



POLICY BRIEF EVOCA #4

Digitalization in the context of complex problems in Africa



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For most of us, digital technologies like computers, mobile phones, and the Internet have become essential in our daily lives, and the global pandemic further exacerbated this. The existence of digital technologies and services has arguably been transformative and created a suite of opportunities: New ways to communicate, monitor events, document data, and exchange information. Many novel services emerged in par with this, think about email, social media, videoconferencing, and mobile banking. While digital technologies and services were initially only accessible to people in Western countries and the urban elites in low- and middle-income countries, this has rapidly changed in recent years. It is estimated that nearly 500 million farmers in low-income countries will own a mobile phone by 2025 (GSMA, 2020). Global optimism exists about the opportunities that deployment of digital technologies and services offer and the transformations in smallholder agriculture that may result from this. However, research shows that reaching the promising outcomes and impacts of digitalization is a lot more complicated than merely introducing a digital technology in a community or designing a mobile phone application. This policy brief discusses this complexity and provides relevant recommendations for policy and practice.

Photo cover: Rwandan farmers appear excited about an application that was developed to support extension agents and farmers with the diagnosis and control of a banana disease

Photo 2: Many farmers do not yet access smartphones or other more advanced digital technologies. For those relying on basic phones, SMS and USSD services are still quintessential.

African case studies provide scientific insights

This policy brief shares research findings of an interdisciplinary research programme titled “Responsible life-science innovations for development in the digital age: Environmental Virtual Observatories for Connective Action” (hereafter referred to as EVOCA) that was implemented between 2016 and 2021 by Wageningen University and Research, together with international and local partner organizations. EVOCA developed and researched participatory monitoring systems, virtual platforms, and digital applications geared towards facilitating connective action regarding six different complex problems in four African countries (Rwanda, Kenya, Ghana, and Ethiopia). The policy brief features insights about digitalization in the context of complex African problems that are based on case studies conducted in the four aforementioned countries.

Addressing longstanding challenges in Africa through digital innovations

The widespread access to digital innovations today has resulted in high hopes for and ambitions to leverage these innovations to solve challenges that have plagued Africa’s rural regions since long. Such challenges include access to financial services, timely information about the weather and climate, and insights into the occurrence and spread of crop diseases. These problems have in common that information, knowledge, and communication (or lack thereof) play a role in sustaining the issue. The assumption exists that the adoption and scaling of innovative digital technologies and services like mobile phones, apps, and social media, leads to enhanced sharing of information between actors, and could hence be used to address complex socio-ecological problems like pests and diseases (Chepkwony, 2021; McCampbell, 2021).

Digital services and platforms furthermore promise to support reconfiguration of relationships within agricultural value chains, and to enable improved trust between actors (Agyekumhene, 2021). This in turn means a shift from traditional, linear, rural advisory services to more tailor-made and integrated services.

Mobile technologies help to overcome physical barriers to communication

Application of digital technologies and services

Overcoming communication barriers

EVOCA research with smallholder farmers in Laikipia, Kenya, showed that mobile phones were used widely to communicate with friends and family, but also to access information on pressing issues of concerns such as human security, human-wildlife conflicts, and the occurrence of diseases (Chepkwony, 2021). Mobile technologies have thus visibly helped to overcome physical barriers to



Photo3: Learning with and from each other. Local technological support can be a key to successful adoption of phone-based technologies and services.

communication and eased interaction between service providers and users. But the true ability of these technologies to positively impact complex problems depends on their ability to help with transforming scientific and indigenous information into actionable knowledge. From EVOCA’s Ghanaian case study on climate services it emerged that traditionally it is farmer-to-farmer information exchange that contributes to actionable knowledge (Nyamekye, 2020). The question remains if and how digital technologies and services can further enhance this process.

Responding to information needs

Advisory services have traditionally been marked by issues with the timeliness, accuracy, and suitability of the advice that is given (Nyadzi, 2020). The information included in such advice is needed to help with managing uncertainties, for example about rainfall patterns, climatological conditions, or the occurrence of pests and diseases. EVOCA’s research findings in Ghana showed that people’s information needs are linked to the type and timing of farm-level decision-making (Nyadzi, 2020). This decision-making is in turn influenced by both formal and informal institutional arrangements, and adapted accordingly (Nyamekye, 2020). Digital technologies and services can act as information intermediaries and provide an effective response to agricultural constraints. But for this to effectively happen, it is critical to consider what type of information different stakeholders demand, to match demand and supply of information, and to and to manage the digital innovation process (Munthali, 2021).

The role of trust

Limitations in communication infrastructure in rural areas affect practices of farmers and their ability to collaborate with other stakeholders when addressing

socio-ecological challenges. These limitations are also linked to the existence of mistrust between actors in agricultural value chains (Agyekumhene, 2021). EVO-CA research in Ghana on financial lending services in maize production systems provided relevant insights about the working of trust and how digital services may support with building trust relationships for collaboration.

