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Use of Digital Tools in Kenya's Potato Value Chains

Qualitative perspectives from a field visit in Nakuru County

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Introduction

Potato farmers in Kenya face a multitude of challenges throughout the value chain, including limited access to quality seeds and fertilizers, inadequate storage and postharvest handling facilities, and fluctuating market prices. These issues are particularly acute for women and youth, who face additional barriers due to persistent social inequalities in the agricultural sector. Digital tools—such as smartphones, smart sensors, or tools involving remote sensing and GIS mobile mapping, as well as applications for agricultural information, e-marketplaces, e-learning platforms, and digital financing platforms—hold significant potential to address these challenges. For instance, these tools can provide access to valuable agricultural information, weather forecasts, and best management practices, helping farmers make informed decisions and improve crop management. Mobile apps and platforms can facilitate market access by connecting farmers directly with buyers, which can reduce price fluctuations and ensure fair returns on their produce through price information. Digital tools can also play a crucial role in addressing postharvest losses by providing real-time monitoring and management of storage conditions, helping farmers optimize storage to reduce spoilage and wastage. Additionally, digital platforms can provide farmers with information on proper postharvest handling techniques, including sorting, grading, and packaging, to ensure that potatoes are well processed, prepared, packaged, and marketed with minimal losses. However, the adoption of these tools has been slow in Africa south of the Sahara, hindered by infrastructural gaps,

high costs, and low digital literacy, thereby limiting their scalability and impact (Aker et al. 2016, Aker and Cariolle 2022, Abate et al. 2023).[1,2,3]

To help address some of these challenges, IFPRI is conducting a study *Evaluating the impact of digital tool integration on agricultural outcomes, youth employment, and gender inequality in Kenya's potato value chain* —funded by the Mastercard Foundation[4]—to assess factors that contribute to gender and age differences in access to markets and prices, and ways that digital tools can be used to eliminate those differences and improve the welfare of women and youth. The IFPRI study is being conducted in Nakuru and Nyandarua counties, the main potato growing areas in Kenya. To increase understanding of women's experience with digital tools, including how they are used to acquire information on agricultural practices, postharvest losses, markets, and prices, among others, as well as information on digital information service providers and their operations, we conducted a field visit in Nakuru County on March 11–12, 2024. This project note summarizes key findings from the field visit, how the findings have been used to design the IFPRI study, and some of the key activities and expected outcomes.

Field visit and qualitative data collection in Nakuru County

The field visit was conducted with two groups of five Farm Service Centers (FSCs) and 12 farmers, facilitated by Farm to Market Alliance and the Cereal Growers Association of Kenya. The aim was to gain insights on farmers' experiences and challenges in potato farming and marketing, with the overarching goal of informing strategies to enhance digital tool adoption and improve agricultural outcomes for smallholder farmers in the potato value chain. The field visit focused on understanding the role of digital tools in Kenya's potato value chain, with particular emphasis on their impact on agricultural practices, market access, and gender and youth dynamics. Farmers were asked about their potato farming practices, including the challenges they face in acquiring inputs, managing soil fertility, and handling postharvest processes. Other questions focused on their familiarity with digital tools, how often they use these tools, and perceived benefits and barriers to adoption. Additionally, information was sought on the relationship between farmers and FSCs to assess the support provided by FSCs and their role in promoting digital tools. We also asked FSCs about their methods for engaging with farmers, the digital tools they use, and challenges in encouraging digital tool adoption among farmers, particularly women.

Main findings from the field visit in Nakuru County

Cultivation Practices. Potato farming in the region occurs in two main seasons: March–April and August–September. Farmers predominantly grow the *Shangi* variety due to its suitability to the local environment and strong market demand. Soil fertility is managed using a range of synthetic fertilizers (such as Faka, Falcon, Mafuno, and Yara), while pest control (for aphids, flea beetles, leaf hoppers, and the potato tuber moth) relies heavily on agrochemicals (such as Ridemil, Infinito, and Donda). However, farmers face significant challenges in pest and disease management, such as bacterial wilt, pest resistance due to improper pesticide use, and insufficient access to certified seeds. Additionally, farmers report that misuse of fertilizers, often applied without soil testing, further complicates crop management.

Input Acquisition and Challenges. Planting materials, including seeds and fertilizers, are sourced from private companies such as Kisima Farm, IPM, and Agrico. Farmers encounter various challenges in accessing quality inputs, including price fluctuations. There is also difficulty accessing subsidized fertilizers, sometimes with wait times of more than a week. However, emerging opportunities offer potential support, such as partnerships with organizations like Platinum, which offers input and training with payment plans, and Apollo Ag, which provides inputs on credit.

