



What Drives the Integration of Lead Farmers into Public Extension Systems? Unpacking Institutional, Policy, and Operational Factors in Tanzania's Kagera Region

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Abstract: Integrating community-based intermediaries into public agricultural extension systems is increasingly recognized as a strategy to address chronic service delivery gaps in sub-Saharan Africa. However, the systemic factors that enable or constrain such integration remain poorly understood. This study investigates the institutional, policy, and operational conditions influencing the integration of Lead Farmers (LFs) into Tanzania's government-led agricultural extension system, using the Kagera Region as a case study. Despite LFs being widely promoted by non-governmental and donor-funded projects to facilitate peer learning and improve agronomic practices, their formal alignment with public extension structures is limited, uncoordinated, and lacks long-term institutional backing. A cross-sectional, mixed-methods design was employed, combining a household survey of 95 smallholder farmers with 18 key informant interviews and four focus group discussions involving extension officers, NGO representatives, researchers, and local leaders. The findings reveal that while LFs are highly valued for their accessibility, credibility, and complementary role in extension delivery; with over 80% of surveyed farmers acknowledging their positive contribution to productivity; their effective integration is severely constrained by a lack of political commitment, the absence of coherent policy frameworks, weak institutional coordination, and inadequate administrative and financial preparedness. The study contributes to policy and practice by moving beyond project-level assessments to provide a systems-level analysis of the structural determinants of LF integration. It highlights that without deliberate efforts to embed LFs within formal planning, budgeting, and accountability mechanisms, their role remains informal and unsustainable. The study concludes that leveraging the potential of LFs requires a fundamental shift from project-based engagement to institutionalized integration. It recommends the formulation of a national policy guideline to standardize LF roles, the mainstreaming of LFs into district agricultural plans and budgets, the establishment of multi-stakeholder coordination platforms, and the provision of structured, ongoing training through public institutions.

Keywords: Lead farmers, Agricultural extension systems, Institutional integration, Policy frameworks, Tanzania

1. Background Information

Agriculture remains central to global food systems and rural livelihoods, particularly in sub-Saharan Africa, where it supports over half of the population and up to 90% of rural inhabitants (World Bank, 2021). Smallholder farmers, who cultivate less than two hectares, contribute an estimated 30–34% of the global food supply, yet they frequently face persistent constraints, including limited access to productive inputs, markets, and critically effective agricultural extension services (Food and Agriculture Organization [FAO], 2021). In Tanzania, agriculture is a cornerstone of the economy,

Contributing 26.1% to the Gross Domestic Product (GDP) and employing more than 65% of the workforce, the vast majority of whom are smallholder farmers (United Republic of Tanzania [URT], 2023). However, the performance of the sector is undermined by low technology adoption, inadequate extension staffing, and insufficient financial investment. In rural areas, the ratio of extension officers to farmers is alarmingly high, with some districts reporting ratios as extreme as 1:2,307, far exceeding acceptable standards and severely hindering farmers' access to timely, context-specific



agronomic advice (FAO, 2022; Kaur & Kaur, 2018; Urassa *et al.*, 2023).

This persistent extension gap has direct consequences for agricultural productivity and rural resilience. The limited capacity of formal systems impedes the timely adoption of agricultural innovations, weakens the ability of farming communities to cope with climate shocks, and contributes to declining productivity trends (Mkumbo *et al.*, 2022; Rivera & Qamar, 2019). In response, a range of alternative, community-based extension approaches have emerged to complement the overstretched public system. Among these, the Lead Farmer (LF) model has gained significant attention as a promising strategy for decentralizing knowledge dissemination. Lead Farmers are respected and experienced community members selected and trained to deliver agricultural advice, demonstrate best practices, and facilitate peer-to-peer learning (Ringo *et al.*, 2023). Operating as a bridge between formal extension agents and the wider farming community, LFs leverage social capital and local legitimacy to enhance the reach and relevance of extension messages (Kiptot & Franzel, 2015).

