Promoting Digital Solutions for Agriproducers

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First things First!
What is Digital Agriculture?

- Digital Agriculture is the use of digital technologies to improve agricultural productivity, sustainability, and profitability.

- It involves the integration of advanced technologies, data analytics, and information systems in agricultural practices.

- It can be used to collect and analyze data, automate tasks, and provide insights into the agricultural system.

Need for a Paradigm Shift

- The global population is growing, putting increasing pressure on the agricultural sector to produce more food.
- Traditional farming methods are not sustainable and cannot meet the demands of the future.
- Digital agriculture offers a promising solution to the challenges of food production and sustainability.
- Digital solutions can help agriproducers to improve productivity, efficiency, and sustainability.

Benefits of Digital Agriculture

- **Precision agriculture:** Digital technologies can be used to monitor crop health, soil conditions, and weather patterns in real time. This information can be used to make informed decisions about irrigation, fertilization, and crop protection.
- **Data analytics:** Big data analytics can be used to identify patterns and trends in crop performance, disease outbreaks, and market demand. This information can be used to make predictions about future crop yields and prices.
- **Supply chain management:** Digital technologies such as **Blockchain** can be used to track the movement of food from farm to fork. This information can be used to ensure food safety and traceability.
- DA application are vast, encompassing every stage of activity, from production to promotion of products to consumers (Nezamova and Olentsova, 2022) and are essential for solving a myriad of challenges in the agricultural sector.

Challenges of Digital Agriculture

- In sub-Saharan Africa alone, over 400 digital agriculture solutions are in use (Addom et al., 2019; Goedde et al., 2021), yet there's minimal impact. Why?
- **High cost:** Digital technologies can be expensive to adopt and implement.
- **Lack of access:** Rural areas may have limited access to digital infrastructure, such as internet connectivity.
- **Data security and privacy:** There are concerns about the security and privacy of data collected through digital agriculture technologies.
- **Lack of skills:** Agriproducers may lack the skills and knowledge needed to use digital technologies effectively.
- These challenges definitely needs to be addressed

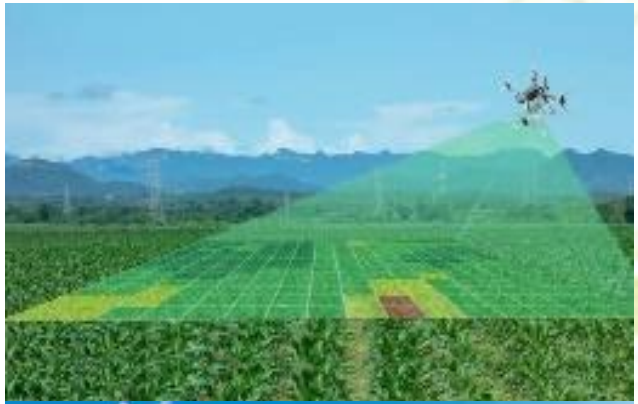
Key findings on Digital Agriculture from recent studies

- Smart farming technologies can enhance agricultural efficiency, transparency, profitability, and equity. (Chandra and Collis, 2021)
- Kolmykova *et al.,* (2021) found that digital technologies can be used to boost labor productivity and product quality.
- Real-time decision-making and resource conservation are two key benefits of digital agriculture(Cambra-Baseca *et al.,* 2019)
- Digital agriculture is being used to bridge gaps in the agricultural ecosystem in Nigeria as found by Akinwale *et al.,* (2023)
- Okafor and Malizu (2013); Okeke *et al.,* (2015) highlighted that ICTs and mobile phones are playing an increasingly important role in agricultural extension services in Nigeria.
- There are still constraints faced by rural farmers in accessing agricultural information. (Obidike, 2011)
- Research is ongoing to identify new ways to use digital technologies to improve agricultural productivity, sustainability, and equity.

Digital Solutions in Agriculture: Transforming the Landscape

- Digital solutions in agriculture encompass a wide range of technologies, including precision agriculture, data analytics, supply chain digitalization, remote sensing, and robotics.
- These technologies can be used to improve agricultural productivity, sustainability, and profitability in a variety of ways.
- For example, **precision agriculture** can be used to optimize crop management decisions, such as irrigation, fertilization, and pest control.
- **Data analytics** can be used to predict disease outbreaks, optimize resource allocation, and achieve more efficient water usage and pest control.

