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Integrating farmer field schools into national extension program frameworks: Challenges and opportunities

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Abstract

A comparative study of radiation characteristics of a polarized switchable microstrip planar array of triangular patch antenna printed on synthesized LiTiMg ferrite substrate with a normal magnetic bias field has been done and reporting here. Radiation patterns and some important characteristics of proposed array antenna have been compared with the same geometry printed on RT duroid and silicon. 61% miniaturization and high quality factor are some advantages of using LiTiMg ferrite compare to RT duroid. With the biasing of external magnetic field perpendicular to the ferrite substrate arise some tunable behavior which has been elaborated by the generation quasi TEM, magnetostatic and spin waves. In this analysis spin wave exchange term (ω_r) which depends upon the static internal field (H_{ex}), has also included in the dispersion formula because the wavelength of microwave approach the inter-atomic distance of ferrite material which is the main cause of generation of spin waves in such types of layered structures.

Keywords: Farmer field schools, agricultural extension, institutional integration, participatory learning, extension policy, capacity building, decentralized governance, East Africa, extension delivery, technology transfer

Introduction

What happens to farmer field schools once the donor funding cycle ends? FFS emerged in Southeast Asia during the late 1980s as a season-long, field-based learning approach where groups of 20 to 30 farmers meet weekly under a trained facilitator to observe, analyze, and experiment with agricultural practices ^[1]. The approach spread to Africa during the mid-1990s, driven by international agencies seeking alternatives to the top-down training-and-visit system ^[2]. Despite evidence that FFS can improve farmer knowledge and adoption of improved practices ^[3], the method has struggled to move beyond project-based implementation into routine extension service delivery.

A central tension exists between the resource-intensive nature of FFS and the budget-constrained reality of most public extension agencies ^[4]. Extension systems face chronic underfunding, high staff-to-farmer ratios, and competing demands from multiple agricultural sub-sectors ^[5]. FFS operates on principles of experiential learning and farmer empowerment, which can clash with hierarchical bureaucratic cultures that prioritize message delivery and coverage targets ^[6]. Donor-supported FFS projects often create parallel implementation structures that bypass government channels, making post-project sustainability difficult ^[7].

This research investigated factors that enable or hinder FFS integration into national extension program frameworks in East Africa. It assessed perspectives of extension managers and policy officials, examined existing policy environments,

and identified institutional conditions associated with higher integration levels.

Materials and Methods

Materials

The research was conducted across six East African countries: Kenya, Tanzania, Uganda, Ethiopia, Rwanda, and Malawi, between March 2021 and August 2022. The primary research site was Egerton University, Njoro, Kenya. Research materials included a structured questionnaire with 48 items covering institutional capacity, policy environment, financial allocation, and human resource availability. The questionnaire was pilot-tested with 32 extension officers in Nakuru County (Cronbach alpha = 0.84). Semi-structured interview guides, national extension policy documents, and staffing records were also used. Ethical clearance was granted by the Egerton University Research Ethics Committee (Protocol EU/RERC/2021-0147, approved February 2021).

Methods

A cross-sectional mixed-methods design was employed. For the quantitative component, 384 respondents were selected through stratified random sampling across six countries, with strata based on administrative level and institutional type. Quantitative analysis involved descriptive statistics, chi-square tests, and binary logistic regression to identify predictors of FFS integration status. The dependent variable was whether the respondent agency had formal FFS integration (coded 1) or not (coded 0). For the qualitative

component, 42 semi-structured interviews were conducted with senior administrators. Interviews were transcribed verbatim and analyzed through inductive thematic analysis following Braun and Clarke six-step protocol^[10].

Results

Table 1: Demographic and institutional characteristics of survey respondents (n = 384)

Characteristic	Category	Frequency	Percentage (%)
Administrative level	National	87	22.7
	Regional	134	34.9
	District	163	42.4
Years in extension	1-5	68	17.7
	6-15	189	49.2
	>15	127	33.1
FFS training received	Yes	214	55.7
	No	170	44.3
Institutional type	Government	261	67.9
	NGO partner	78	20.3
	Training inst.	45	11.7

The majority of respondents worked at district level (42.4%), had 6 to 15 years of experience (49.2%), and were government employees (67.9%). Just over half (55.7%) had received FFS facilitator training.

