Sapientia Global Journal of Arts, Humanities and Development Studies (SGOJAHDS), Vol.8 No.2 June, 2025; p.g. 297 – 310; ISSN: 2695-2319 (Print); ISSN: 2695-2327 (Online)

BRIDGING THE INFORMATION GAP IN RURAL AGRICULTURE: THE ROLE OF COMMUNICATION APPS IN COOPERATIVE DEVELOPMENT

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Abstract

Rural agricultural cooperative societies play a pivotal role in the economic development of many developing nations by fostering collective action among smallholder farmers. However, these cooperatives often suffer from poor access to timely and accurate information due to infrastructural limitations, illiteracy, and inefficient communication channels. This information gap has contributed to suboptimal decision-making, reduced market access, and stagnation in productivity. With the rise of mobile and digital technologies, communication apps present a promising avenue for enhancing knowledge dissemination, resource coordination, and community engagement within agricultural cooperatives. This paper explores the potential of mobile communication applications in bridging information asymmetries among rural agricultural cooperatives, particularly in Nigeria and other sub-Saharan African contexts. Drawing on a review of existing literature, development reports, and selected case studies such as Kenya's DigiFarm and Nigeria's AgroMall, the study identifies both the opportunities and challenges associated with deploying digital communication tools in rural settings. Findings indicate that mobile apps can improve access to market information, agronomic advice, weather forecasts, and financial services when designed with user needs in mind. The paper concludes by recommending collaborative strategies between governments, NGOs, tech developers, and cooperative unions to ensure inclusivity, sustainability, and scalability of such digital innovations.

Keywords: Bridging Information Gap, Rural Agriculture, Role, Communication Apps, Cooperative Development.

1. Introduction

Agriculture remains the backbone of rural economies across sub-Saharan Africa, engaging over 60% of the population and contributing significantly to GDP in countries such as Nigeria, Ghana, and Kenya (Food and Agriculture Organization [FAO], 2020). In this context, agricultural cooperative societies serve as key actors in mobilizing rural farmers, facilitating access to agricultural inputs, providing financial services, and enabling collective marketing (International Cooperative Alliance, 2019). Despite their importance, these cooperatives often operate under significant constraints due to limited access to timely, reliable information a challenge commonly referred to as the "rural information gap" (Aker, 2011; Ayanwale & Adekunle, 2022). The information gap in rural agriculture arises from multiple factors: poor infrastructure, low levels of education and digital literacy, language barriers, and inadequate extension services (World Bank, 2021). As a result, farmers in rural cooperatives may lack access to critical information about weather forecasts, market prices, improved farming

techniques, and government programs. This disconnect hampers their productivity, limits their market reach, and increases their vulnerability to economic shocks and climate change (Gakuru, Winters, & Stepman, 2009).

With the expansion of mobile phone penetration and digital connectivity in Africa, communication applications offer a transformative opportunity to close this information gap. Mobile-based platforms such as SMS alert systems, WhatsApp groups, and specialized agricultural apps can disseminate real-time information to farmers and cooperative leaders, enabling quicker decisions, better coordination, and improved outcomes (Qiang et al., 2012; Aker & Mbiti, 2010). This paper explores how communication apps can bridge the information gap in rural agricultural cooperatives, using evidence from successful case studies in sub-Saharan Africa. The study aims to understand how mobile and digital platforms enhance cooperative operations, identify challenges in their adoption, and offer policy and design recommendations to maximize impact. In doing so, it contributes to the broader discourse on ICT for Development (ICT4D) and supports ongoing efforts to meet Sustainable Development Goals (SDGs) particularly SDG 2 (Zero Hunger), SDG 9 (Industry, Innovation and Infrastructure), and SDG 17 (Partnerships for the Goals).

1. Conceptual Clarifications

Understanding the key concepts of rural development, agricultural innovation, and digital communication is crucial to this study. Agricultural cooperatives voluntary associations of farmers enhance rural livelihoods by providing inputs, training, credit, and marketing services, though their impact is often limited by communication challenges (ILO, 2018; Chambo, 2009; Ojo & Jibowo, 2021). Communication apps like WhatsApp, Telegram, and AgroMall address these gaps by enabling real-time information sharing on farming practices, markets, and weather (Aker, 2011; World Bank, 2017). These tools align with ICT for Development (ICT4D), which aims to reduce the rural-urban information gap caused by poor infrastructure and digital illiteracy, and promote inclusive growth and sustainability in agriculture (Qiang et al., 2012; Heeks, 2010; FAO, 2020).