Digital Solutions in Agriculture: Transforming the Landscape (Cont'd)



- **Supply chain digitalization** can ensure the traceability and transparency of food products, reducing post-harvest losses and enhancing consumer trust.
- **Remote sensing** can collect critical data on crops, soil, and weather conditions, providing valuable insights for agriproducers.
- **Robotics** can streamline tasks like weeding and harvesting, enhancing efficiency and reducing environmental impact.

Digital Solutions in Nigerian Agriculture

- Digital solutions are transforming the agricultural landscape, offering unprecedented opportunities for agriproducers to enhance efficiency, sustainability, and profitability.
- The integration of these technologies is not just a choice but a necessity to address global food demand while preserving our precious resources and ecosystems.
- Nigeria is still behind in the use of digital solutions in agriculture, and these technologies have the potential to transform the sector and help the country achieve food security.

Available Digital Solutions in Nigerian Agriculture

Mobile Apps for Farmer

- Mobile apps are becoming indispensable tools for farmers, providing access to crucial information such as weather forecasts, market prices, and farming tips.
- For example, the "**AKILIMO**“ (Intelligent Agriculture) app by ACAI offers Cassava farmers agronomic recommendations and guidance, revolutionizing decision-making processes.
- Other popular mobile apps for farmers include "**AgroMall** “-Online Marketplace , "**FarmAgric**“- Crowdfunding for Inputs and Capital, "**AFEX Commodities Exchange“** – Blockchain for AgroTrade and "**Ignitia**“ – SMS-based Weather Advisory using IoT.

Available Digital Solutions in Nigerian Agriculture

e-Wallet Systems

- e-wallet systems are ushering in a new era of transparency and efficiency. They allow farmers to receive agricultural subsidies and inputs directly on their mobile phones, reducing inefficiencies and corruption.
- For example, the **"Growth Enhancement Support Scheme (GESS)"** is an initiative by the Nigerian government that employs e-wallet systems to distribute subsidized agricultural inputs directly to farmers' mobile phones.
- Other examples of e-wallet systems for farmers include **"Paga"** and **"Farmcrowdy".**

Available Digital Solutions in Nigerian Agriculture

Precision Agriculture Solutions

- The marriage of precision agriculture with technologies like GPS-guided tractors, drones, and satellite imagery is transforming farming. These technologies facilitate precise planting, irrigation, and pest management.
- For example, the **"Hello Tractor"** platform offers an IoT-enabled tractor-sharing platform that empowers farmers to access mechanization equipment on-demand.
- Other examples of precision agriculture solutions for farmers include "**CropIn**" and "**Farmforce**" which provides AI-Based Farming Solutions across the value chain.

Available Digital Solutions in Nigerian Agriculture

FUNAAB's Digital Agriculture Solutions

- FUNAAB Early Warning System, PlantDoctor, SmartSoil (On-going) and others coming up

More Prospects

- The agricultural sector in Nigeria is experiencing a digital revolution, and with the continuous evolution of technology, the future holds even more promise for sustainable and efficient farming practices.
- The digital solutions discussed in this presentation are just a few examples of the many ways that technology is being used to improve agriculture in Nigeria.
- As these technologies continue to develop, we can expect to see even more innovation and progress in the agricultural sector in the years to come.

Successful Implementation Stories

Some notable examples of successful implementation stories include:

Dangote Sugar: This enterprise leverages satellite data for scouting, early weed detection, moisture adjustment, and field visibility in their sugar cane cultivation (www.eos.com). Furthermore, they have implemented drone-based spraying for precise crop nutrient management.

AGRAIN: An integrator company in Ukraine, AGRAIN, utilizes remote sensing for crop monitoring and management, benefitting both large and smallholder farmers. (www.eos.com)

Indian Farmer: In India, an innovative farmer employs drones for crop dusting, foliar fertilizer application, and greenhouse quality monitoring, showcasing the versatility of digital tools in agriculture. (www.youtube.com)

Sustainability and Environmental Impact of Digital Solutions in Agriculture

Key Environmental Management Benefits

- **Water conservation:** can be used to measure water levels in irrigation canals and sprinkler systems, and alerts can be sent to farmers if there are leaks or if water levels are too low.
- **Pesticide and fertilizer use**: Data collected from sensors, drones, and satellites to create detailed maps of fields. These maps can be used to target pesticides and fertilizers to specific areas, where they are needed most.
- **Food safety and traceability**: To ensure food safety and traceability by tracking the movement of food products. For example, QR codes can be used to track the movement of food products, and blockchain technology can be used to create a secure and transparent record of food production and distribution.
- By embracing digital solutions, agriproducers can help to make agriculture more sustainable and protect the environment for future generations.