Making the distinction between calculative, relational, and institutional trust (see table 1) the study found that digital services can positively affect calculative trust. This in turn appeared to nurture relational and institutional trust between actors (Agyekumhene, 2021). The reason that digital services enhanced calculative trust is that they support availability of credible information (e.g. by capturing and distributing local information) which is needed for timely decision-making and risk management.

Table 1: Different types of trust that digital technologies and services may contribute to (based on Chris).

Interpersonal trust	Calculative trust	Rational, based on economic exchange. Emerging when a trustor perceives that a trustee will perform an action that is beneficial to him/her/them
	Relational trust	Build overtime. Information (reliability and dependability) within the relationship between trustor and trustee forms the basis
	Institutional trust	Institutions as sources and objects of trust (Möllering, 2006). Presence of specific institutional arrangements overtime generate expectations about (future) actions of trustees and foster assurance that engagements with the 'other' are trustworthy

The use of social media

The focus in digital development often lies on the development of new platforms and services. Meanwhile, well-known social media platforms such as WhatsApp, Facebook, and Telegram already play an important role when it comes to communicating and exchanging information and knowledge about crop diseases. For example, extension agents in Ghana used social media to rapidly share and obtain information about emerging issues such as fall army worm rapidly and widely (Munthali, 2021). A closer look at the use and functioning of these platforms showed that social media can, to some extent, support coordination (idem, table 2).

Social network analysis of the two social media platforms, one associated to an extension organization and another to a research institute, showed that exchanges via these platforms were non-egalitarian due to the existence of centralized network and communication structures. The researchers found that social hierarchies, insti-

Table 2: Categories of messages shared on different social media platforms in Ghana (Munthali et al. 2021).

Categories	Type of messages	MOFA-DFAD WhatsApp platform	CABI-Plantwise Telegram platform
Knowledge sharing for problem solving	Knowledge gap stipulation	✓	✓
	Pest/disease identification	✓	✓
	Prescription provision	✓	✓
	Practical problem stipulation	✓	✓
	Practical problem solution	✓	✓
Knowledge dissemination	Lectures	✗	✓
	Working solution sharing	✗	✓
	Technical information sharing	✓	✗
	Innovation sharing	✓	✓
Pest/disease monitoring	Pest/disease occurrence	✓	✓
	Pest/disease alert	✓	✓
Notifications	Activity announcement	✓	✓
	Practical announcement	✓	✓
	Agricultural news/update	✓	
	Directive	✓	✓
	Field activity report	✓	✓
Social	Jokes	✓	✓
	Inspirational messages	✓	✓
	Crime alerts	✓	✓
	Bible quotations	✓	✓
	Job advertisements	✓	✓
	Non-agricultural news	✓	✓

✓ Shared over platform ✗ Not shared over platform

tutional rules, and identity management tactics from users prevented social media platforms from fostering open communication. This made them unsuitable for joint knowledge integration and collective problem management (Munthali, 2021).

Social hierarchies, institutional rules, and identity management tactics prevent social media platforms from fostering open communication

Not replacing but complementing conventional means of interactions

Much of the enthusiasm for digital technologies and services is borne from the ability to use all the features that these technologies have to offer, and the ambition to make advisory services more effective, efficient, and personalized. Digital technologies and services can indeed be helpful mediators since they – among other things – allow for linking and exchanging scientific data and knowledge with community data and knowledge, and may compliment traditional means of communication and organization of collective action within socio-ecological systems.

However, not the technological features but the social features of a specific context shape the application and use of digital technologies and services (Munthali, 2021). Additionally, people's capabilities, opportunities, and motivations are important determinants of their capacity to adopt and use, or simply said the 'user-readiness' for a specific technology or services (McCampbell, 2021).

With this in mind, EVOCA researchers showed that face-to-face communication is sometimes more suitable for rural advisory services (McCampbell, 2021; Munthali, 2021), and that many farmers and extension agents in fact still prefer this way of communication.

A combination of conventional, contemporary, and face-to-face interaction is required to get the best of both the digital and the analogue world

The power of conventional technologies such as radio and simple phone calls should not be underestimated either. These technologies were found to be critical for many farmers to access agricultural advice, including advice about emerging issues like pests and diseases (Damtew Assefa, 2020; McCampbell, 2021; Munthali, 2021). Additionally, more basic ICT services that rely on e.g. SMS or IVR were found to be more suitable for action-oriented, linear intermediation such as disseminating and retrieving information (Munthali, 2021). Summarized, a combination of conventional (e.g. radio, calling), contemporary (e.g. apps, IVR), and face-to-face interaction is required to get the best from both the digital and analogue world.