Causes of the Rural Information Gap

1. Poor Infrastructure and Economic Barriers: Rural areas often lack essential telecommunications infrastructure such as stable electricity, internet connectivity, and mobile network coverage, making access to information technologies difficult (Aker & Mbiti, 2010). Even when information is available, the high cost of mobile data, internet services, and training discourages use among small-scale farmers (Qiang et al., 2012).
2. Low Literacy, Digital Skills, and Extension Support: High levels of illiteracy and limited digital literacy prevent many rural dwellers especially women from using or understanding digital tools and technical agricultural content (FAO, 2020; Ayanwale & Adekunle, 2022; GSMA, 2023). Additionally, inefficient agricultural extension services, characterized by underfunding and understaffing, leave cooperatives and farmers without timely, localized, and practical guidance (Anderson & Feder, 2007).
3. Language, Cultural, and Communication Barriers: Much agricultural information is delivered in official or foreign languages rather than local dialects, creating a disconnect between message and audience. Cultural misunderstandings and misinterpretation of agricultural advice further widen the information gap and reduce the effectiveness of development communication (Munyua, 2007).

Consequences of the Information Gap

Agricultural Cooperative Societies and the Rural Information Gap: Agricultural cooperative societies are farmer-led, democratically controlled organizations that provide access to farming inputs, credit, training, and marketing services (ILO, 2018; Chambo, 2009). They play a vital role in improving rural livelihoods but often face challenges related to poor internal communication and limited access to relevant external information (Ojo & Jibowo, 2021). This contributes to the broader rural information gap the disparity in access to timely and actionable data between rural and urban populations resulting from inadequate infrastructure, digital illiteracy, and lack of localized content (Qiang et al., 2012; Gakuru et al., 2009; Ayanwale & Adekunle, 2022).

Communication Applications (Apps) in Agriculture: Communication apps such as WhatsApp, Telegram, AgroMall, and iCow are mobile or web-based platforms that support real-time messaging, collaboration, and information sharing. In agricultural contexts, they facilitate the dissemination of agronomic advice, weather alerts, market prices, and financial services, thereby improving coordination and decision-making within cooperatives (Aker, 2011; World Bank, 2017).

ICT for Development (ICT4D) Framework: ICT4D is a strategic framework that uses digital technologies such as mobile phones, internet tools, and software—to promote development in sectors like agriculture, education, and health (Heeks, 2010). In agriculture, ICT4D supports service delivery, market access, and farmer resilience. The use of communication apps by cooperatives aligns with ICT4D goals by leveraging technology to bridge rural inequalities and enhance sustainable rural development (FAO, 2020).

Bridging the Gap: Why Communication Matters

Addressing the rural information gap is essential for empowering cooperative societies and improving rural livelihoods. Effective communication enables timely access to relevant agricultural knowledge, improved collaboration among cooperative members, better decision-making at both farm and cooperative levels, and greater transparency and accountability in cooperative leadership. Communication applications, when well-designed and inclusive, can simultaneously address many of these challenges. By delivering targeted, timely, and localized content, they hold the potential to bridge the rural information divide. However, this divide remains a significant barrier to agricultural transformation in sub-Saharan Africa, driven by weak infrastructure, limited digital literacy, and inefficient extension services. These issues hinder the effectiveness of cooperative societies and limit their impact on rural development. Nevertheless, digital tools especially communication apps offer a promising solution for overcoming these challenges. The next chapter will explore the specific roles of agricultural cooperatives and examine how communication technologies can enhance their operations and contributions to rural development.

The Role of Cooperative Societies in Agricultural Development

Agricultural cooperative societies have long been recognized as essential instruments for promoting rural development, especially in low- and middle-income countries. These societies help farmers overcome common barriers such as limited access to inputs, credit, markets, and information by pooling resources, fostering collaboration, and enabling collective bargaining (ICA, 2019). In many African countries, including Nigeria, cooperatives

have emerged as grassroots responses to both economic challenges and institutional shortcomings in the agricultural sector (Ayanwale & Adekunle, 2022). This chapter explores the structure, functions, and communication challenges of agricultural cooperatives, with a focus on how improved internal and external communication can significantly boost their effectiveness.

