Report #1
The Use of Digital for Public Service Provision in Sub-Saharan Africa

17/09/2020

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Chair « Digital Trust »

FERDI Webinar Series

Digital Trust: A condition for Africa's emergence

Motivation & scope of the report

In SSA, expectations of the digital economy expansion to create jobs and to offer satisfying living conditions to populations are particularly important.

This report questions this potential by reviewing of empirical evidence on **digitization** and digital initiatives in the area of **public services provision** in the West and the rest of Sub-Saharan Africa (SSA).

The report combines **survey data** to document the digitization process in SSA, with a review of **evidenced-based analyses** of public services provision through digital, complemented by **cases studies** on related digital innovations.

Reviewed initiatives often focus on simple technologies, esp. **mobile technology**, deployed to deliver **basic services** in the areas of agriculture, **education**, **health** and social protection.

1. Digitization and public services provision in Sub-Saharan Africa: General background

1.1. Expected dividends from digital technology diffusion in SSA

Digital technologies (DT) are "the representation of information in bits […] rather than atoms", which "reduces the cost of storage, computation and transmission of data" (Goldfarb & Tucker, JEL 2019, p.3).

Digital technologies (DTs) are "**general purpose technologies**" (Bresnahan & Trajtenberg, 1995), expected to reduce:

1. Information search costs
2. Replication costs
3. Travel costs
4. Tracking/targeting/verification costs

… in **various areas of public services provision**, offering solutions when those services are undermined by **market failures** ubiquitous in many SSA countries.

DTs are also **network goods** whose utility derived by users and socioeconomic impacts depend:

1. on **the network** size and on the quality of interconnections; and
2. on the importance of **market failures:** informational asymmetries + transaction costs

1.2.Expected dividends from digital technology diffusion in SSA

DT have the potential to "leapfrog" infrastructures, processes, administrations, and other institutions that have been put in place in industrialized countries to reduce market failures…

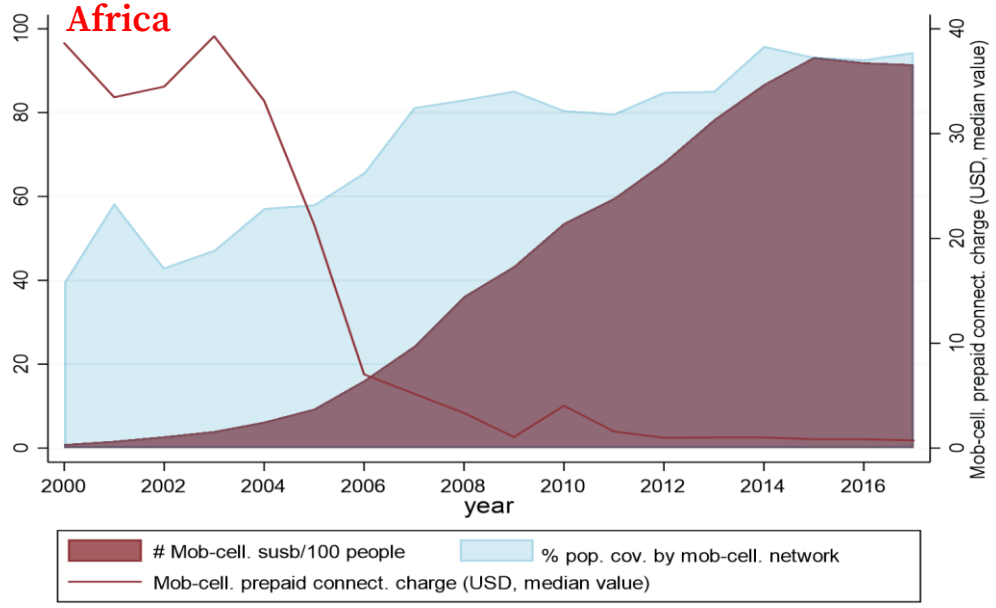
… but which are often missing or failing in SSA countries.

This **leapfrogging potential** however greatly depends on DT adoption and diffusion in the population

Problem: In SSA, populations excluded from public service provision are usually the same populations that are deprived from access to DTs

Reasons to be optimistic: the diffusion of mobile devices throughout the (West) African population has been spectacular since 2000, in the same way as was the share of the population covered by mobile networks.