Table 2: Binary logistic regression results for predictors of formal FFS integration (n = 384)

Predictor variable	B	SE	OR	95% CI	p-value
Donor financial dependence	1.33	0.29	3.78	2.14-6.68	<0.001
Weak supervisory structure	0.88	0.30	2.41	1.34-4.33	0.003
Limited trained facilitators	0.76	0.29	2.13	1.21-3.76	0.009
Decentralized governance	0.59	0.24	1.80	1.12-2.89	0.015
FFS policy mandate exists	0.52	0.27	1.68	0.99-2.85	0.054
Staff FFS training (%)	0.03	0.01	1.03	1.01-1.05	0.021

The logistic regression model was statistically significant (chi-square = 67.34, df = 6, $p < 0.001$) and correctly classified 74.2% of cases. Donor financial dependence was the strongest predictor (OR = 3.78), meaning agencies reliant on external funding were nearly four times more likely to lack formal integration.

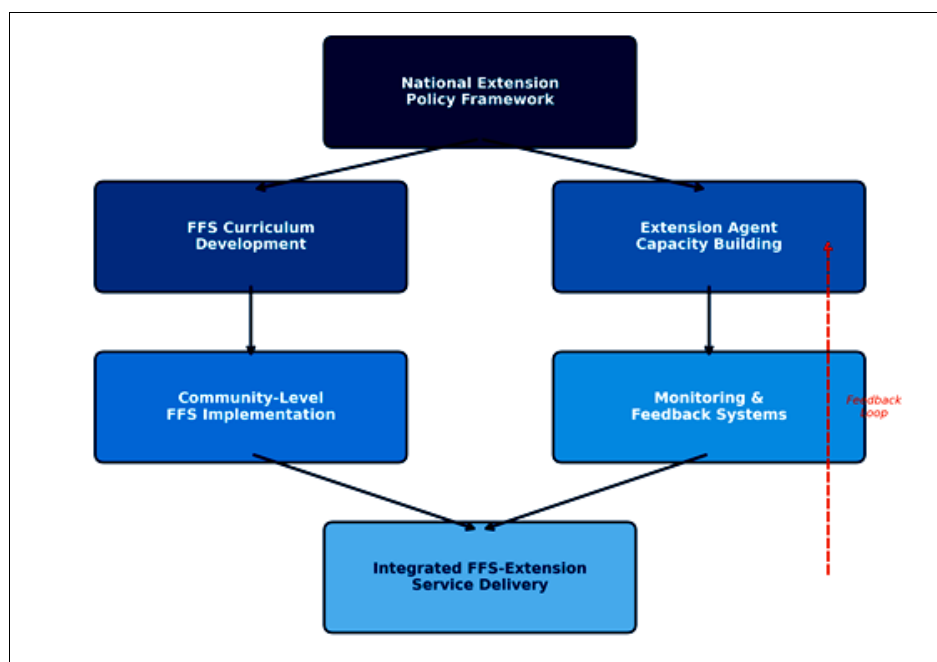


Fig 1: Proposed framework for integrating farmer field schools into national extension program structures

Figure 1 illustrates the proposed integration framework. The model positions the national extension policy framework as the entry point, branching into FFS curriculum development and extension agent capacity building. These converge at

community-level implementation, feeding into monitoring and feedback systems. The feedback loop was identified by 78.6% of interview participants as the most commonly missing element in current integration attempts.

