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How Digital Platforms are being used to Improve Agricultural Extension Outreach in India

SAYANIKA BORAH*[1], H.C. KALITA[2], MUNMI BORUAH[3] AND SATYAJEET MAHANTA[4]
[1]Assistant Professor, [2]Senior Scientist & Head, [3]Ph.D Scholar and [4]M.Sc Scholar
[1, 3 &4]Department of Extension Education and Communication Management, Assam Agricultural University Jorhat (Assam) India
[2]KVK (ICAR), Longleng (Nagaland) India

*Corresponding Author

ABSTRACT

In recent years, digital platforms have emerged as transformative tools in enhancing agricultural extension outreach across India. These platforms bridge the information gap between research institutions and farming communities by delivering timely, location-specific, and need-based advisories. Government initiatives like *Digital India*, *eNAM*, and *Kisan Suvidha*, alongside private and NGO-led innovations such as *AgriStack*, *AgriApp*, *RML AgTech*, and *Digital Green*, are revolutionizing the way farmers access information on crop management, weather forecasts, pest control, market prices, and government schemes. Mobile apps, SMS services, interactive voice response systems (IVRS), and social media channels are increasingly being leveraged to deliver knowledge to even the remotest regions. These technologies enable real-time problem-solving, personalized recommendations, and participatory learning, fostering more informed and resilient farming communities. However, challenges such as digital literacy, infrastructure gaps, and language barriers persist, highlighting the need for inclusive and locally adaptable digital extension models. This abstract explores the growing role of digital platforms in strengthening agricultural extension services in India, aiming to improve productivity, sustainability, and livelihood security for farmers.

Keywords: Digital Plateforms, Mobile apps, Sicial Media, Agricultural Extension

INTRODUCTION

In India, digital platforms are significantly improving agricultural extension outreach by providing farmers with direct access to timely, location-specific information on weather forecasts, market prices, crop advisories, and new farming techniques through mobile apps, web portals, and social media, enabling them to make informed decisions and optimize their agricultural practices, all while overcoming geographical barriers and reaching a wider audience than traditional extension methods (Chander and Sulaiman, 2014).

One of the most significant benefits of digital technology in agricultural extension is its ability to enhance accessibility. By leveraging online platforms and mobile technologies, extension services can reach a broader audience, including those in remote areas or with limited mobility.

Key ways digital platforms are used in agricultural extension in India:

Mobile-based information delivery:

SMS, IVRS (Interactive Voice Response System), and dedicated mobile apps like "mKisan" deliver crucial agricultural updates directly to farmers' phones, allowing for personalized information based on their location and crop type.

Online knowledge repositories:

Platforms like "Kisan Call Centres" provide access

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to a vast database of agricultural information, including best practices, crop management techniques, and disease control methods, through phone consultations or online forums.

Social media engagement:

Utilizing platforms like Facebook, YouTube, and WhatsApp groups to share educational content, live demonstrations, and farmer-to-farmer discussions, promoting knowledge sharing and community building.

Weather and market information:

Real-time weather updates and market price data through digital platforms allow farmers to make informed decisions regarding planting, harvesting, and selling their produce.

Precision agriculture tools:

Integrating data from sensors and drones with digital platforms enables farmers to receive site-specific recommendations regarding fertilizer application, irrigation management, and crop selection.

Digital marketplaces:

Platforms like eNAM (National Agriculture Market) facilitate direct interaction between farmers and buyers, eliminating intermediaries and improving price realization.

Benefits of using digital platforms in agricultural extension:

Increased reach:

Access to information is broadened, reaching even remote farmers who might not have easy access to traditional extension services.

Personalized information:

Digital platforms can tailor agricultural advice based on specific local conditions and farmer needs.

Faster information dissemination:

Timely updates on weather events, market trends, and new technologies can be delivered quickly to farmers.

Cost-effective outreach:

Compared to physical visits, digital platforms can reach a larger audience at a lower cost.

How digital platforms are being used to improve extension outreach:

Digital platforms are revolutionizing extension outreach by making information more accessible, interactive, and efficient. Here are some key ways they are being used:

Mobile Applications:

Apps like Plantix and AgriApp provide real-time advice on pest control, soil health, and best farming practices.Farmers can access customized recommendations based on their location and crop type.

Social Media and Messaging Apps:

Platforms like Facebook, WhatsApp, Telegram, and YouTube are widely used for knowledge sharing. Extension officers create groups to share farming tips, weather alerts, and market prices.

E-Learning Platforms and Webinars:

Websites such as Coursera, Agrilinks, and FAO e-learning offer courses on sustainable agriculture and farm management.

