



SMART FARMERS LEARNING WITH DIGITAL TECHNOLOGIES



FAO
INVESTMENT
CENTRE

INVESTMENT
BRIEF

Gerard Sylvester, Kristin Davis, Johanna Gammelgaard
and John Preissing

Strengthening the skills and capabilities of agricultural producers, especially smallholder producers, to successfully manage their agricultural enterprises requires sustained investment. Such investment is key to transforming our agri-food systems. It is also crucial for delivering on the Sustainable Development Agenda.

Digital agricultural technologies, innovations and data are transforming business models and practices across entire value chains. They are helping to address bottlenecks in productivity, postharvest handling, market access, finance

and supply chain management. This can result in higher smallholder producer incomes, better food and nutrition security, increased resilience and greater inclusion of youth and women (CTA, 2021).

But can digital technologies also be used to train agricultural producers or increase their skills and knowledge? This brief explores cases from a global study (Davis *et al.*, 2021) and other examples to provide insights and investment recommendations on the use of digital technologies to strengthen agriculture human capital.

Digital technologies help provide greater access to personalized information and services to strengthen human capital across the value chain.

Tanzania's Upscaling Agricultural Technologies through Knowledge and Extension project (UPTAKE) (Gakuo, 2017) introduced a short message service (SMS) to radio broadcasts, providing farmers with quality information to enhance maize production, reduce risks and minimize postharvest losses. SMS supplements and reinforces advisories sent by extension workers and can provide customized and real-time notices based on weather conditions. Farmers pointed to increased knowledge and adoption of some technologies. Following a reported outbreak of maize stemborer, they spoke of taking up pest and disease management practices recommended by the SMS campaign. They also requested SMS campaigns on other crops such as beans. Monitoring of the campaign has helped determine the type of information and tips farmers consider most relevant and actionable (Gakuo and Karanja, 2018).

Another example is from Digital Green's community video approach used in India and in several African countries (Digital Green, 2021). Digital Green strengthens farmers' capacity by providing customized information at scale. The lack of resources and skills coupled with localized farming practices inhibits the effectiveness of traditional extension services. Digital Green embeds its digital interventions in the government extension system, viewing government extension workers as their main partners. Working with local extension, Digital Green identifies information gaps and then shares relevant knowledge through videos. One problem with digital approaches can be the absence of known and trusted in-person support from someone like an extension officer or lead farmer. Digital Green leverages community participation and increases trust and credibility by featuring

local people in the videos (FAO and ICRISAT, 2021). This participatory approach combined with simple technology solutions enables small-scale farming communities to produce and share information to improve capacities for better agricultural productivity and foster positive behaviour change within communities.

Access to a wider set of digital tools is also useful for strengthening agriculture human capital. Kazakhstan's dairy industry has significant potential for growth but faces many challenges. As a member of the Eurasian Economic Union, Kazakh producers must meet rigorous food safety standards, meaning smaller-scale dairy farmers need knowledge and skills to upgrade their operations and improve production. The Smart Milk portal (Dairy Union of Kazakhstan, 2020) provides a 'one-stop shop' on good practices and food safety along the entire dairy supply chain, from farm to table. The digitalization of content facilitates access to knowledge – anytime, anywhere – on a smartphone or tablet. Using digital technologies such as the Collect Mobile app (FAO, 2020a), Kazakh dairy companies can monitor the performance of their raw milk suppliers, gain insight into the suppliers' growth potential and optimize milk procurement routes.

These digital solutions alongside more typical training and policy work are transforming Kazakhstan's dairy industry. They are improving the capacities of smaller-scale milk producers and building bridges and trust between producers and dairy companies. Such solutions result in greater industry efficiency, resilience to shocks and faster growth.



Digital technologies can help build and strengthen social networks and business communities.