Structure and Functions of Agricultural Cooperatives

Agricultural cooperatives are member-based organizations democratically governed and collectively owned by farmers. Their key functions include:

a) Access to Inputs and Credit: Cooperatives often help members purchase inputs such as seeds, fertilizers, and agrochemicals at discounted rates through bulk buying. They may also provide access to credit, either directly or through partnerships with microfinance institutions (Ojo & Jibowo, 2021).

b) Marketing and Value Addition: By aggregating produce, cooperatives improve farmers' bargaining power and facilitate access to larger, often urban markets. Some cooperatives also engage in value-added processing (e.g., milling, packaging), which increases revenue for members (Wanyama, 2014).

c) Training and Capacity Building: Cooperatives serve as platforms for delivering agricultural training, extension services, and technical support. Training sessions often cover best practices in crop management, post-harvest handling, business skills, and cooperative governance (FAO, 2020).

d) Advocacy and Representation: Well-structured cooperatives represent farmers' interests in policy dialogues and can engage with governments, NGOs, and development partners. They ensure that smallholder voices are included in agricultural planning and decision-making processes (ILO, 2018).

Agricultural Cooperatives in Nigeria: An Overview: In Nigeria, agricultural cooperatives have existed since the colonial period but gained significant prominence following the structural adjustment programs of the 1980s, which reduced state involvement in agriculture. Today, cooperatives remain vital in enabling smallholder farmers to withstand market fluctuations, secure input supply, and participate in government subsidy programs (Chambo, 2009; Nwankwo, 2021). Despite their importance, many Nigerian cooperatives struggle with poor management, inadequate record-keeping, weak internal communication, and limited access to ICT tools (Adebayo & Onu, 2019). These weaknesses hamper their ability to adapt to changing agricultural conditions and limit their effectiveness in promoting rural development.

Communication Challenges in Cooperative Societies: Effective communication is central to the success of any cooperative. Unfortunately, many cooperatives face challenges in both internal and external communication.

a) Internal Communication Issues: Internal communication between leadership and members or among members themselves is often hindered by lack of regular meetings, poor information flow, and absence of structured feedback mechanisms. This leads to low

participation in decision-making and weak commitment to cooperative goals (Ogunlela, 2018).

b) Limited Access to Communication Tools: Most rural cooperatives rely on face-to-face meetings, hand-written notices, and word-of-mouth communication. These methods are inefficient and cannot meet the dynamic needs of modern agricultural systems. As a result, members may miss crucial information on prices, training schedules, or input distribution (Gakuru et al., 2009).

c) Digital Divide: While mobile phone usage is rising in Nigeria, many rural cooperatives have yet to adopt digital tools for coordination and record-keeping. The digital divide fueled by low digital literacy, high data costs, and poor connectivity limits the ability of cooperatives to transition into information-driven organizations (GSMA, 2023).

Opportunities for Strengthening Cooperatives Through Communication Apps

The adoption of communication apps in cooperative societies presents a valuable opportunity to strengthen their effectiveness and impact on rural development. These apps can be used to disseminate real-time information on meetings, training sessions, and market prices; facilitate virtual engagement between leaders and members; store records; share multimedia learning materials; monitor cooperative activities; collect feedback; and enhance democratic decision-making processes. They also support linkages with external stakeholders such as buyers, extension officers, and policymakers. Apps like AgroMall, DigiFarm, WeFarm, and WhatsApp for Business are already being piloted across parts of Africa with encouraging results (World Bank, 2017). Their integration into cooperative systems could mark a transformative moment for agricultural development, especially in regions heavily reliant on smallholder farming. Although agricultural cooperatives provide essential services such as input access, training, and marketing, their potential is often limited by internal inefficiencies and poor communication infrastructure. The next chapter will explore how communication technologies can convert these challenges into opportunities by digitizing communication processes and bridging the rural information gap.

