new opportunities to integrate smallholders in a digitally driven agrifood system. (Trendov et al. 2019: 1)

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PREGNANT WITH HOPE: WHO EXPECTS WHAT FROM DIGITALIZATION

Civil Society, Farmers

- improved access to information on markets, inputs, cultivation, diseases, weather
- improved access to financing, insurance and loans
- access to digital training, extension services, and nutritional advice
- networking and collaborating opportunities through digital platforms, e.g. to counter corporate power by sharing alternative knowledge
- strengthened land rights through digital surveying, transactions and formalisation of land titles
- lower input costs through sharing economy solutions

Governmental, Institutional, Supranational Stakeholders

- fiscal-political incentives in pushing digitalization
- reduction of bureaucracy
- easier implementation of policies in isolated areas
- higher transparency and accountability, less corruption
- better evidence bases for developing policies
- promoted market linkages and financial inclusion
- simplified consultation and monitoring of agriculture
- easier supranational cooperation, e.g. by common seals or standards.

Private Sector

- access to new markets, market price transparency
- increased productivity and efficiency through mechanisation, intensification, weather forecasting, pest detection, etc.
- reduced transaction costs and geographical barriers
- more investment in start-ups, private public partnerships, and joint ventures

Development Cooperation

- improved traceability across value chains
- increased market transparency and fairness
- closer producer-consumer relationship
- better information and services for farmers
- lower transaction cost

heavily relies on rain, and 90% of crops are grown on low-yielding arable land. A fourth of production is lost post harvesting. Market access for farmers remains low and (youth) unemployment high (Trendov et al. 2019: 14). The COVID-19 pandemic has led to labour shortages, hindered access to markets and extension services, deepened hunger and poverty (Baumüller and Addom 2020). The majority of food is produced by smallholder farmers, prone to be left behind by digital high-tech farming.

Hence, **most African countries made agricultural transformation a key priority.** Digitalization is thought to be the “game changer” in an “inclusive, digitally-enabled agricultural transformation,” which improves the livelihoods of “Africa’s 250 million smallholder farmers and pastoralists.” (CTA 2019: 16-17)

The digital panacea is **promising African smallholders vast opportunities:** From improved access to information, services and advice to greater productivity and e-voucher-systems, as well as “more sustainable farming practices, improved land rights and ultimately better nutrition — particularly for climate vulnerable and women smallholders.” (CTA 2019: 30)

Mobile broadband connection has taken the continent by storm (see graphic on next page). Based on this, and with an annual growth of about 44% in 2019 more than 33 million African smallholders — roughly 45% of smallholder households — already used digital solutions (CTA 2019: 18). **African digital solutions** today span commodity exchange and ag-commerce,

Smallholders in the Global South are those who produce crops or manage livestock on two or less hectares of land. Family members usually provide most of the labor, as it is also their main source of income and subsistence (IFC 2013: 2). Over 80% of farms globally are smallholder farms. While only using 12% of the farmland, they produce approximately 80% of the food consumed in Asia and sub-Saharan Africa (Fan and Rue 2020: 13). In this paper, in addition to farmers, and agro-pastoralists, food producers, pastoralists and fisherfolk are also considered as smallholder farmers (FAO et al. 2020: 118).

crop disease diagnostics, alternative credit scoring, sharing platforms, cold chain, hydroponics, urban farming, and crowdfarming to name a few). A study found that farmers using digital technologies were able to increase their income by 20 to 40 percent, with high youth usership (CTA 2019: 20).

Kenya is praised as a paragon of digitalization — what makes it successful? See box on next page.

Digital Divide: The Person You Are Trying to Reach is Unavailable

Large parts of the world’s population, especially in the Global South, lack digital literacy, and access to basic infrastructure, devices and financial means (AUC & OECD 2021). This is known as “**digital divide**” — a phenomenon that refers to economic, cultural, political, personal and social inequalities in access to digital and technological solutions. Given these inequalities, the digital divide must be understood as a social rather than technical problem (Ragnedda 2019).

Regarding smallholders, those inequalities are usually compounded by the **rural and gender divide**. Rural regions are usually left behind in the infrastructural and educational development compared to urban centres. Women use the internet significantly less than men. Only one in seven women has access to mobile services in so-called “least developed countries” — 31% less than their male counterparts (Bassermann 2019; Malabo Montpellier Panel 2019).

Without addressing the **triple digital, rural and gender divide**, digitalization threatens to widen existing gaps between marginalized and privileged groups (Bassermann 2019).

Power to the Market: Digitalization as a Trap?

Critics of digitalization in agriculture warn of **lock-in effects**: The increasing dependence of smallholders on large agro and tech companies. In the input sector, large companies are increasingly dictating what, how, when and where farmers can buy (Mooney 2018: 11-12).

Moreover, "Big Data not only invites but in fact demands greater **concentration**, since no company at any point along the chain can risk allowing others to gain control of more information." (Mooney 2018: 10) This promotes vertical integration and oligopolistic market positions (CTA 2019: 21).

Multinational corporations deem smallholders an **"untapped" market**. This makes smallholders prone to receive selective, business-biased information. For example, half of all private sector research projects in the agricultural sector focus on maize. The other nearly 7,000 species grown by smallholders are neglected (Mooney 2018: 28).