The LF model is not unique to Tanzania. In countries such as Malawi and Uganda, national extension strategies have begun to formally recognize the role of community-based agents, including LFs, embedding them within structured government programs. Evidence from these contexts suggests that with clear policy backing, effective coordination mechanisms, and sustained capacity support, LFs can complement government extension staff effectively and at scale (Franzel *et al.*, 2019). In Tanzania, the application of LFs has been observed in several regions, including Mbeya, Iringa, and Kagera, where non-governmental organizations (NGOs) and donor-funded projects have supported community-based extension initiatives. For instance, in Iringa, the Southern Agricultural Growth Corridor of Tanzania (SAGCOT) partnered with local government authorities to utilize LFs in promoting conservation agriculture. Despite these promising interventions, such efforts have largely remained outside the formal public extension system, characterized by limited coordination, weak institutional anchoring, and an absence of sustainability plans once project funding ceases (URT, 2021).

The Tanzanian experience reveals that the integration of LFs into formal extension systems faces numerous constraints. Among the key challenges are the absence of clear policy frameworks defining the role of LFs within public extension institutions, a lack of structured incentive mechanisms, and weak coordination among the diverse stakeholders, including government, NGOs, and farmer organizations, who engage with LFs (Mkumbo *et al.*, 2022; Ringo, 2020). In many instances, LFs continue to function informally under the

guidance of short-term projects, thereby limiting their long-term effectiveness and alignment with national agricultural development objectives (URT, 2021). While existing literature has documented the effectiveness of LFs at the project or community level, there is limited empirical evidence on the institutional, policy, and administrative conditions that shape their integration into formal government extension structures. In the Tanzanian context, how LFs are coordinated, supported, and positioned within the public system remains poorly understood, leaving the processes and constraints influencing their long-term institutionalization and sustainability largely unexplored (Franzel *et al.*, 2019; Ringo *et al.*, 2023).

Kagera Region, located in the north-western zone of Tanzania, provides a relevant context for examining this issue. The region is characterized by its agro-ecological diversity and extensive smallholder farming systems, with major crops including bananas, coffee, beans, and tea (Merumba *et al.*, 2022; URT, 2023). Agriculture serves as the main source of livelihood for approximately 77% of the population; however, extension service delivery faces persistent challenges, with an extension officer-to-farmer ratio of 1:1,327 (URT, 2023). Several community-based initiatives and NGOs, such as KADERES, MAVUNO, and Café Africa Tanzania, have introduced and supported LFs initiatives within the region. While these non-state actors have been active, the integration of LFs into government-led extension services has yet to be formally institutionalized, highlighting the need to explore the factors that facilitate or hinder this process.

In this study, the integration of Lead Farmers is conceptualized as the extent to which LFs are formally recognized, coordinated, and supported within the government agricultural extension system. This encompasses their alignment with existing institutional arrangements, supervision mechanisms, policy frameworks, and resource allocation systems, enabling them to operate as complementary actors alongside government-employed extension officers rather than as parallel or project-based agents. In response to the identified gaps, this study aimed to assess the integration of Lead Farmers into Tanzania's government agricultural extension system, using Kagera Region as a case study. Specifically, the study sought to: (i) identify the factors influencing the successful integration of Lead Farmers; (ii) examine farmers' perceptions regarding their integration; and (iii) assess the roles played by Lead Farmers in enhancing agricultural productivity.

2.0 Theoretical Framework

This study is anchored in a multi-theoretical framework that integrates three complementary perspectives: Institutional Theory, Innovation Diffusion Theory, and Systems Theory. This integrated framework is designed to capture the



complex, multi-dimensional nature of Lead Farmer (LF) integration into a public extension system, moving beyond a narrow focus on individual adoption to encompass the institutional, social, and systemic conditions that shape integration outcomes. The framework posits that the successful integration of LFs is not merely a function of farmer-level acceptance but is contingent upon the interplay of enabling institutional structures, effective knowledge diffusion processes, and the functional coherence of the broader extension system.

2.1 Institutional Theory

Institutional Theory provides the primary lens for understanding the formal and informal structures that govern the integration of LFs. Originating from the work of DiMaggio and Powell (1983) and Scott (2014), this theory posits that organizations and the actors within them are deeply influenced by the institutional environment, comprising regulative, normative, and cultural-cognitive pillars. In the context of this study, the *regulative pillar* refers to the formal rules, policies, and legal frameworks that define the role of LFs within the government extension system. The absence of clear national policy guidelines, as highlighted in the background literature (URT, 2021), represents a critical gap in this pillar, creating ambiguity and hindering formal adoption. The *normative pillar* encompasses the values, norms, and expectations of key stakeholders, including extension officers, local leaders, and farmers. The acceptance of LFs as credible and legitimate actors, as documented by Ringo et al. (2023) and supported by findings from this study, is a reflection of this normative dimension. Finally, the *cultural-cognitive pillar* relates to the shared beliefs and cognitive frameworks that shape how actors perceive and make sense of LFs. The trust placed in LFs due to their shared farming experience and community embeddedness (Kiptot & Franzel, 2015) is a manifestation of this pillar. Institutional theory thus guides the analysis by directing attention to how these three pillars; particularly the interplay between formal policy (regulative) and informal acceptance (normative and cognitive); influence the prospects for LF integration.