The increasing penetration of mobile technology and digital tools in rural areas presents unprecedented opportunities to bridge the agricultural information gap. Communication apps ranging from basic SMS alerts to advanced interactive platforms are becoming essential for knowledge dissemination, farmer coordination, and service delivery within cooperative societies (Aker, 2011; Qiang et al., 2012). These tools are particularly impactful in sub-Saharan Africa, where traditional extension systems often fall short. Information and Communication Technologies (ICTs) for agriculture encompass a wide range of tools, including mobile phones, apps, radio, television, satellite data, and internet platforms, all aimed at improving productivity and rural livelihoods (FAO, 2020). ICTs contribute to agriculture by providing real-time market prices and weather updates, enhancing extension services and remote training, enabling digital payments and agricultural e-commerce, promoting transparency in cooperative operations, and supporting data-driven decision-making and planning. The World Bank (2017) highlights mobile-based interventions as especially promising due to their scalability and cost-effectiveness in remote, infrastructure-poor settings. This chapter explores the evolving role of communication technologies in agriculture, with a focus on their functionalities and impact on cooperative development across Africa and beyond.

Types of Communication Apps Used in Agriculture

Communication apps used in agriculture can be categorized by function and technology:

a) **SMS and USSD-Based Platforms:** These apps work on basic feature phones without internet access and include platforms like Esoko (Ghana) and Agronigeria (Nigeria). They deliver agricultural tips, weather forecasts, and price updates via short codes or SMS (Aker & Mbiti, 2010).

b) Mobile Apps with Internet Connectivity: Apps such as DigiFarm (Kenya), AgroMall (Nigeria), and iCow (Kenya) offer more interactive experiences through smartphones. Features include chat support, video tutorials, digital record-keeping, and GPS-enabled advice tailored to farm location (GSMA, 2023).

c) Social Messaging Apps: Platforms like WhatsApp, Telegram, and Facebook Messenger are increasingly used by cooperatives for internal communication, training, and networking. These are often informal but effective due to their widespread usage among youth and rural leaders (Munyua, 2007).

d) Hybrid Platforms: Some initiatives combine multiple tools. For example, WeFarm allows peer-to-peer advice sharing via SMS and online platforms, integrating machine learning to match farmer queries with crowd-sourced responses (World Bank, 2017).

Benefits of Communication Apps for Agricultural Cooperatives

1. Improved Access to Timely Information: Apps enable farmers to receive updates on climate, pest outbreaks, input prices, and market trends, empowering them to make informed decisions (Gakuru, Winters, & Stepman, 2009).

2. Enhanced Communication and Coordination: Cooperative leaders can schedule meetings, share training materials, and send bulk updates to members, fostering unity and responsiveness (Ojo & Jibowo, 2021).

3. **Training and Knowledge Sharing:** Video and audio content in local languages can be distributed via apps, bridging literacy gaps and facilitating remote learning (FAO, 2020).

4. **Financial Inclusion:** Apps integrated with mobile money platforms like M-Pesa allow farmers to receive payments, access microloans, and contribute to cooperative savings schemes (Aker & Blumenstock, 2015).

5. Data Collection and Record-Keeping: Digital platforms help cooperatives track attendance, record transactions, and monitor individual farm productivity, increasing transparency and accountability.

Limitations and Challenges

Despite their potential, the adoption of communication apps in rural agricultural cooperatives is not without obstacles:

- Digital Literacy: Many older or less-educated farmers may struggle to use smartphone apps effectively.

- Infrastructure Gaps: Poor mobile coverage and unreliable electricity remain critical barriers in remote areas.
- Affordability: The cost of smartphones, internet subscriptions, and app maintenance may exclude low-income farmers.
- Cultural Resistance: Some members may resist technology, preferring traditional face-to-face communication.
- Content Relevance: Information must be localized, timely, and presented in accessible formats to be useful (Heeks, 2010).

Global and African Examples of App-Based Agricultural Support

- DigiFarm (Kenya): Offers a one-stop platform for farmers to access credit, training, inputs, and markets through mobile phones (Safaricom, 2019).
- AgroMall (Nigeria): Provides agro-data intelligence, extension services, and a digital wallet for smallholder farmers (AgroMall, 2021).
- Hello Tractor (Nigeria, Kenya): Connects tractor owners with smallholders needing affordable mechanization via mobile booking.
- iCow (Kenya): A mobile app that provides livestock farmers with voice-based guidance on animal health and production.

