

Best practices and recommendations for digital inclusion through resilient infrastructure

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Advancing Smallholder Agribusiness in Botswana through Smart Digital Innovation

- Theme: Digital Connectivity and Resilience
- Presenter: Dr. Thorsten Jelinek, Senior Fellow and Europe Director,
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Presentation Outline

- Research team
- Introduction
- Research methodology
- Research findings and outcomes
- Recommendations and Conclusions

Research team



- Prof. Dr. Michael Max Bühler, University of Applied Sciences Konstanz, Germany



- Dr. Thorsten Jelinek, Senior Fellow and Europe Director, Taihe Institute, Germany/China



- Prof. Dr. Konrad Nübel, Technical University of Munich, Germany



- Vasilis Koulolias, Executive Director and Founder, eGovlab, University of Stockholm, Sweden



- Loungo Monchusi, Development Cooperation Lead at SmartBots, Government of Botswana



- Ron Bakker, Founding Partner, PLP Architect, United Kingdom



- Dr. Pia Hollenbach, Senior Researcher, Institute of Geography and Sustainability, University of Lausanne, Switzerland



- Yame Nkgowe, Founder, Sustainable Cities Africa, Botswana



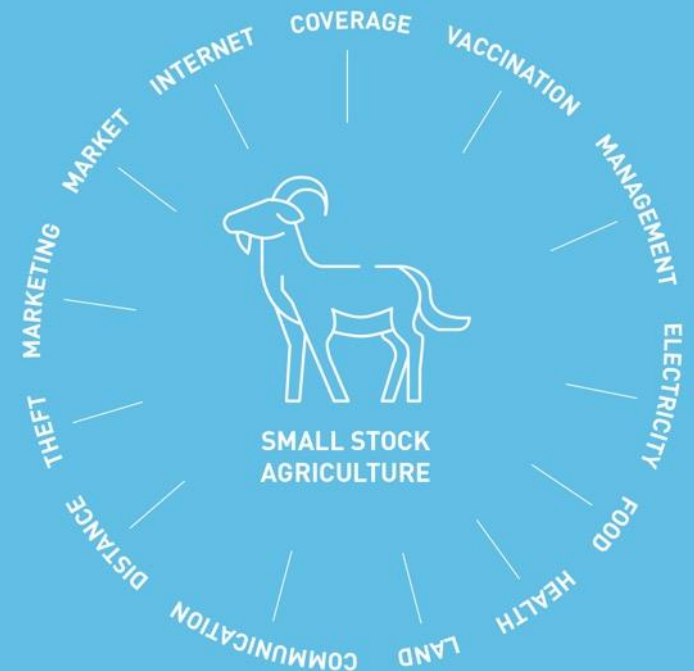
- Dr. Sajid M. Sheikh, Senior Lecturer, Electrical Engineering, University of Botswana

Introduction

- **Assumption.** We set out to investigate possible pathways “*for Africa’s transition towards an inclusive and competitive digital economy,*” identifying potential industries, stakeholders, and use cases for the development of a **federated digital platform** and **advanced digital services**.
- **Approach.** We analyzed the opportunity of **trusted and sovereign data sharing** with **Botswana’s strategic development** and “**lived realities.**”
- **Result.** We developed a proposal for transformation roadmap “*Advancing Smallholder Agribusiness in Botswana through Smart Digital Innovation.*”

Post-covid recovery - climate change - supply-chain disruption - rising food and energy prices - rapid digitalization

Local development needs



Research methodology

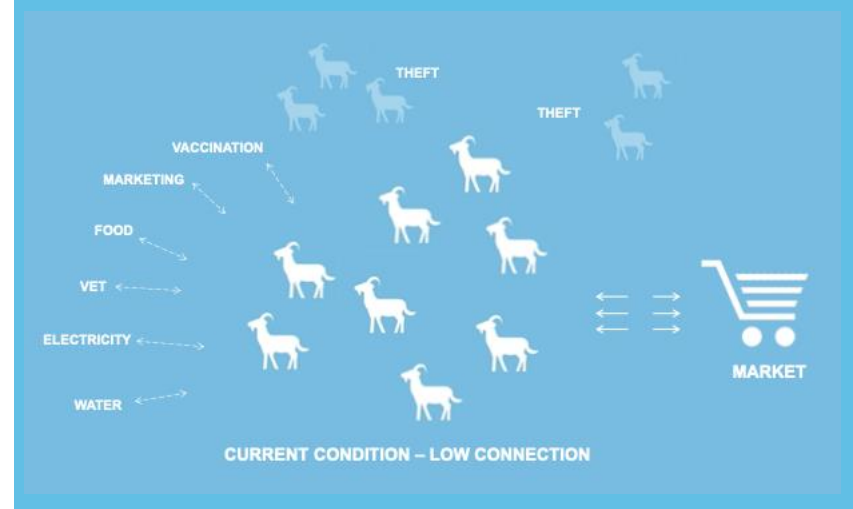
Research Team. International team experienced in development, infrastructure, and digital governance.