Large corporations **harness and commodify data**. Data protection laws of end users in the Global South are often not formalized, and information is processed in the Global North. Hence, smallholder knowledge and data looms to be privatized (Tanzmann 2019).

Often, smallholders cannot afford services or are excluded because digital "solutions" are not adapted to the **regional context and language** (Bassermann 2019).

Daniel Wanjama of the Seed Savers Network Kenya, laments that "there is still widespread **digital illiteracy** in the country

along with skepticism about new, digital technologies in rural regions, especially among elderly people." (direct quote from SLE's Development Policy Debate)

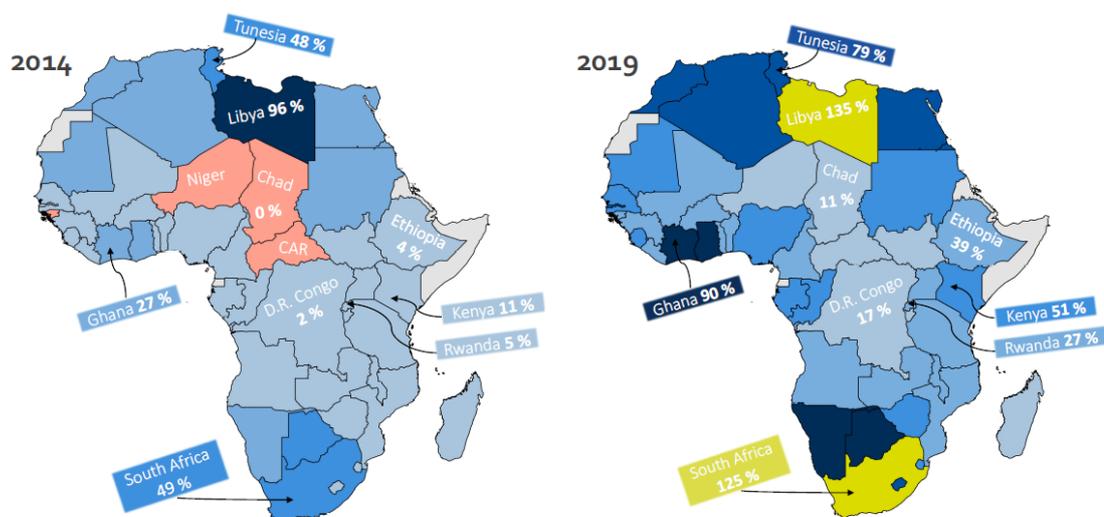
Overarchingly, technological advances might outrun their institutional embedding and **exacerbate inequalities**. The current lack of regulatory frameworks for digital business on all governmental levels distributes its profits to the rich (Mooney 2018: 26).

Recommendations: Make Digitalization Work for African Smallholders

Marginalized populations must also benefit from digitalization in agriculture. To that end, we recommend to ensure that your approach is **multidisciplinary, multidimensional and multi-levelled**:

1. **Make inclusive digitalization a national priority**, like in Kenya.
2. **Ensure barrier-free access to communication and information technologies, also in difficult to reach rural areas.** (Northoff 2020; WBGU 2020: 179)
 - a. Design digitalization processes in a highly inclusive way. Adapt them to the needs and perspectives of target-groups.
 - b. Make digital services affordable.
 - c. Adapt information to local farmers'

Mobile Broadband Connection in African Countries 2014 and 2019



Mobile Broadband Connection Penetration
Relative share of population holding 3G or 4G SIM Card

Data Source: GSMA Mobile Connectivity Index



KENYA : AFRICA'S DIGITAL LEADER

Kenya and its capital Nairobi attract national and international tech companies. Start-ups offering digital services are flourishing. Kenya has a dedicated ICT (Information, Communication, Technology) ministry. The agricultural ministry promotes e-voucher programmes for agro-inputs, digital extension services, and data collection and sharing. This success story is based on Kenya's pioneer role in mobile money. In 2007, Safaricom and the Central Bank of Kenya created the mobile money service M-Pesa. Today, 23 million users use it to transfer money via their phones. Safaricom also dominates the agricultural sector in the country with its service M-Farm, which provides information on weather, market prices and agro-input dealers. It must be noted, however, that this created a monopoly for Safaricom, leading to high prices for data plans and difficulties for competitors to enter the market (Malabo Montpellier Panel 2019: 41-44).

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needs.

- d. Reduce digital illiteracy and technology scepticism.
- e. Assure that technologies and innovations serve poverty reduction — in a socio-ecological sustainable manner.
- f. Develop solutions for all smallholders, not only those in lucrative export-oriented value chains.

3. Create national and international binding standards on data protection, data ownership, and intellectual property rights. Warrant a strong, transparent legal framework for digitalization in agriculture. (Tanzmann 2019)

- a. Store and process data in countries of origin. Many countries in sub-Saharan Africa still lack national data protection laws. Only if data remains within countries of origin, data rights can be claimed. (Mooney 2018: 26)
- b. Ensure end users know their data protection rights and safeguard them.
- c. Never commercialize agricultural intellectual property in monopolistic private entities

4. Prevent commercial lock-in effects of smallholders.

- a. Empower diverse sets of social actors — such as smallholders and the civil society — to monitor, change and delimit technologies that potentially change entire sectors they rely on.
- b. Balance power relations between agricultural stakeholders — such as large agribusiness companies and governments — to optimize food systems.

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