These examples demonstrate the feasibility of app-based interventions in strengthening cooperative development when supported by relevant infrastructure, training, and stakeholder engagement. Communication apps, when properly deployed, can revolutionize how agricultural cooperatives function in rural areas. They enhance communication flow, empower decision-making, and increase productivity through better access to information. While challenges remain, particularly around infrastructure and literacy, the growing success of ICT-based agricultural platforms across Africa shows promising potential for inclusive, tech-driven rural development. The next chapter will present case studies and empirical insights to demonstrate the real-world applications and impact of these tools.

Case Studies and Empirical Insights: While theoretical discussions on communication apps in agriculture are helpful, real-world applications offer deeper insight into their practical utility and limitations. This chapter presents selected case studies and empirical findings from across Africa, especially Nigeria, Kenya, and Ghana. These examples demonstrate how communication technologies are being integrated into cooperative societies and agricultural systems to improve information dissemination, coordination, and productivity.

Case Study 1: AgroMall Digital Platform – Nigeria

AgroMall, launched in Nigeria, is a digital agricultural platform designed to connect smallholder farmers to information, services, and markets through mobile technology. The app supports digital profiling of farmers, provides agronomic advice, and offers access to extension services, input supply, and financial products (AgroMall, 2021).

Impact on Cooperatives:

- Cooperatives using AgroMall report increased transparency in loan disbursement and repayment tracking.
- Members receive weather alerts, price forecasts, and digital training content directly on their mobile phones.

- In pilot locations such as Oyo and Kaduna States, AgroMall helped cooperatives increase maize yields by 18% in two planting seasons (AgroMall, 2022).

Key Takeaway: Digital platforms like AgroMall can digitize cooperative recordkeeping, improve communication between leaders and members, and enhance access to external markets.

Case Study 2: DigiFarm – Kenya

DigiFarm, developed by Safaricom in partnership with iProcure and FarmDrive, is one of the most successful examples of mobile agriculture solutions in East Africa. The platform offers services including digital input access, microloans, agronomic tips, and e-extension.

Features:

- Available via USSD, it's accessible to farmers with basic phones.
- Uses machine learning to customize recommendations.
- Allows cooperative managers to monitor member participation and production trends.

Outcomes:

- Over 1 million farmers enrolled as of 2022 (Safaricom, 2022).
- Cooperatives integrated into DigiFarm reported more efficient aggregation of produce and reduced post-harvest losses.
- Enabled input traceability and improved group sales through digital records.

Case Study 3: FarmCrowdy – Nigeria

Farm Crowdy is a Nigerian agritech company that allows urban investors to fund smallholder farmers through an app, with cooperative societies serving as the operational units on the ground. It combines communication, finance, and extension services in one mobile solution.

Cooperative Integration:

- Cooperative societies serve as clusters for monitoring, training, and harvesting.
- Real-time reporting via the app improves transparency for investors and boosts cooperative credibility.
- Farmers in Kaduna, Plateau, and Benue States have reported improved yields due to access to inputs, training, and digital guidance.

Empirical Study: WhatsApp for Farmer Coordination – Ghana

A 2021 study by Darko and Kumi (2021) in the Eastern Region of Ghana showed that smallholder cooperatives using WhatsApp groups for coordination experienced:

- 30% improvement in meeting attendance.
- Faster decision-making during emergencies (e.g., pest outbreaks).
- Enhanced solidarity and real-time problem solving among members.

Though informal, WhatsApp proved effective for its low cost and familiarity among members.

Lessons Learned Across Case Studies

1. Simplicity Is Key: Apps that work on basic phones (USSD/SMS) tend to reach more farmers than those requiring internet.
2. Digital Literacy Training Boosts Use: Where cooperatives offered basic digital skills training, adoption and usage of apps significantly increased.
3. Localized Content Increases Impact: Voice notes, local language tips, and region-specific advice were more engaging and actionable and Partnerships Drive Success: Government, private tech firms, and NGOs must collaborate with cooperatives for scale, funding, and technical support.

Limitations Noted in Case Studies

- Device Affordability: Many farmers still rely on borrowed or shared devices.
- Gender Disparity: Fewer women participated in digital platforms unless gender-inclusive training was offered.
- Inconsistent Power Supply: Lack of electricity remains a bottleneck for smartphone usage in many rural areas and Trust Issues: Some farmers feared data misuse or exploitation through digital platforms.