Webinars and virtual training programs provide real-time interaction with experts.

Digital Advisory Services and AI Chatbots:

AI-driven chatbots and IVR (Interactive Voice Response) systems allow farmers to ask questions and get instant responses. Services like Kisan Call Centers in India provide expert advice via phone or text messages.

Remote Sensing and GIS Tools:

Satellite imagery and drones help monitor crop health, soil moisture, and weather patterns. These insights assist in precision farming and disaster preparedness.

Online Marketplaces and E-Commerce:

Platforms like AgriBazaar, Farmcrowdy, and Hello Tractor connect farmers directly with buyers, reducing dependency on middlemen.

Digital payment solutions ensure seamless transactions.

Digital Radio and Podcasts:

Community radio stations and podcasts are used to broadcast educational content to rural areas.

Farmers can listen to expert interviews, success

stories, and policy updates.

By integrating these digital tools, extension services are becoming more inclusive, cost-effective, and scalable, benefiting farmers worldwide (Boruah and Borah, 2023).

How mobile apps, is being used to improve extension outreach:

Mobile apps are playing a transformative role in improving agricultural extension outreach by making advisory services more accessible, real-time, and data-driven (World Bank, 2021). Here's how they are being used:

Real-Time Information and Advisory Services:

Mobile apps provide instant access to expert recommendations on crop management, pest control, weather forecasting, and market prices.

Example: Plantix – A diagnostic app that helps farmers detect diseases and nutrient deficiencies by uploading images of affected crops.

Farmer-to-Farmer and Expert Communication:

Apps enable direct communication between farmers, extension officers, and agronomists through chat features, video calls, and discussion forums (Mittal and Mehar, 2016).

Example: AgriApp – Connects farmers with experts for real-time advisory services.

Weather Forecasting and Early Warning Systems:

Many apps provide localized weather forecasts, drought alerts, and pest outbreak warnings, helping farmers plan agricultural activities effectively.

Example: aWhere – Offers location-based weather insights and climate-smart farming advice.

Precision Farming and Remote Sensing Integration:

Mobile apps integrate with GIS, satellite imagery, and IoT devices to provide precision agriculture recommendations. Example: CropIn – Helps farmers monitor field conditions and receive tailored advice based on data analytics.

Digital Market Access and E-Commerce:

Farmers can sell their products, buy inputs, and compare market prices directly via mobile applications. Example: AgriBazaar – A platform that connects farmers with buyers to ensure fair prices for their produce.

Training and Capacity Building:

Many apps offer videos, e-books, and online courses on sustainable farming practices, livestock management, and agribusiness. Example: e-Krishi Pathshala – Provides digital learning modules for farmers.

Financial and Insurance Services:

Some apps provide access to microloans, crop insurance, and digital payments, reducing financial risks for farmers. Example: Tigo Kilimo – Helps smallholder farmers access financial services and market information.

By integrating these features, mobile apps are making agricultural extension services more efficient, scalable, and inclusive, helping farmers adopt better practices and improve productivity.

How social media is being used to improve extension outreach:

Social media platforms like Facebook, WhatsApp, Twitter, YouTube, and Telegram are revolutionizing extension services by making agricultural knowledge more accessible, interactive, and widespread (Meera *et al.*, 2004). Here's how they are being used:

Knowledge Sharing and Farmer Engagement:

Facebook and WhatsApp Groups: Extension officers create groups where farmers can ask questions, share experiences, and receive expert advice.

Example: "Digital Green" uses WhatsApp to disseminate videos on best agricultural practices.

Live Demonstrations and Webinars:

Platforms like Facebook Live, YouTube Live, and Zoom allow real-time interaction with experts.

Farmers can watch live demonstrations on pest control, irrigation techniques, and new farming technologies.

Example: YouTube channels like "Krishi Jagran" provide visual learning for farmers.

Weather and Market Price Alerts:

Twitter and Telegram channels share real-time weather forecasts, pest outbreak warnings, and daily commodity prices. Farmers can use this information to make informed decisions about harvesting, selling, and irrigation.