Figure 1. Mobile phone penetration in West Africa



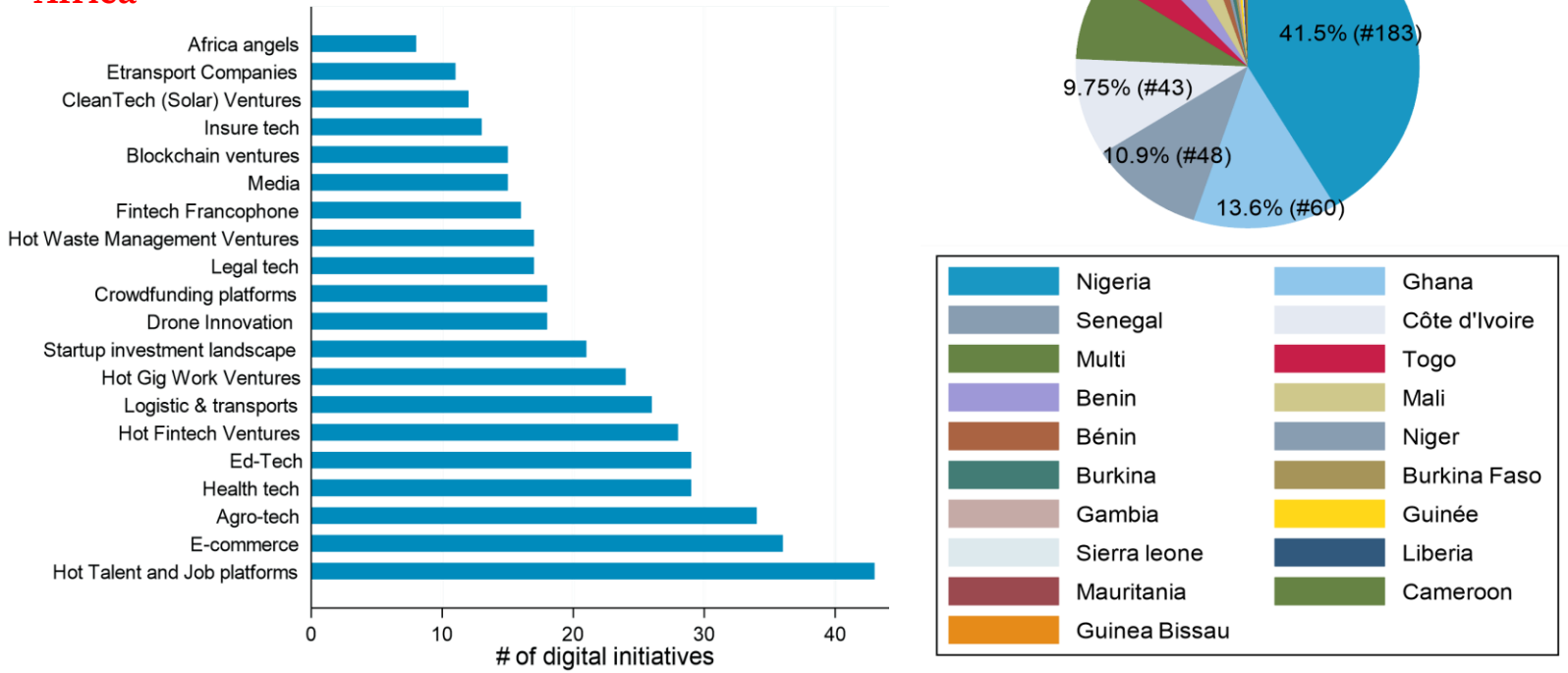
Source: Authors, from ITU dataset. West Africa encompasses ECOWAS countries.

1.2. Where does the digitization of Sub-Saharan and West Africa stand?

As a result of this digitization process, digital innovation have multiplied…

However, **unequal process**: 4 countries – Nigeria, Ghana, Senegal and Côte d'Ivoire – concentrate more than 75% of these initiatives

Figure 2. Digital innovation multiplication in West Africa



Source: Briter Bridges, innovation maps, 2019. https://briterbridges.com/innovation-maps. Note: 442 digital innovations recorded.