The real-world implementation of communication apps in agriculture across Nigeria, Kenya, and Ghana reveals both promise and complexity. Apps like AgroMall, DigiFarm, and FarmCrowdy demonstrate that mobile technology when paired with cooperative structures can significantly improve rural agricultural outcomes. However, their success depends on factors such as inclusivity, digital literacy, infrastructure, and sustained multi-stakeholder support. The following chapter explores broader challenges that hinder the widespread adoption of communication apps in rural cooperatives.

Challenges in Adopting Communication Apps in Agricultural Cooperatives

Barriers to Adoption of Communication Apps in Rural Agricultural Cooperatives

1. **Infrastructure and Economic Constraints**: Rural areas often lack reliable electricity and mobile network coverage, making it difficult for farmers to charge phones or access mobile apps (World Bank, 2021; Aker & Mbiti, 2010). Poor roads limit access to training and technical support. In addition, smartphones and data remain unaffordable for many farmers, with high costs of maintenance and usage discouraging regular app engagement (GSMA, 2023).

2. **Low Digital Literacy and Socio-Cultural Resistance**: Many rural cooperative members lack basic digital skills and are unfamiliar with app usage. Literacy challenges, especially among older farmers and women, further hinder effective engagement (FAO, 2020; Heeks, 2010). Cultural norms favor traditional, face-to-face communication and often restrict women's access to digital tools (Ogunlela, 2018; GSMA, 2023). Mistrust and fear of misuse or data privacy concerns also reduce app adoption (Aker, 2011).

3. **Institutional and Policy Gaps:** Weak government support, absence of ICT integration in extension services, and lack of regulation for digital agriculture tools contribute to fragmented efforts. Many cooperatives operate in isolation without access to quality

platforms or coordinated digital inclusion programs, reducing long-term sustainability (Qiang et al., 2012).

Lessons from Failed or Stalled Initiatives

Several well-intentioned app-based projects have failed due to one or more of the challenges listed above. For example:

- A 2019 pilot program in Northern Nigeria failed to reach scale due to poor farmer training and lack of field support.
- In Uganda, a mobile platform launched by a private firm collapsed after one year due to low user retention, lack of language customization, and poor community engagement (Wanyama, 2014).

These cases underscore the need for holistic approaches that combine technology with community participation, training, and follow-up support. While communication apps have clear potential to transform agricultural cooperatives, numerous challenges ranging from poor infrastructure to socio-cultural resistance stand in the way of widespread adoption. Overcoming these obstacles requires a coordinated, inclusive, and context-specific strategy involving government, private sector actors, NGOs, and the cooperatives themselves. The next chapter outlines such a strategy by presenting policy and development recommendations for stakeholders interested in driving digital transformation in rural agriculture.

Government Policy Recommendations

a) Infrastructure Investment: Governments must prioritize rural connectivity by expanding mobile network coverage, rural electrification, and internet infrastructure. Strategic partnerships with telecom operators can reduce the cost and complexity of reaching underserved regions (World Bank, 2021). Investment in solar-powered charging stations and community ICT hubs can support device usage and cooperative communication.

b) Incentivize Agri-Tech Innovation: Promote local innovation by offering tax incentives, grants for agritech pilots in remote areas, and support for content development in indigenous languages to encourage culturally relevant communication tools for rural farmers (GSMA, 2023).c) Governments should integrate communication apps into public agricultural extension services. Extension officers can be trained to use and promote mobile platforms during farm visits and training sessions (FAO, 2020). Mobile tools should not replace but complement human extension systems, increasing reach and responsiveness.