Table 1 : Digital Technologies in Agricultural Extension: A Comparative Overview

Technology	Application in Extension	Benefits	Adoption Rate (%)
Social Media Platforms	Information sharing, community building, real-time updates	Wide reach, instant communication, cost-effective	75
Precision Farming Tools	Data-driven advisory, field monitoring, resource optimization	Improved accuracy, efficiency, sustainability	50
Digital Content Management Systems	Organizing and distributing educational materials	Centralized resource hub, easy updates, accessibility	60
Mobile Apps	On-the-go information access, data collection	Convenience, real-time assistance, offline capabilities	70
AI and Machine Learning	Predictive analytics, personalized recommendations	Data-driven insights, scalability, continuous improvement	30

(Source: Farmonaut, 2024)
https://farmonaut.com/blogs/revolutionizing-agricultural-extension

Digital Marketing and Market Linkages:

Farmers can showcase and sell their produce directly through Facebook Marketplace and WhatsApp Business.

Example: AgriMarketplace on Facebook connects farmers with buyers, reducing dependency on middlemen.

Crowdsourcing Solutions and Expert Consultations:

Farmers post pictures and videos of diseased crops or soil conditions and receive advice from agricultural experts or fellow farmers.

Example: Plantix Facebook Community allows farmers to upload images for pest and disease diagnosis.

Awareness Campaigns and Policy Updates:

Governments and agricultural organizations use social media to share information on new policies, subsidy programs, and best practices.

Example: FAO and IFAD Twitter handles provide global agricultural updates.

Digital Learning and Capacity Building:

YouTube channels offer step-by-step tutorials on organic farming, greenhouse management, and livestock care.

Example: "Smart Farmer" on YouTube provides free agricultural training videos.

Community Building and Networking:

Social media fosters peer-to-peer learning, helping farmers connect with others facing similar challenges. Example: Facebook Groups like "Modern Farming Techniques" allow farmers to discuss new trends.

Impact of Social Media on Extension Outreach:

Cost-effective and Wide Reach:

Farmers in remote areas can access expert advice without travel.

Real-Time Interaction*:*

Immediate feedback helps farmers make timely decisions.

Multimedia Learning*:*

Videos, images, and infographics make learning more effective.

Farmer Empowerment*:*

Farmers can voice concerns, share innovations, and engage in discussions.

Social media is bridging the gap between extension services and farmers, making agricultural knowledge more accessible, timely, and impactful (Rao, 2007).

Challenges associated with digital agricultural extension in India:

Digital literacy gap:

Many farmers, particularly older generations, might lack the necessary digital skills to effectively use these platforms.

Network connectivity issues:

Poor internet access in rural areas can limit the reach of digital extension services.

Data privacy concerns:

Ensuring the security of farmers' personal data is

crucial for building trust in digital platforms.

Overcoming Challenges in Digital Agricultural Extension:

While the benefits of digital technology in agricultural extension are numerous, it's important to acknowledge and address the challenges that come with this digital transformation:

Digital Divide:

Ensuring that all farmers, regardless of location or socioeconomic status, have access to digital resources and the skills to use them (Boruah and Borah, 2023).

Data Privacy and Security:

Protecting sensitive farm data and ensuring compliance with data protection regulations.

Technology Adoption:

Overcoming resistance to new technologies and providing adequate training for both extension professionals and farmers.

Content Quality and Relevance:

Maintaining high standards of accuracy and relevance in digital content across various platforms.

This table provides a clear overview of how various digital technologies are being applied in agricultural extension, their benefits, and their current adoption rates. It's important to note that these adoption rates are estimates and can vary significantly depending on the region and specific context.

Measuring the Impact of Digital Extension Services:

To ensure the effectiveness of digital technologies in agricultural extension, it's crucial to implement robust measurement and evaluation strategies. Key metrics to consider include:

Adoption Rates:

Track the number of farmers using digital extension tools and services.

Knowledge Gain:

Assess improvements in farmers' understanding of agricultural practices through pre and post-intervention surveys.

Behavioral Change:

Monitor changes in farming practices resulting from digital extension efforts.

Productivity Improvements:

Measure increases in crop yields and farm efficiency.

Economic Impact:

Evaluate changes in farm income and profitability.

User Satisfaction:

Gather feedback on the usefulness and usability of digital extension tools.

Conclusion:

Digital platforms have significantly enhanced agricultural extension outreach in India by making information more accessible, timely, and farmer-centric. They have bridged traditional communication gaps by using mobile apps, SMS alerts, social media, and online portals to deliver critical advisories on crop production, weather, pest management, and market trends. These innovations empower farmers to make informed decisions, adopt improved practices, and connect with markets and experts more efficiently (Sulaiman and Hall, 2004). Despite challenges like digital literacy, connectivity, and regional disparities, the integration of digital tools with conventional extension systems presents a promising pathway toward more inclusive, scalable, and resilient agricultural development. Continued investment in infrastructure, capacity building, and localized content will be essential to fully harness the potential of digital extension services across the country.

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