



Digital agriculture at the grassroots: evaluating the reach of mobile extension tools

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Abstract

The digital revolution in Indian agriculture is fundamentally altering the traditional extension landscape, bridging the gap between scientific research and grassroots farming communities. This article explores the adoption, efficacy and on-ground reach of mobile-based extension tools, specifically focusing on platforms like Kisan Sarathi, Meghdoot and Bharat Vistaar. By transitioning from generic recommendations to personalized, real-time advisory services, these applications are empowering rural livelihoods. The evaluation highlights how digital integration enhances soil health management, improves climate resilience and expedites pest management, while also examining the challenges of digital literacy and accessibility in rural landscapes.

Keywords: Digital, Traditional, Kisan Sarathi, Meghdoot, Bharat Vistaar

Introduction

Indian agriculture remains the backbone of the rural economy, yet the historical challenge of bridging the gap between scientific research and grassroots farming communities persists (Balaji and Craufurd, 2011). The traditional agricultural extension system, which relies heavily on face-to-face interactions, physical field visits and localized demonstrations, is increasingly strained by a widening farmer-to-extension-worker ratio. This structural bottleneck often results in delayed information transfer, generic recommendations and a lack of timely interventions. Consequently, small and marginal farmers are frequently left vulnerable to sudden pest outbreaks, rapid weather anomalies and fluctuating market dynamics. The rapid penetration of smartphones and affordable mobile internet across rural India has ignited a much-needed paradigm shift in how agricultural knowledge is disseminated (Mittal and Mehar, 2016). Mobile phones are no longer mere communication devices; they have evolved into powerful, pocket-sized agricultural diagnostic and advisory tools (Sulaiman *et al.*, 2012). This digital revolution is democratizing access to scientific farming practices, enabling real-time, two-way communication channels that were previously unimaginable (Singh *et al.*, 2020). Modern e-extension platforms are replacing

outdated broadcast models with hyper-localized, data-driven insights that empower farmers to make proactive decisions (Kumar and Sharma, 2023). In this transformative landscape, the role of Krishi Vigyan Kendras (KVKs) and their Subject Matter Specialists is undergoing a fundamental evolution (Indian Council of Agricultural Research [ICAR], 2026). The mandate is expanding beyond traditional field demonstrations to encompass the curation, validation and targeted distribution of digital knowledge. Extension scientists must now leverage complex digital platforms to ensure that scientifically backed interventions such as sustainable soil health practices, bio-fertilizer adoption and climate-resilient agronomy reach the last mile efficiently and accurately. This article critically evaluates the on-ground reach, efficacy and adoption of prominent mobile-based extension tools, with a specific focus on platforms like Kisan Sarathi, Meghdoot and Bharat Vistaar. By transitioning from generic advisories to personalized, real-time diagnostic services, these applications are actively empowering rural livelihoods. This evaluation highlights how targeted digital integration enhances precision agriculture, improves climate resilience and expedites pest management, while also examining the critical challenges of digital literacy and technological accessibility in rural landscapes.

The Role of Kisan Sarathi in Precision Advisory

Kisan Sarathi has emerged as a cornerstone for digital agricultural extension, facilitating a two-way interactive communication channel between scientists and farmers (Ministry of Agriculture and Farmers Welfare, 2026). This platform allows extension workers at the Krishi Vigyan Kendra (KVK) level to push highly specific, multimedia-based advisories regarding crop management, balanced fertilizer application and soil test-based recommendations (Ghosh and Majumdar, 2022). The platform's ability to reach thousands of farmers simultaneously ensures that critical alerts regarding pest outbreaks or vital nutrient management strategies reach the grassroots without delay, significantly reducing the reliance on chemical inputs like Urea and DAP when organic or bio-fertilizer alternatives are viable.

Meghdoot and Climate-Resilient Agriculture

With weather anomalies such as the El Niño phenomenon heavily impacting Kharif crop production, real-time agromet advisories have become essential. The Meghdoot application plays a pivotal role in contingency planning (India Meteorological Department [IMD]). By translating complex meteorological data into actionable farm-level advice, Meghdoot helps farmers make informed decisions about sowing times, irrigation scheduling and harvesting (Patra and Babu, 2024). For crops highly sensitive to weather fluctuations like paddy, cotton and chilli, this localized weather intelligence is a critical safeguard against crop failure and economic loss.

Bharat Vistaar and the Future of E-Extension

Evaluating the efficacy of tools like Bharat Vistaar and the National Pest Surveillance System (NPSS) reveals a growing appetite for sophisticated diagnostic platforms among rural communities. These applications empower farmers to identify diseases and pests through image capture and receive immediate management protocols. However, the successful adoption of these mobile tools hinges on continuous skill training programs and digital literacy campaigns. Extension scientists must remain proactive in evaluating the user interface and practical reach of these tools to ensure they serve the marginal farmer effectively.

Conclusion

The integration of mobile extension tools like Kisan Sarathi, Meghdoot and Bharat Vistaar represents a monumental leap forward in agricultural sustainability and farmer

empowerment. While the digital divide remains a challenge, the targeted use of these platforms by extension networks significantly enhances the speed and precision of knowledge transfer. Ensuring the continued success of digital agriculture at the grassroots will require sustained investment in rural digital literacy, localized content creation and feedback-driven application updates to maximize their socio-economic impact.

Conflict of Interest

The authors declare no competing or conflict of interest.

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