1.2. Where does the digitization of Sub-Saharan and West Africa stand?

Reasons to be skeptical

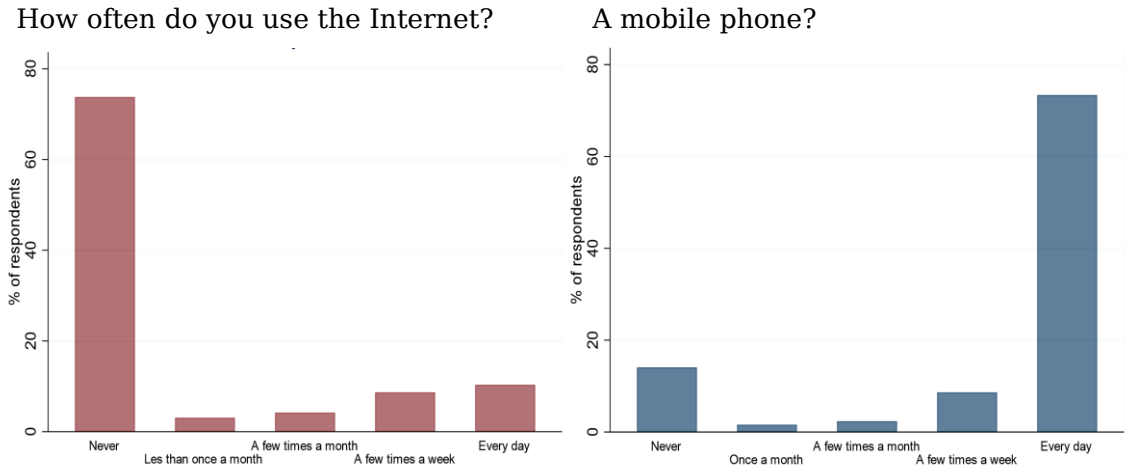
Internet penetration rates were not exceeding **55%** of the population in 2015 (ITU, 2019).

Internet penetration in **Francophone landlocked countries** is even **< 7%** of the population;

Niger, Sierra Leone, and Guinea-Bissau had penetration rates **< 5%** of the population (ITU, 2019).

Afro-barometer surveys conducted over a sample of almost 18,000 African citizens in 2014 and 2015 in 13 West African countries stress that **the digital divide is an Internet divide**.

Figure 3. Internet adoption in West Africa, 2014-2015



17,750/17,912 respondents (left/right-side graphs). Surveyed countries: Benin, Burkina Faso, Cape Verde, Côte d'Ivoire, Ghana, Guinea, Liberia, Mali, Niger, Nigeria, Senegal, Sierra Leone, Togo. Surveys conducted between 2014 and 2015.

Consequences: digital initiatives in public service delivery often rely on simple mobile technology

2. Digital for HealthCare provision: eHealth effectiveness in normal and COVID times

2.1. Context of eHealth interventions

Structural obstacles to Healthcare provision in SSA:

- Missing health and transport infrastructures
- A predominantly rural and poorly educated population
- Failing health information systems, under-trained health staff, and under-resourced health centers

High transaction costs and informational asymmetries that undermine the healthcare system performance and make it vulnerable to health and economic shocks.

COVID-19 and Healthcare provision in SSA:

Except for South Africa, SSA has presumably been relatively spared by the COVID19 (Nachega, Seydi, Zoumla, Clin. Inf. Dis., 2020)

More worrisome are the consequences of **social distancing policies in both industrialized countries and SSA**:

- **Health shock**
- **Economic shock**
- **Social shock**

Could eHealth interventions be an effective, efficient, viable solution for delivering health care, particularly during COVID times?

2.2. Delivering healthcare through mobile (mHealth)

mHealth interventions' design

Given the large internet divide, especially in vulnerable groups, **simple mobile phones are widespread devices** to deliver health-related services

4 levels of mHealth interventions:

- Patient follow-up, sensitization and education
- Health worker capacity building and monitoring
- Drug supply chain and stock management
- Data collection and reporting

... And **4 principal areas of intervention**: (1) HIV, (2) malaria, (3) tuberculosis and (4) pre/postnatal care.

Examples of mHealth

Technology for Maternal and Child Health (T4MCH) (Ghana): interactive platform enabling health workers to send maternal and child health-related information.