Data collection and analysis. Insights were derived from (i) qualitative **semi-structured** expert interviews (online/in-person) reflecting the “lived reality” and “voices from within,” (ii) a **focus group** providing co-design and hypothesis validation, and (iii) **secondary research** analyzing technology trends, Africa’s transformation strategy, and Botswana’s farming sector and digital development.

Research methodology. Method triangulation to capture the full range of **experiences and attitudes shared by farmers and other stakeholders**, while relating those to **global and regional trends** and structures.

Research objective: identification and conceptualization of a scalable digitalization use-case from which the region or country could benefit most

Focus on small holder farming and agriculture.



Research findings and outcomes

- Botswana aspires to become a **high-income country by 2036** (“Vision 2036”), a **knowledge-based economy** and **smart society**. (“SmartBots”). Its strategy supports and complements the continent’s boarder transformation strategy laid out by the Africa Union and Smart Africa.
- The **primary sector remains vital for the country’s population** but is mainly based on subsistence farming/stock holding and dominated by traditional farming methods. This makes **smallholding agriculture and stock farming an essential area of digitalization and technology-driven development**.
- **Trusted and sovereign data sharing** and **digital federation** are deemed essential for an inclusive and competitive digital economy. However, Botswana meanders between the Fourth Industrial Revolution and **low digital penetration**.
- Interviews and focus group showed the **adoption of technology and connectivity needs to be cost-effective and easily accessible** especially for small holding farmers in underdeveloped regions.
- To overcome the low digital penetration, the research team proposes a **step-by-step digital transformation roadmap**.

- Agriculture accounts for 2.1% of Botswana's GDP but employs 20.4% of its workforce
- Sector is vital for about 70% of country's citizens, mainly based on subsistence farming and traditional farming methods
- Sector has low digital penetration, is water-stressed and exposed to climate change-related risks

“Thinking to implement a drone system of cameras for monitoring and having an overview of what is happening, if we do not use the technology, the costs for driving there will remain. The problem is the technology is not accessible for many small-scale farmers; it is currently too expensive.” (smallholder farmer)

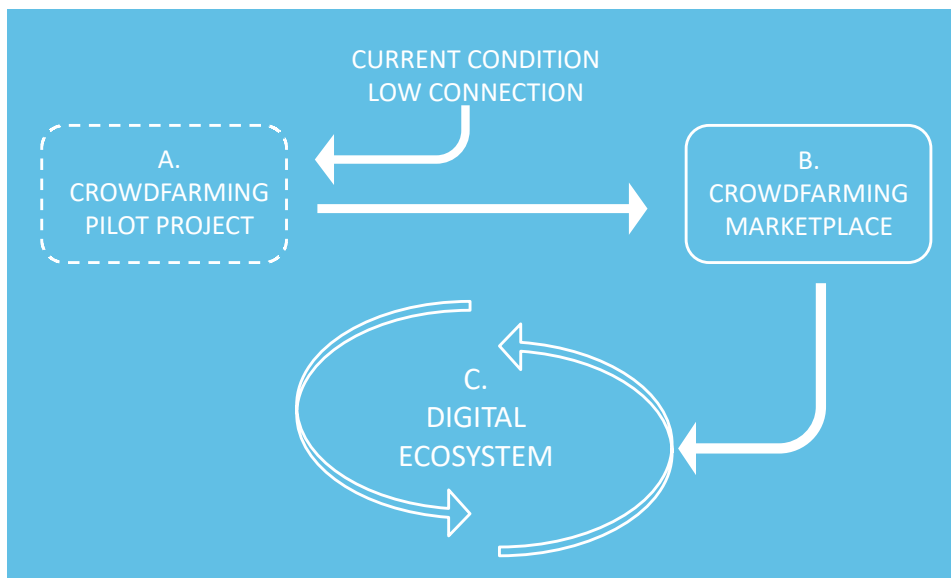
Research findings and outcomes

Digital transformation roadmap

Research result is the proposal of a **pilot project** as part of a longer-term **roadmap comprised of three stages** linked as maturity levels of digital transformation of Botswana's agriculture sector and beyond:

- a. **Crowdfarming Pilot Project.** Defining roles, relationships, and transactions of a crowdfarming platform represented in a **minimum-viable digital tool**. Crowdfarming is a multi-local production model for agriculture, enabling smallholders to plan their harvests better and increase yields while improving their financial security.
- b. **Crowdfarming Marketplace.** Proof-of-concept is developed into an **ecommerce marketplace connecting farmers with retail and wholesale customers** and increasing the number of crowdfarming participants. A newly established organisation operates and further develops the marketplace based on a sustainable income model.
- c. **Digital Ecosystem for Smallholder Agriculture.** Marketplace matures into an **ecosystem for sharing data, applications, and other digital assets**. A **federated digital infrastructure** connects farmers to new resources, knowledge, and markets. Farmer groups can afford advanced technologies offered as-a-service, attracting new businesses and start-ups offering **precision agriculture technologies** and **farming-as-a-service**.