Promoting Digital Agriculture in Nigeria

Provide Solutions to Address Challenges

- Subsidies and grants
- Training and education programs
- Infrastructure development
- Data security and privacy policies

Provide Capacity Building in Digital Agriculture

- Offering training and education programs on digital skills
- Providing access to online resources and tools
- Creating partnerships with technology providers and research institutions
- Sharing best practices

Promoting Digital Agriculture in Nigeria (Cont'd)

Collaboration and Partnerships

Governments playing a key role in promoting digital solutions

- Collaborative efforts among technology providers, farmers' associations, and research institutions
- Sharing best practices and fostering innovation

Policy and Regulatory Considerations

The role of governments in promoting digital adoption

- Incentivizing innovation
- Infrastructure development
- Data protection

Known Digital Agriculture Promotion Efforts

Prof. O. B. Kehinde's Digital Agriculture Promotion Efforts

- Supported the FUNAAB Alumni Convention Lecture 2023 on "**Leading Agritech Revolution: The Role of Big Data, Blockchain, and Artificial Intelligence in Driving Agriconomy.**"
- Enabled the SmartSoil Project Capacity Building for Researchers, which aimed to accelerate the development and adoption of agri-based digital innovations in the Southwest region of Nigeria.
- Organized and Chaired the FUNAAB Sensitization Workshop on "**The Application of Unmanned Aerial Vehicles (Drone Technology) in Agricultural, Environmental Management, Engineering Sciences, and Research.**"

What are your personal Goals to Promote Digital Agriculture?

References

- Akinwale, J. A., Wole-Alo, F. I., & Oluwole, B. O. (2023). Digital Platforms for Linking Agriculture Investors with Smallholder Farmers in Nigeria. Journal of Agricultural Extension, 27(2), 65-72.

- Addom B.K., Tsan M., Totapally M., & Haliu M. (2019). The digitalisation of Africa agriculture report, 2018–2019, The Technical Centre for Agricultural and Rural Cooperation, August 2019, cta.int

- Cambra-Baseca, C., Sendra, S., Lloret, J., & Tomas, J. (2019). A smart decision system for digital farming. Agronomy, 9(5), 216.

- Chandra, R., & Collis, S. (2021). Smart Farming with technologies such as IoT, computer vision, and AI can improve agricultural efficiency, transparency, profitability, and equity for farmers in low- and middle-income countries. COMMUNICATIONS OF THE ACM, 64(12), 75-84.

References

- Goedde, L., McCullough, R., Ooko-Ombaka, A., & Pais, G. (2021). How digital tools can help transform African agri-food systems. McKinsey & Company: Chicago, IL, USA, 1-9.
- Grober, T., & Grober, O. (2020). Improving the efficiency of farm management using modern digital technologies. In E3S web of conferences (Vol. 175, p. 13003). EDP Sciences.
- Kolmykova, T. S., Obukhova, A. S., Klykova, S. V., Mashegov, P. N., Zaitsev, A. G., & Popova, O. V. (2021). Features and benefits of digital technologies in agricultural enterprises. In E3S Web of Conferences (Vol. 247, p. 01018). EDP Sciences.
- Nezamova, O. A., & Olentsova, J. A. (2022, February). The main trends of digitalization in agriculture. In IOP Conference Series: Earth and Environmental Science (Vol. 981, No. 3, p. 032018). IOP Publishing.

References

- Obidike, N. A. (2011). Rural farmers' problems accessing agricultural information: A case study of Nsukka local government area of Enugu State, Nigeria. Library Philosophy and Practice, 660(1), 1-11.

- Okafor, G. O., & Malizu, C. F. (2013). New media and sustainable agricultural development in Nigeria. New Media and Mass Communication, 20(1), 66-73.

- Okeke, M. N., Nwalieji, H. U., & Uzuegbunam, C. O. (2015). Emerging role of information communication technologies in extension service delivery in Nigeria: A review. Journal of Agricultural Extension, 19(1), 128-141.

- www.eos.com/blog/dangote-uses-satellite-data-for-sugar-cane-in-nigeria/

Thank you for your time and attention ☺