Since 2016, a virtual community of the Colombian Cattle Growers Federation (FEDEGAN), called WhatsApp Ganadero, connects more than 19 000 Colombian livestock producers organized into regional groups. This social network is an effective and direct communication channel between smartphone-using beef and dairy cattle producers in 31 regions of the country. The platform features sectoral news and provides livestock fair dates, regional climate forecasts and

other important data like weekly livestock prices in the main markets and vaccination cycles. Livestock farmers share productive and commercial experiences and success stories in sustainable production, promote their products and identify new business opportunities. In addition to receiving up-to-date information, the network enables them to do business more efficiently by saving time and reducing transaction costs.

Digital technologies can support rural entrepreneurs – including women and youth.

Women play a significant role in enhancing agricultural and rural development, improving food security and eradicating rural poverty (FAO, 2020b). M-Pesa, the mobile banking system in Kenya, has helped bridge the gap in financial services for women by providing an easy platform to manage transactions. It has also helped improve household incomes (Van Hove and Dubus, 2019). Understanding women's access to digital technologies and how they obtain and apply information are essential when deciding on agriculture human capital development interventions.

Human capital development is also evident in investment programmes focusing on creating rural youth entrepreneurs. Kuza One in Kenya, for example, uses a digital platform that trains young last-mile rural agents to provide in-season agro-advisories to improve the productivity, resilience and incomes of smallholder farmers (Kuza, 2021). The platform also links these young entrepreneurs and their smallholder customers to products and services through a digital marketplace.

Digital technologies can support formal learning.

Radio is still a relevant and popular technology and one of the most used broadcasting systems globally due to its accessibility and affordability (GFRAS, 2021). In the Philippines, radio is an indispensable part of informal education through extension delivery, improving human capital through advisories. This informal learning has proven to be very effective in the rural milieu. When combined with other interventions, like farmer field schools or Dimitra Clubs (FAO, 2019), it has produced excellent outcomes.

However, more formal learning is also possible over radio. The School on Air (SOA) (APIRAS, 2020) programme in the Philippines provides courses on crop production and natural resource management. At the end of each lesson, farmer-students submit their answers to a village SOA facilitator to demonstrate the practical skills they have learned. Certificates are issued to those who complete the sessions and practicum. An assessment showed that the students acquired knowledge, skills and self-confidence that contributed to improved farming and livelihood practices.

Digital technologies need an **enabling environment** and **multi-partner arrangements**.

To sustain and mainstream digital technologies, complementary investments in policies and frameworks, transport and logistics infrastructure, rural connectivity and access to electricity are crucial. This will help accelerate the building of human capital through digital technologies while also strengthening capacities to use such technologies. This implies engagement with a wide range of partners in interna-

tional financing institution-funded projects. For instance, the International Fund for Agricultural Development (IFAD) collaborates with several technology and mobile phone companies in projects working with youth through incubators (programmes or institutions that provide support and services to start young entrepreneurs off in business).



Investment areas for strengthening human capital through digital technologies

1

Strengthen policy, regulatory and incentive frameworks to build and sustain agriculture human capital

Public policies directed at investing in and empowering rural communities through digital technologies are crucial for developing agriculture human capital. For better use of digital technologies, the policy and regulatory environment should extend broadband and mobile coverage. Policies should also provide incentives to the private sector to align with public capacity development efforts to improve the digital skills of rural communities.

Recommended investment areas include strengthening the rural infrastructure for digital technologies; improving data governance and regulatory frameworks; increasing the digital literacy of food systems stakeholders; and creating incentives for rural communities to use digital technologies.

2

Enhance coordination among critical stakeholders to facilitate cross-sector collaboration and align investments to strengthen agriculture human capital

Various actors such as banks, healthcare providers and bookkeepers offering digital services like mobile payments and e-health services can help strengthen the human capital of rural people. But better communication, coordination and collaboration among stakeholders are needed to make sure these developed skills are used, information silos are reduced and synergies are built between various agriculture human capital development initiatives. Doing so can help address gaps in capacity. Programmes that provide smallholders with opportunities to strengthen their capacity and livelihoods, for example, depend on coordinated efforts. A connected approach helps deliver actionable advisories while also building the capacity needed to utilize and benefit from those advisories. Moreover, strengthening rural digital and non-digital innovations that support the human capital development of smallholders will help sustain and create value at the grassroots levels.