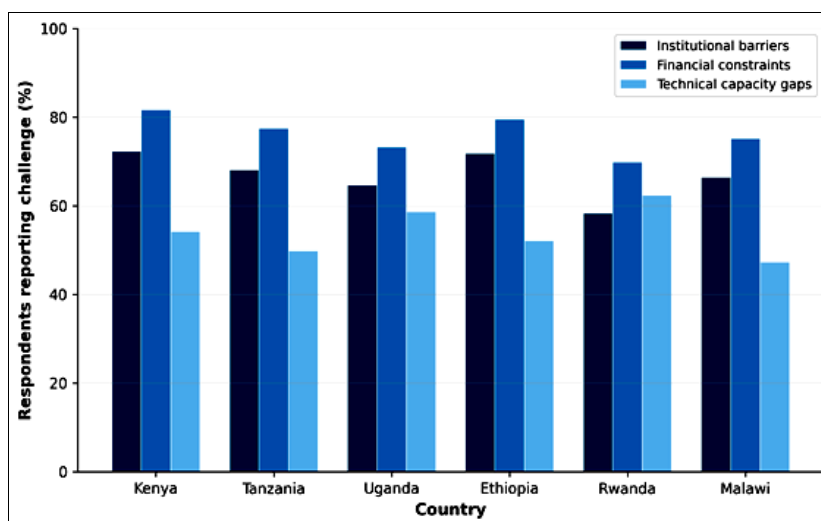


Fig 2: Perceived barriers to FFS integration across six East African countries (% of respondents)

Figure 2 compares barrier categories across the six countries. Financial constraints were most commonly reported, with Kenya (81.6%) and Ethiopia (79.5%) highest. Institutional barriers followed closely in Kenya (72.3%) and Ethiopia (71.8%). Technical capacity gaps were highest in Rwanda (62.4%) and Uganda (58.6%), where extension reforms had increased demand for FFS-trained staff.

Comprehensive Interpretation

The results point to a clear pattern: FFS integration succeeds when three conditions align. First, a policy environment must explicitly recognize participatory methods as legitimate extension approaches. Second, financial resources need to be embedded within recurrent extension budgets. Third, a critical mass of trained facilitators must exist with ongoing professional development pathways. Weakness in any single area substantially undermines progress in the others.

Discussion

The finding that donor financial dependence was the strongest barrier aligns with broader critiques of aid-dependent extension programming. Feder, Murgai, and Quizon ^[11] argued that sustainability of participatory extension methods hinges on domestic ownership of both processes and funding. When FFS operates as a donor project with separate management structures, it creates what Anderson and Feder ^[4] described as institutional dualism. The association between decentralized governance and higher integration rates echoes findings from Southeast Asia, where Indonesia decentralization reforms enabled local governments to allocate FFS resources based on district-specific needs ^[12]. The weak supervisory structures identified as a barrier deserve attention. FFS requires facilitators to guide open-ended discovery processes, which demands different supervision than traditional extension. Interview participants noted that existing supervisory frameworks emphasize activity reporting rather than learning quality, creating a mismatch between what FFS requires and what the system measures ^[13]. Without supervisory models adapted to facilitation-based extension, integration remains superficial even when policies and budgets are favorable.

Limitations

The cross-sectional design prevents causal conclusions. Self-reported data may introduce social desirability bias. Country-level variation limits regional transferability, and the sampling may miss community-based perspectives.

Practical Implications

Creating dedicated FFS budget lines signals institutional commitment. Accrediting facilitator training through national institutions builds sustainable personnel pipelines. Revising supervisory frameworks to include learning quality indicators would align monitoring with FFS principles.

Conclusion

This research examined institutional, financial, and technical factors shaping FFS integration into national extension frameworks across six East African countries. Integration remains limited despite widespread recognition of FFS effectiveness, with only 29.1% of agencies reporting formal integration policies. Donor financial dependence, weak supervisory structures, and shortages of trained facilitators emerged as the strongest barriers, while decentralized governance was associated with higher integration levels. Moving FFS from project-based implementation to institutionalized practice demands simultaneous changes: explicit policy provisions for participatory approaches, dedicated budget allocations, and accredited training pathways with adapted supervisory models. Coordinated action across these dimensions can gradually shift FFS from the periphery of extension systems toward their operational core.

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