Development Agency Interventions

a). Promote Digital Literacy: NGOs and development agencies should provide gender-sensitive digital training for rural farmers especially women and youth covering phone use, app navigation, and digital safety (GSMA, 2023).

b) **Improve Access to Devices and Data:** Partner with telecoms to offer subsidized phones, data plans, or leasing options; prioritize support for women- and youth-led cooperatives (Heeks, 2010).

c) **Strengthen Cooperatives Digitally:** Focus on building cooperative capacity through digital leadership training, communication strategies, and post-donor sustainability planning.**Private Sector and Telecom Partnerships**

Private sector stakeholders have a critical role in driving innovation and adoption**.**

a) Inclusive Product Design

App developers must prioritize:

- Offline functionality or low-data operation
- Multilingual interfaces
- Voice-based features for low-literacy users
- Simple user interfaces compatible with basic smartphones

User feedback loops should be embedded to continuously improve usability and relevance (Qiang et al., 2012).

b) Public-Private Partnerships (PPPs)

Telecoms and agritech companies can partner with governments or cooperatives to:

- Launch joint ICT platforms
- Sponsor farmer digital inclusion programs
- Provide access to API-based services for cooperatives (e.g., mobile payments, GPS, or SMS broadcasting)

Such partnerships reduce rollout costs and expand rural market coverage.

Role of Cooperative Leaders

Cooperative executives and field officers must act as digital champions. Their roles include:

- Encouraging app adoption among members
- Facilitating peer-to-peer tech support
- Ensuring transparency through digital records
- Working with NGOs and tech providers to co-design usable tools

Where cooperative leaders are tech-literate and proactive, adoption is significantly higher (Ojo & Jibowo, 2021).

A Multi-Stakeholder Framework

Sustainable integration of communication apps in agriculture requires a collaborative model:

Stakeholder	Role
Government	Policy, infrastructure, public extension integration
NGOs/Donors	Literacy training, device access, cooperative support
Private Sector	App development, connectivity, PPPs
Cooperatives	Member mobilization, grassroots deployment
Academia	Monitoring, evaluation, and feedback

Only through such synergy can rural digital inclusion become scalable and equitable. The successful adoption of communication apps in agricultural cooperatives hinges on enabling policies, development partnerships, and inclusive technology design. A multi-stakeholder approach is needed one that addresses infrastructure, affordability, training, and trust. These

recommendations are essential to ensure that rural farmers, regardless of gender, geography, or income level, are not left behind in the digital age.

Conclusion

This article explored how communication apps can bridge the rural information gap and enhance agricultural cooperatives. While cooperatives are vital for rural development, they face challenges such as poor infrastructure, low literacy, and limited digital access. ICT tools offer real-time information, coordination, and learning opportunities, as shown by platforms like AgroMall, DigiFarm, and FarmCrowdy. However, barriers like affordability, gender inequality, and institutional weaknesses hinder widespread adoption. For these technologies to succeed, there must be investment in infrastructure, digital literacy, inclusive app design, and cooperative leadership. With the right support, communication apps can drive inclusive, tech-enabled agricultural transformation.

Recommendations

For Government Agencies: Invest in rural digital infrastructure, including mobile towers, electricity, and broadband. Integrate digital tools into national agricultural extension strategies. Develop inclusive ICT policies that promote rural innovation and protect user data.

For Development Partners and NGOs: Implement digital literacy campaigns, especially targeting women, youth, and cooperative leaders. Provide financial or material support for smartphone access and connectivity in rural areas. Support the creation of local content in native languages and visual/audio formats.

For Private Sector/Tech Developers: Design communication apps with offline functionality, intuitive navigation, and voice-based features. Collaborate with cooperatives to co-create solutions that reflect real needs and cultural values. Offer flexible business models (e.g., freemium, subsidized licensing) to ensure sustainability and scale.

For Cooperative Societies: Develop internal communication plans using mobile tools to improve information flow and participation. Appoint or train digital champions within the group to support app adoption and usage. Partner with local institutions and NGOs to pilot and evaluate digital platforms suited to members' needs.

Bridging the rural information gap through communication apps is not merely a technical issue; it is a matter of equity, empowerment, and sustainable development. By leveraging cooperative societies as change agents, and by grounding digital innovation in local realities, Africa's smallholder farmers can enter a new era of productivity, resilience, and shared prosperity.

References

Adebayo, O. O., & Onu, J. I. (2019). *Constraints to effective performance of agricultural cooperatives in Nigeria*. Journal of Rural Cooperation, 47(1), 1–15.

AgroMall. (2021). *AgroMall company profile.* Retrieved from https://agromall.com

AgroMall. (2022). *Impact report: Transforming rural agriculture through digital innovation.*

Aker, J. C. (2011). *Dial "A" for agriculture: A review of information and communication technologies for agricultural extension in developing countries*. Agricultural Economics, 42(6), 631–647.