Recommended investment areas include building a holistic strategy to address and strengthen human capital for participation in the digital ecosystem; improving technical education; and creating a one-stop shop for digital services, government services (e.g. applications for permits, passports, social security, public health), agriculture, health, education and livelihoods in rural areas.

3

Invest in strengthening ecosystems and institutional infrastructure to sustain human capital through digital interventions

Smallholders often face resource constraints and could benefit from ongoing skills development to innovate and improve resource use efficiency. Investing and building the necessary ecosystem to support human capital development through digital technologies can help reduce the financial and human resources needed to provide regular human capital development interventions. Weak institutional partnerships, unable to sustain human capital development after projects have ended, have hampered several promising digital initiatives. An ecosystems approach focused on building well connected systems and avoiding institutional knowledge silos will create more opportunities for sustainable solutions to improve the human capital of smallholders.

Recommended investment areas include strengthening the infrastructure (offices, broadband, training centres, white boards, etc.) and soft skills of organizational members (technical knowledge, incentive systems to use more digital operations) in research organizations, agro-tech companies, extension departments, training institutions, community organizations and non-governmental organizations to contribute to training and sustaining agriculture human capital.

4

Amplify investment impacts by bridging the digital divide and facilitating inclusion to sustain agriculture human capital development

Opportunities to use digital technologies to strengthen agriculture human capital exist; however, the challenges of digital inclusion should not be ignored. Technology could be considered biased, as many digital services do not reach women and other marginalized groups (CTA, 2021). The use of digital technologies to enhance inclusion should remain a key area for investment to ensure that no one is left behind, regardless of their gender, region, age, disability or economic status. Digital champions – individuals who deliver skills trainings and help communities create digital content – should be used to support formal and non-formal education in rural communities.

The G20 Digital Ministers' declaration recognizes the importance of digital skills while addressing the inequalities that arise as countries move towards a digital economy (G20, 2021). People living in rural communities need digital skills to be able to participate fully in the digital economy and potentially benefit from decent employment, higher incomes, better livelihoods and welfare.

Recommended investment areas include increasing marginalized groups' access to and use of digital technologies through public policy entry points. Investing in digital skills, developing customized and appropriate digital tools in relevant languages, and reducing the cost of digital technology adoption through targeted subsidies, where applicable, will help translate benefits from digital technologies equitably (Schroeder, Lampietti and Elabed, 2021). Investing in initiatives to foster lifelong learning and adaptive skills around digital technologies can support inclusive human capital development.

Conclusion

Increasing the knowledge and skills of agricultural producers can contribute to better market access, greater climate resilience, disaster risk management and local economic development through income generation and improved profitability (Ali, Abiodun and Memon, 2018). The use of digital technologies can help develop these capacities more effectively and efficiently. This brief showcases some successful initiatives and identifies areas where investors can leverage digital interventions to strengthen and sustain agriculture human capital.

The challenges in our agri-food systems are enormous. Strengthening farmers' capacities through digital technologies to address some of these challenges requires policies, coordination, investment, innovation and inclusion. Working with beneficiaries and other partners will encourage the growth of locally appropriate, affordable and sustainable digital technology infrastructure, tools, applications and services for the rural economy.



