Strategies to Engage Farmers Regarding Technology and Innovations

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Introduction & Need for Strategy

To sustainably meet the food demands of a growing global population, the integration of advanced technologies such as drones, GPS-based tools, and environmental sensors into agricultural systems is crucial. These innovations offer the potential to boost productivity and enhance farmers' livelihoods (Bayity & Edgar, 2022; Karunathilake et al., 2023). Despite these benefits, widespread adoption remains limited due to systemic barriers, including financial constraints, limited technical skills, and skepticism toward unfamiliar technologies (Derakhti et al., 2023).

Addressing this gap calls for strategies rooted in Learner-Centered Teaching (LCT), which positions farmers not as passive recipients but as active collaborators in the innovation process. By valuing their experiences, incorporating their feedback, and responding to local contexts, LCT fosters the co-development of technologies that are practical, empowering, and sustainable (Makapela et al., 2025).

Connection to Literature

This study draws on two key theoretical frameworks - the Technology Acceptance Model (TAM) and Diffusion of Innovations (DOI) theory to inform LCT-based engagement strategies. TAM emphasizes the importance of perceived usefulness and ease of use in shaping individuals' willingness to adopt new technologies (Davis, 1989), informing the need to align tools with farmers' needs. DOI highlights the influence of social systems, communication channels, and cultural norms on technology adoption (Rogers, 2003), reinforcing the importance of participatory approaches.

By integrating TAM and DOI with LCT principles, this approach supports participatory, inclusive engagement, and trust-building strategies that position farmers as co-creators of innovation. These emphasize culturally responsive facilitation and differentiated learning environments to overcome structural and cultural barriers, including institutional mistrust and resistance to change (Bekee et al., 2024; Becerra-Encinales et al., 2024).

Implementation of Strategy

A narrative review of the literature was conducted to explore two guiding questions: (1) What challenges hinder the adoption of agricultural technologies? and (2) What strategies have been found to promote adoption? Findings from diverse contexts indicate that factors such as farm size disparities, limited digital literacy, infrastructure gaps, and socio-demographic characteristics significantly influence the adoption decisions (Kolady et al., 2021; Rizzo et al., 2024).

To address these challenges, this study proposes a multifaceted engagement strategy that combines experiential learning with accessible digital tools. Field demonstrations, peer learning forums, and farmer discussion groups can be designed to foster inclusive participation, particularly among women, youth, and marginalized communities. Locally adapted approaches such as the use of drought-tolerant seeds in Burkina Faso or climate

responsive planting calendars in Ethiopia can further enhance the relevance and applicability of new technologies (Morris, 2021).

Moreover, leveraging digital platforms that deliver timely information such as weather updates and pest alerts, alongside incentive mechanisms like input subsidies and recognition certificates, can encourage behavioral change without fostering dependency.

Fostering enduring, trust-centered collaboration between farmers, extension agents, and technology developers is essential. Technology facilitators should prioritize culturally responsive communication and recognize the diverse learning preferences across age groups, literacy levels, and farming systems. Training sessions that incorporate storytelling, visual aids, and local languages can make abstract technologies more relatable and reduce resistance to change (Yangambi et al., 2024). Involving early adopters or community leaders as peer educators can further enhance credibility and foster social learning as emphasized by Diffusion of Innovation theory (Rogers, 2003). These relational and educational elements are critical to ensuring that technology adoption is not only technically feasible but also socially and culturally meaningful.

Overall, these integrated strategies respond directly to the challenges identified and promote a sustainable, farmer-centered model of technology adoption.

Implications

Bridging the adoption gap requires participatory, context-sensitive strategies that align with the lived realities of farmers. Strengthening extension systems through mobile technologies and digital platforms can provide ongoing, personalized support. Policy efforts should prioritize inclusion by investing in gender-responsive training programs and youth-focused innovation hubs. Additionally, adaptive research and enabling policies such as input subsidies and reduced tariffs are essential to create a supportive environment that fosters long-term adoption and sustained innovation

Advice to Others

Stakeholders such as educators, extension agents, program administrators, and evaluators should begin training programs by mapping the needs, priorities, and constraints of farmers. Embedding these strategies from the onset can lead to more transformative and sustainable outcomes. By aligning programs with farmers lived realities, interventions are more likely to foster meaningful adoption and long-term improvements in agricultural productivity.

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