Postharvest Handling and Marketing. After harvesting, potatoes are typically sold directly to traders, without any storage or processing by farmers. Postharvest handling involves basic methods that help reduce losses, such as ox-drawn plows that prepare the land better than standard plows, and service planting with other crops that benefit potato cultivation by improving soil fertility. Farmers experience issues such as delayed availability of traders, which can lead to crop spoilage and the rejection of 10 to

20 percent of their produce due to size standards set by traders. There is interest in technologies to improve storage and market access, such as the Warehouse Receipt System, which is being implemented in the country but is still in early stages.[5]

Relationship with Farmer Service Centers (FSCs). FSCs play a critical role in supporting farmers. They provide access to certified seeds, inputs, and training by engaging farmers through group meetings, demos, and digital communication, particularly via WhatsApp. However, there is a need for increased support in using digital tools effectively, as farmers express a desire for more seminars and capacity-building sessions.

Digital Tool Usage Among Farmers. There is a noticeable gender divide in digital tool usage, with women predominantly using regular mobile phones due to their affordability, while most men use smartphones. Farmers primarily use WhatsApp, radio, and SMS for agricultural information, preferring oral communication over digital tools that require reading. Despite the potential benefits of digital tools, barriers such as cost, data requirements, and a lack of digital literacy hinder broader adoption. Farmers are also cautious of online fraud, perceiving online transactions as risky and preferring to make transactions through trusted FSCs.

FSCs and Digital Tools. FSCs utilize various digital tools, including Viazi Soko, Yara Bodega, and Labpro, to assist farmers. However, promoting these tools is challenging due to the cost of data, low knowledge of apps, and poor literacy and use of digital tools. FSCs have noted that women are less likely to adopt digital tools, often viewing smartphones as expensive and potentially misused by children. Despite this, communication platforms like WhatsApp are widely used for organizing events and sharing information.

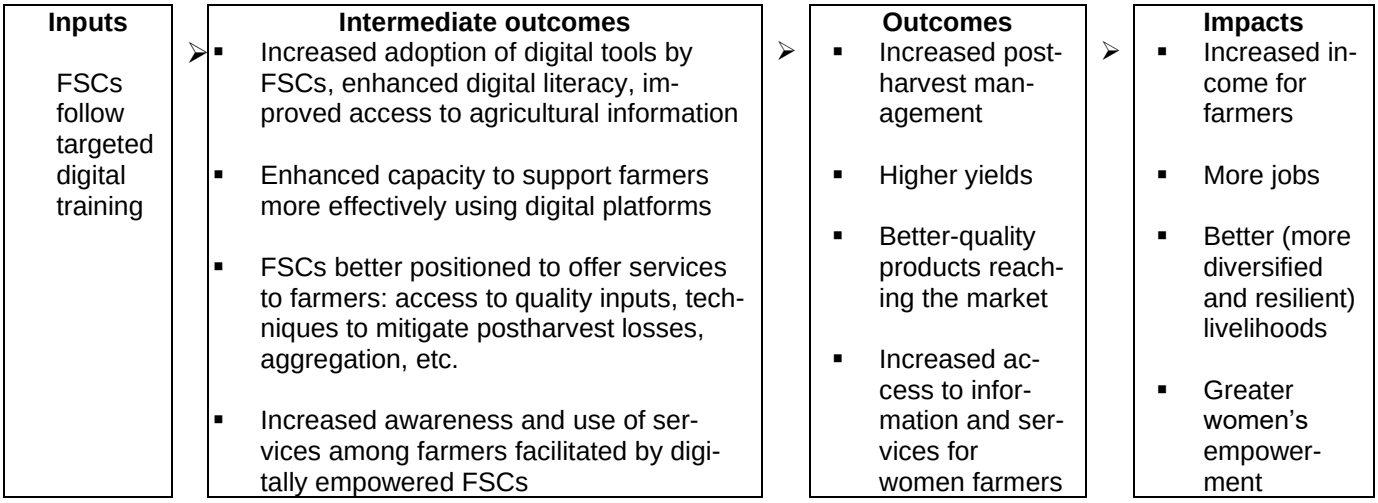
How findings from the field visit have been used

The findings from the field visit revealed several critical issues with the initial assumptions underlying the study design. First, the initial assumptions underestimated the importance of understanding farmers' use and perception of digital tools. It became clear that many farmers, especially women, had little to no direct interaction with agricultural apps, often relying on intermediaries such as agripreneurs or FSCs to handle these tools. Second, the potato value chain in Nakuru County relies almost entirely on traders who purchase potatoes from farmers or aggregators and transport them to major markets. As such, farmers rarely sell their potatoes directly in a marketplace with many buyers. Thus, the prices they receive are more influenced by the behavior and bargaining power of traders, who control access to important markets, rather than by any direct market information accessed by farmers. In summary, providing mobile phones and direct market price information to farmers seemed to overlook key aspects of the functioning of the potato value chain. Moreover, most farmers, especially women, have limited experience in using agricultural apps and often rely on intermediaries to manage these digital tools for them. As a result, even with real-time price information, farmers have little control over potato prices, making the direct market data less relevant in improving their earnings. The focus on intermediaries, rather than individual farmers, seems more effective in achieving meaningful change.

