

ICT-Enabled Interventions for Improving Agricultural Decision-Making and Market Access among Smallholder Farmers in Developing Regions

P.K.S. Prasadhi¹, M.S. Wijewickrama², W.A.R.K. Wickramasinghe³, M.N.F. Shalma⁴, N.U.V. Mendis⁵, M.I.I. Mapitigama⁶, H.R.S. Sewwandi⁷, and C.S. Ranasinghe^{8,*}

*Department of Information Systems, Faculty of Management Studies,
Rajarata University of Sri Lanka, Mihintale, Sri Lanka¹⁻⁸*

*Corresponding author: csranasinghe456@gmail.com

Abstract

Agriculture remains central to the socio-economic development of many developing countries. Smallholder farmers play a pivotal role here, but are facing systemic challenges such as unpredictable weather, limited access to market and agronomic information, pest and disease outbreaks, poor infrastructure, and low levels of literacy. This study proposes and evaluates an integrated web-based platform to address these barriers and strengthen agricultural decision-making and resilience. Using a mixed-methods research design, data were collected through field interviews, focus groups, and pilot testing conducted over one month with 10 farmers from selected rural communities. The platform integrates satellite-based weather alerts, AI-driven pest diagnostics, SMS and voice-based communication for low-literacy users, expert advisory services, and a digital marketplace linking farmers with buyers and transporters. Results show significant improvements in access to timely information, adoption of improved farming practices, reduction of post-harvest losses, and participation in formal markets, with high levels of engagement observed among digitally underserved populations. By building upon and extending prior ICT-agriculture initiatives, this study demonstrates the transformative potential of inclusive digital solutions for enhancing agricultural value chains and promoting sustainable rural development. The findings hold implications for policymakers, development agencies, and technology providers seeking scalable, context-sensitive innovations to empower marginalized farming communities.

Keywords: agriculture, digital inclusion, ICT solutions, smallholder farmers, sustainable development