References

- APIRAS**, 2020. CHAMP2: School on Air. Best Practice Notes No. 2. APIRAS. University of the Philippines, Los Banos. Available at: <http://apiras.net/charmp2-school-on-air-janice-b-agrifino-and-crislyn-b-orcales/>
- Ali, M., Abiodun E., & Memon, M. H.** 2018. *Human capital, social capabilities and economic growth*. *Economies* 6: 2. <http://doi.org/10.3390/economies6010002>
- CTA**. 2021. *The Digitalisation of African Agriculture Report*. In: CTA (online). Wageningen. [Cited 15 September 2021] <https://www.cta.int/en/digitalisation-agriculture-africa>
- Dairy Union of Kazakhstan**. 2020. In: *Smartsut*. (online). [Cited 15 September 2021]. <https://smartsut.com/>
- Davis, K., Gammelgaard, J., Preissing, J., Gilbert, R., & Ngwenya, H.** 2021. *Investing in Farmers: Agriculture Human Capital Investment Strategies*. FAO, Rome. <https://doi.org/10.4060/cb7134en>
- Digital Green**. 2021. In: *Digital Green* (online). New Delhi. [Cited 15 September 2021]. <https://www.digitalgreen.org/>
- FAO & ICRISAT**. 2021. *Digital Agriculture in Action: Selected Case Studies from India*. FAO, Rome.
- FAO**. 2020a. In: *OpenForis* (online). Rome. [Cited 15 September 2021]. <http://www.openforis.org/tools/collect-mobile.html>
- FAO**. 2020b. *We stand with rural women for sustainable agriculture and development*. In: FAO. (online). Rome. [Cited 15 September 2021]. <http://www.fao.org/fao-stories/article/en/c/1313789/>
- FAO**. 2019. *Dimitra Clubs: Community Engagement for Empowerment*. In: FAO (online). Rome. [Cited 15 September 2021]. <http://www.fao.org/in-action/dimitra-clubs/en/>
- G20**. 2021. *Declaration of G20 Digital Ministers*. In: *G20 Italia 2021* (online). Rome. [Cited 15 September 2021]. https://www.g20.org/wp-content/uploads/2021/08/DECLARATION-OF-G20-DIGITAL-MINISTERS-2021_FINAL.pdf
- Gakuo, S.** 2017. *1.75 million SMSs push UPTAKE of new technologies*. In: *CABI*. (online). Nairobi. [Cited 15 September 2021]. <https://africasoilhealth.cabi.org/2017/07/10/1-75-million-sms-on-uptake-of-new-technologies/>
- Gakuo, S. & Karanja, L.** 2018. *e-Agriculture Promising Practice UPTAKE: Driving adoption of agri-technologies through information and communication technologies (ICT)*. In: *FAO*. (online). Rome. [Cited 15 September 2021] <http://www.fao.org/3/i9191en/I9191EN.pdf>
- GFRAS**. 2021. *Using Radio in Agricultural Extension*. In: *GFRAS*. (online). [Cited 15 September 2021] <https://www.g-fras.org/en/good-practice-notes/using-radio-in-agricultural-extension.html?showall=1>
- Kuza**. 2021. In: *Kuza* (online). Nairobi. [Cited 15 September 2021] <https://vimeo.com/496044712>; <https://www.kuza.one/>
- Schroeder, K., Lampietti, J., & Elabed, G.** 2021. *What's Cooking : Digital Transformation of the Agrifood System*. Agriculture and Food Series. Washington, DC. World Bank. Available: <https://openknowledge.worldbank.org/handle/10986/35216> License: CC BY 3.0 IGO.
- Van Hove, L., & Dubus, A.** 2019. *M-PESA and Financial Inclusion in Kenya: Of Paying Comes Saving? Sustainability*. 11(3):568. <https://doi.org/10.3390/su11030568>

Abbreviations and acronyms

FAO	Food and Agriculture Organization of the United Nations
FEDEGAN	Colombian Cattle Growers Federation
IFAD	International Fund for Agricultural Development
SOA	School on Air
SMS	short message service
UPTAKE	Upscaling Agricultural Technologies through Knowledge and Extension project

Required citation:

Sylvester, G., Davis, K., Gammelgaard, J. and Preissing, J. 2021. *Smart farmers – Learning with digital technologies*. Investment brief. Rome, FAO and IFPRI. <https://doi.org/10.4060/cb7947en>



Some rights reserved. This work is available under a CC BY-NC-SA 3.0 IGO licence

The views expressed in this information product are those of the author(s) and do not necessarily reflect the views or policies of FAO.