Aker, J. C., & Blumenstock, J. (2015). *The economic impacts of new technologies in Africa.* In C. Monga & J. Y. Lin (Eds.), *The Oxford Handbook of Africa and Economics* (Vol. 2, pp. 354–371). Oxford University Press.

Aker, J. C., & Mbiti, I. M. (2010). *Mobile phones and economic development in Africa*. Journal of Economic Perspectives, 24(3), 207–232.

Anderson, J. R., & Feder, G. (2007). *Agricultural extension*. In R. Evenson & P. Pingali (Eds.), Handbook of Agricultural Economics (Vol. 3, pp. 2343–2378). Elsevier.

Ayanwale, A. B., & Adekunle, A. (2022). *Gender dimensions of access to digital agricultural innovations in Nigeria*. African Journal of Science, Technology, Innovation and Development, 14(3), 649–659.

Chambo, S. A. (2009). *Agricultural co-operatives: Role in food security and rural development.* International Labour Organization.

Chambo, S. A. (2009). *Agriculture and rural development: The role of cooperatives in agriculture and rural development*. International Cooperative Alliance.

Darko, E., & Kumi, E. (2021). *Digital communication and farmer coordination in Ghana: A WhatsApp case study.* African Journal of ICT and Development, 5(1), 45–62.

FAO. (2020). *Digital agriculture: Supporting farmers through the digital transformation*. Food and Agriculture Organization of the United Nations. https://www.fao.org

Food and Agriculture Organization [FAO]. (2020). *The State of Food and Agriculture 2020: Overcoming water challenges in agriculture*. FAO.

Gakuru, M., Winters, K., & Stepman, F. (2009). *Innovative farmer advisory services using ICT*. Forum for Agricultural Research in Africa (FARA).

GSMA. (2023). *The mobile economy: Sub-Saharan Africa 2023*. GSM Association. https://www.gsma.com/mobileeconomy/sub-saharan-africa/

Heeks, R. (2010). *Do information and communication technologies (ICTs) contribute to development?* Journal of International Development, 22(5), 625–640.

ICA. (2019). *Cooperatives for sustainable development: Report for the United Nations High-Level Political Forum*. International Cooperative Alliance. https://www.ica.coop

ILO. (2018). *Providing clean energy and agricultural services to communities through cooperatives.* International Labour Organization.

International Cooperative Alliance. (2019). *Cooperatives for sustainable development: A report on the role of cooperatives in SDGs*.

International Labour Organization [ILO]. (2018). *Providing clean energy and decent jobs through cooperatives*.

Munyua, H. (2007). *ICTs and small-scale agriculture in Africa: A scoping study*. International Development Research Centre (IDRC). https://idl-bnc-idrc.dspacedirect.org

Nwankwo, U. (2021). *Revitalizing agricultural cooperatives in Nigeria: Strategies for inclusive rural development*. African Development Review, 33(4), 521–535.

Ogunlela, Y. I. (2018). *Communication and management challenges in Nigerian agricultural cooperatives*. Nigerian Journal of Agricultural Extension, 19(2), 34–43.

Ogunlela, Y. I. (2018). *Digital technology and the future of agriculture in Africa.* Nigerian Journal of Agricultural Economics, 8(2), 13–23.

Ojo, M. O., & Jibowo, A. A. (2021). *Strengthening cooperative societies for agricultural development in Nigeria.* Nigerian Journal of Cooperative Studies, 3(1), 1–14.

Qiang, C. Z.-W., Kuek, S. C., Dymond, A., & Esselaar, S. (2012). *Mobile applications for agriculture and rural development.* World Bank.

Safaricom. (2019). *DigiFarm: Transforming the lives of smallholder farmers.* Retrieved from https://safaricom.co.ke

Wanyama, F. O. (2014). *Cooperatives and the sustainable development goals: A contribution to the post-2015 development debate.* International Labour Organization.

World Bank. (2017). *ICT in agriculture: Connecting smallholders to knowledge, networks, and institutions* (Updated edition). World Bank Group.

World Bank. (2021). *Harnessing technology for sustainable rural development in Africa*.