In response to these findings, the IFPRI team redesigned the study in April 2024, shifting the focus from assessing the effects of digital tools used by individual farmers to evaluating the digital capabilities and training of FSCs, which play a crucial intermediary role in the value chain. By providing FSCs with digital training, the study aims to increase the use and adoption of digital tools, improve postharvest management, and enhance market access for farmers. The study recognizes the importance of intermediaries in the value chain and aims to leverage their role to improve overall agricultural productivity and socioeconomic outcomes, particularly for women and youth. The theory of change that illustrates the pathway from inputs to impacts, facilitated by the digital training of FSCs, is presented in Figure 1. By focusing on FSCs, the study is also aligned with Kenya's broader push toward the agripreneur model, as highlighted by the recent deployment of 6,600 agripreneurs across 33 counties under the National Agricultural Value Chain Development Project.[6] These agripreneurs are being trained to guide farmers in best agricultural

practices, connect them with suppliers and markets, and support them in accessing financial services. The agripreneur model is central to Kenya's strategy to enhance agricultural value chains, and the project's emphasis on strengthening FSCs aligns with this national initiative, ensuring that the interventions are well-integrated into the broader agricultural development framework in the country.

Figure 1. Theory of Change of the FSCs and Digital Tools Project



Source: Authors.

Conclusions and way forward

The field visit in Nakuru County highlighted significant challenges and opportunities in the potato value chain, with a particular focus on the role of digital tools in addressing these issues. Key challenges included limited access to quality inputs, improper postharvest handling, and the dominance of traders in determining market prices. Although digital tools offer potential solutions, their adoption has been slow, particularly among women, due to affordability issues and low digital literacy. The study, which has shifted focus to assess the digital capabilities and training of FSCs, aims to improve the adoption of these tools, boost postharvest management, and enhance market access. By leveraging FSCs as intermediaries, the project seeks to empower smallholder farmers, particularly women and youth, in Kenya's potato value chain.

The redesigned research now focuses on exploring how the intensity of digital tools training influences the use and adoption of digital technologies by FSCs and their ability to support farmers. Using a randomized controlled trial, the study will evaluate outcomes such as postharvest management, crop yields, product quality, market access, income generation, youth employment, and gender equality. Data will be collected through surveys, and potato quality assessments collected from the National Potato Council of Kenya. Ultimately, the study will seek to quantify the socioeconomic and agricultural impacts of digitally empowered FSCs in the potato value chain.

The study's baseline survey is planned for November 2024, with the first descriptive results available by the end of the year. Outcomes and, possibly, impacts will be evaluated after the endline survey in 2025.

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ENDNOTES

[1] Abate, G.T., K.A. Abay, J. Chamberlin, Y. Kassim, D.J. Spielman, and M.P.J. Tabe-Ojong. 2023. "Digital Tools and Agricultural Market Transformation in Africa: Why Are They Not at Scale Yet, and What Will It Take to Get There?" *Food Policy* 116: 102439.

[2] Aker, J., and J. Cariolle. 2022. *The Use of Digital for Public Service Provision in Sub-Saharan Africa.* Notes brèves/Policy brief. Clermont-ferrand, Auvergne, France: FERDI.

[3] Aker, J.C., I. Ghosh, and J. Burrell. 2016. "The Promise (and Pitfalls) of ICT for Agriculture Initiatives." *Agricultural Economics* 47 (S1): 35–48.

[4] This project is implemented to empower smallholder farmers, traders, and processors by improving off-take and aggregation and reducing postharvest losses across key value chains.

[5] https://npck.org/warehouse-receipt-system-in-potato-farming/#:~:text=Most%20of%20the%20potato%20farmers%20in%20Kenya%20are,access%20loans%20using%20the%20warehouse%20receipt%20as%20collateral

[6] https://makueni.go.ke/2024/news/president-ruto-to-launch-the-agripreneur-model/#:~:text=The%20agripreneurs%20will%20assist%20farmers,of%20farm%20and%20mechanization%20services

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