MOS@N (Burkina Faso): interactive voice-response and SMS-transmission system to disseminate health information through mobile to a vulnerable groups

WelTel (Kenya): consists of sending HIV-infected patients SMS reminders for antiretroviral medication.

2.2. Delivering healthcare through mobile (mHealth)

Impacts

Recurring positive outcomes of mHealth interventions:

- improved **patient access to basic health services** such as medical appointments,
- reduced **delays in communication** between patients and health staff,
- improved **data collection** and **reporting**,
- reduced patient **travel costs**,
- improved **health worker compliance to treatment guidelines**,
- and improved **patient sensitization** and **medication**.

Limits

- Evidence from **RCTs are less clear-cut** than results from pilot project analyses
- RCT results **question the scalability and reproducibility** of pilot projects
- MHealth could lead to a **shift in the workload and tasks** borne by low-level health workers, which may in turn reduce health service quality, health worker wellbeing, and the sustainability of mHealth programs.

3. Digital & educational outcomes: learning and monitoring schools using mobile

3.1. Context of Ed-Tech interventions

Structural obstacles to education provision in SSA:

Again, high transaction costs and informational asymmetries that undermine education sector's performance:

- Poor school network coverage
- Rural areas prone to conflict and insecurity
- Missing transport, energy, and telecommunications infrastructures
- School system under demographic pressure
- Lacking human and financial resources
- Bad school governance and low teacher performance (absenteeism, training)

COVID-19 and access to education in SSA:

Transaction costs and informational asymmetries **magnified by the COVID-19 crisis** and social distancing

Social distancing measures are costly, hard to implement,

so that **many schools have closed** for millions of African students.

Consequences: **the number of children using e-learning has doubled** since lockdown measures (Crawfurd (2020))

3.2. Improving educational outcomes through digital technologies (Ed-Tech)

Ed-Tech interventions' design

Two main areas of Ed-Tech interventions:

- E-learning programs, intended for children or adult populations.
- E-monitoring programs, focusing on the monitoring of school administration and teacher performance through digital technologies

Such programs can be instrumental to education by:

- reducing **distance-related costs** (when households have access to energy and Internet).
- reducing **replication costs** by providing digitized educational content, and
- improving **teacher** and **school administration monitoring**

Examples of Ed-Tech

Ubongo (SSA): TV show that permits large-scale dissemination of pedagogical content for children in 14 SSA countries.

iMlango (Nigeria): offers multipurpose and comprehensive digital education services to 180,000 children, 70,000 of whom were girls, at 240 schools in rural or semi-urban area.

"Pret-à-Payer" (Benin): a digital platform which allows school stakeholders to exchange information and to obtain timely access to school financial records.

3.2. Improving educational outcomes through digital technologies (Ed-Tech)

Impacts of E-learning

While **traditional communication technologies** such as the radio or the TV, have been successfully mobilized to support national educational programs in SSA...

... initiatives using mobile, internet, and other apps to provide distance learning are **far from maturity,** when compared to other developing areas, and **limited to few African countries** (Crawfurd, 2020)

Computer-based learning programs are undermined by their **mixed impact**, **high-cost**, and the **low penetration** of computers.

Low-cost smartphones and tablets have opened new perspectives for e-learning, but **little evidence** on their impact in SSA.

E-learning programs based on mobile phone yield benefits when they are set up as an **out-of-school tool**

Impacts of E-monitoring

School stakeholders' access to information on school funding **improves school administration**.

Increased teacher attendance and competencies through mobile-based monitoring. Financial incentives may increase e-monitoring impact on teacher attendance.

Increased student commitment to the learning program and lower school dropout rates.

However, **no clear evidence of higher educational returns** through improved access to information.

Lessons learned and implications for future interventions' design

Mobile technology is the easiest way for Africans to connect to each other, and probably **the best medium to support public service provision**.

Research findings stress that the most basic usages of digital technologies, especially mobile technologies, can **yield the greatest benefits for the poor**.

But **the large and multidimensional digital divide** in SSA hampers the scaling-up of existing initiatives and hinders more sophisticated usages of digital technologies.

Overall, to leverage digital public service provision, decision makers should:

- **focus on basic technologies** accessible by the whole population,
- implement **policies/regulations that ensure affordable and quality access to digital services**,
- make significant **investments in the telecommunications and energy infrastructure** networks.

Thanks for your attention!