Developing for and with users

Actors in the field of digital development increasingly try to involve future users and other stakeholders in the design and development process. Several of the researchers in EVOCA experimented with stakeholder engagement and participatory approaches. Study outcomes from Ghana showed that participatory design approaches are indeed recommended to foster technological access (Munthali, 2021), and to enhance ownership and involvement of local actors (Nyamekye, 2020). This in turn improves the chance of acceptance and use. Focusing on climate and weather services, participatory design appeared to help with defining the information needs of



Photo 4: Bringing indigenous knowledge and observations and scientific information together may initially be a challenge, especially when it comes alongside new technological hardware and software

users, and how this information should be presented to best support decision-making (Nyamekye, 2020). The Ghanaian case study on credit services showed that, as trust and inclusion go hand-in-hand, the engagement of and interaction between diverse stakeholders in the development process is key to overtime generate institutional trust in the digital tools and its associated processes (Agyekumhene, 2021).

Nevertheless, the Rwandan case study that assessed the participatory approach used to develop a smartphone application for banana disease management says that not all that glitters is gold. Although inclusion of diverse actors in the design process did indeed result in an application that reflected the needs of diverse actors, it did not remove power relationships. Furthermore, it appeared that opportunism and a lack of capacity to anticipate and respond to potential unintended consequences of the digital innovation could lead to irresponsible design decisions (McCampbell, 2021).

A warning-sign? Fostering collective (or connective) action

Tension between tailored services and collective action

As written earlier, an applauded feature of digital technologies and services is that they allow for personalization and tailoring of information. The benefit of this is that it contributes to the timeliness, accuracy, and relevance of advice for specific individuals. There is a potential hitch though. Responding to complex problems generally requires that people collaborate and act collectively. In theory digital technologies could support with this process too, especially when they foster multi-way interaction between actors in a value chain. However, several of EVOCA's case studies independently showed that digital technologies and services, including social media platforms, currently do not facilitate such collaborative and interactive innovation intermediation. This is unfortunate because the studies also showed that collective action is indeed more effective than individual action when it comes to the prevention and control of complex problems like, for example, infectious diseases (Damtew Assefa, 2020; McCampbell, 2021; Tafesse Gobena, 2020). Additionally, it became clear that tailored programmes and (digital) services could support collective learning and sense-making (Asingizwe, 2020; Damtew Assefa, 2020; McCampbell, 2021). Thus, this policy-brief finishes with a warning and a call for action. Digital technologies have the capacity to be transformative and contribute to how complex problems in Africa are addressed, but policymakers and practitioners need to recognize that those transformations are not automatically positive in nature.

Recommendations for policy and practice

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Recommendations for policy and action

Consider that digitalization may come with unintended consequences too

Prevent unrealistic expectations, and aim for innovations that are responsible both in the short- and long-term. This requires anticipation of and responsiveness to unintended consequences of digitalization, especially to potentially unwanted impacts. Post-implementation reflexivity should be promoted, to enhance reflection on the trade-offs and consequences of a digital innovation that emerge over time.

Establish if an intervention supports individual or collective decision-making and action

Digital technologies and services can on the one hand allow for tailoring of information and advice to individuals, while they can on the other hand bring people and their knowledge together. Both can be valuable and even critical, and therefore digital interventions should ideally also foster both.

Consider inclusion and potential (future) exclusion of actors

Include future users of digital technologies and services in research, design, decision-making and evaluation of the intervention. Pay specific attention to social inequalities and power relations to foster meaningful participation. Invest in deliberations and dialogue between stakeholders with diverging interests and perspectives. Additionally, pay attention to broader and future implications in regard to inclusion and exclusion of actors due to digitalization.

Support issue-based communication networks

The power of digital technologies lies in the ability to exchange information that is timely, accurate, and relevant. This feature may especially be leveraged to respond to specific issues and potential disasters. It may mean that a service or platform is only used temporarily, until an issue is solved.

Use digital technologies to bring scientific and indigenous knowledge together

Digital technologies offer opportunities to bring indigenous and scientific knowledge together. A participatory and inclusive design approach is recommended to foster this.

Combine conventional and contemporary technologies

Package information dissemination channels, including both conventional and contemporary channels and face-to-face interaction, and support a communication ecosystem that caters for the needs of various actors (e.g. with and without a (smart) phone, literate and illiterate, tech-savvy or not).

Invest in human intermediaries

Traditional human intermediaries (e.g. crop extension agents) remain relevant in a digital age. New intermediaries (technology champions) are needed for successful adoption and use of digital technologies and services in rural areas. These intermediaries may be critical to support inclusive digital ecosystems. Both types of intermediation require resource investment.

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Colophon

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