Three stages roadmap towards a digital ecosystem for smallholder agriculture



From minimal viable product to sovereign data exchange, interoperability, and digital federation

Recommendations and Conclusions

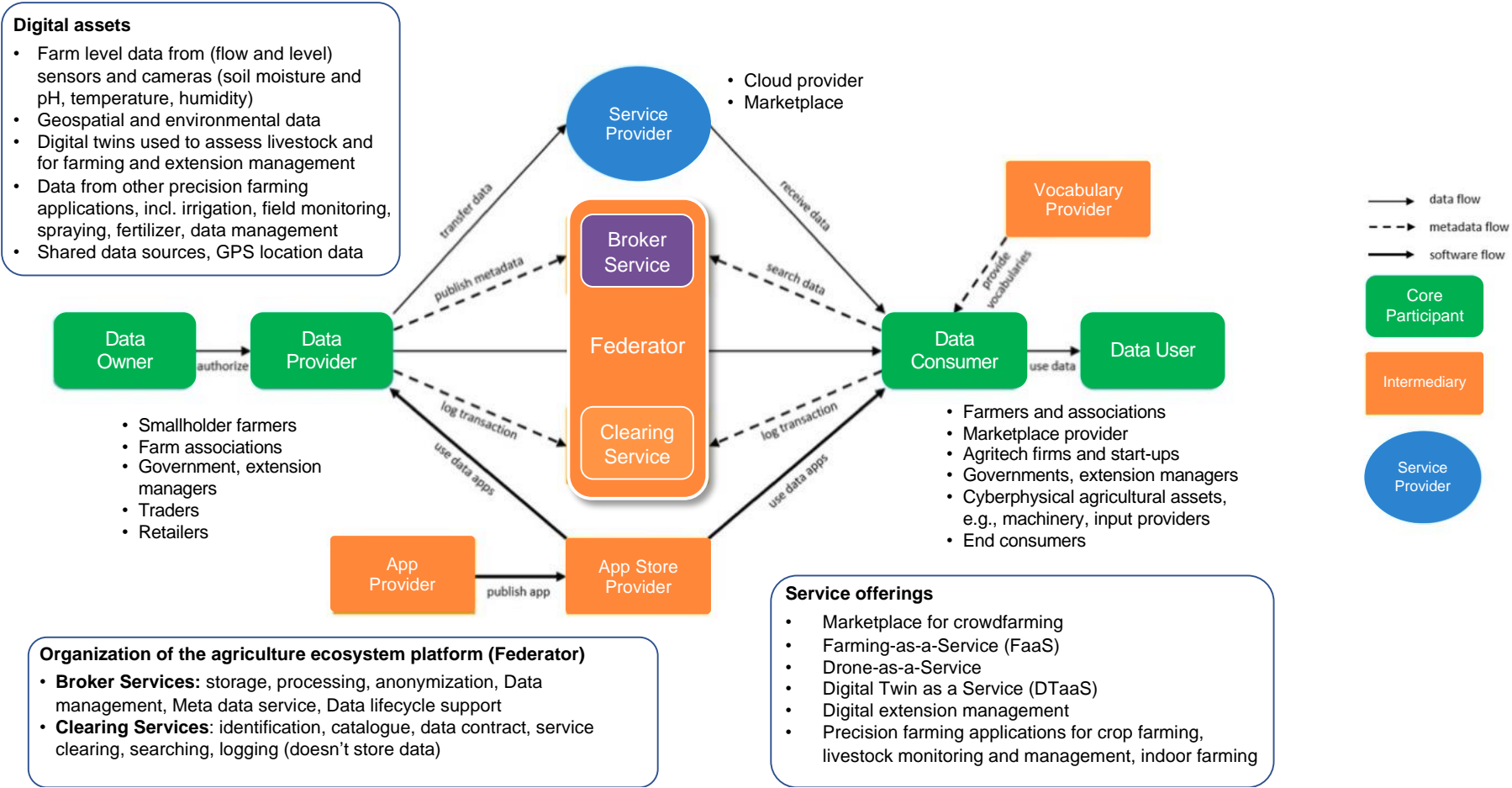
- Despite low digital penetration, **technology itself is not the primary solution** to Botswana's agricultural development needs. Governance is needed to address structural challenges related to electricity and water availability, land reform, market access, and skill gaps.
- The interviews and focus group revealed that the **adoption of technology and connectivity needs to be cost-effective and easily accessible** for farmers in underdeveloped regions. A **step-by-step digital transformation roadmap** can help closing the development gap.
- **Crowdfarming is as a promising initial way to increase digital connectivity** for remote farmers to relevant agribusiness stakeholders and markets.
- The full research report is a **proposal for a follow-up pilot project** to develop a minimum viable digital marketplace, **providing a funding opportunity for potential partners and donors.**



Additional Information

Digital assets, service offerings, and roles enabled by federated digital infrastructure

Adopted and modified from the IDSA* Reference Architecture Model



*International Data Spaces Association