2.2 Innovation Diffusion Theory (IDT)

To understand how LFs facilitate the uptake of agricultural practices and how the “innovation” of LF integration itself spreads, this study draws on Rogers’ (2003) Innovation Diffusion Theory. IDT provides a framework for analyzing how new ideas and practices are communicated and adopted within a social system. In this context, two levels of diffusion are relevant. First, LFs themselves serve as key agents in the diffusion of agricultural innovations to fellow farmers. Their effectiveness as change agents is linked to attributes of the innovation (e.g., relative advantage, compatibility), communication channels (e.g., peer-to-peer networks), and the social system (e.g., community norms). The finding that LFs enhance technology adoption through peer

communication and demonstration plots (Chirwa & Dorward, 2017; Ragasa, 2020) aligns with this perspective. Second, the *integration of the LF model* into the government extension system can itself be viewed as an innovation. This perspective allows for an examination of the factors influencing its adoption by public institutions, including the perceived relative advantage over the current system, compatibility with existing structures, and the complexity of implementation. IDT thus helps to explain the processes through which LFs influence farmers and, simultaneously, the conditions under which the public system might “adopt” LFs as a permanent feature.

2.3 Systems Theory

A systems perspective, informed by the work of Checkland (1999) and Von Bertalanffy (1968), provides the overarching framework for viewing the agricultural extension system as an interconnected whole, rather than a collection of isolated parts. This theory emphasizes that a system is defined by the interactions and interdependencies among its components; including government extension officers, LFs, farmers, NGOs, and policymakers; and that the behavior of the system is shaped by the structure of these relationships. In the context of this study, Systems Theory highlights that the integration of LFs is not a simple, linear process but is contingent on the coherence and functionality of the entire extension system. Factors such as weak institutional coordination, fragmented implementation among actors, and the absence of clear feedback loops (e.g., supervision and accountability mechanisms) represent systemic failures that undermine integration (Mkumbo *et al.*, 2022). As such, by applying this lens, the study moves beyond an actor-centric view to analyze the structural and relational conditions; such as communication flows, resource dependencies, and decision-making processes; that either enable or constrain the LF integration process. The ultimate goal is to understand how to create a more resilient, responsive, and integrated extension system, where LFs operate as a coherent and supported subsystem.

2.4 An Integrated Model for LF Integration

The integration of these three theoretical perspectives forms the conceptual framework for this study, as illustrated in Figure 1. The framework suggests that the successful integration of Lead Farmers into the government extension system is an outcome determined by the interplay of three interlocking dimensions:

- i. *Institutional Context*: This encompasses the formal and informal institutional factors, including policy frameworks (regulative), stakeholder norms and expectations (normative), and the shared beliefs and trust in LFs (cultural-cognitive). The strength and alignment of these institutional pillars create the enabling environment for integration.
- ii. *Diffusion Processes*: This refers to the mechanisms of knowledge and practice transfer. It includes the

role of LFs as change agents in facilitating the adoption of agricultural innovations among farmers (micro-level) and the processes by which the LF model itself is communicated and adopted by the formal extension system (macro-level).

- iii. *Systemic Functionality*: This dimension focuses on the structural and relational characteristics of the broader extension system. It includes factors such as coordination among actors (government, NGOs, farmer groups), resource allocation and budgeting, communication and feedback loops, and accountability mechanisms. The functionality of these systemic elements determines whether the system can effectively absorb and sustain the LF role.

The central proposition of this framework is that integration is not a binary state, but a dynamic process influenced by the interactions across these three dimensions. Weaknesses in any one dimension, for example, a supportive policy (institutional) but a lack of coordination (systemic), can impede overall integration. The model serves as the analytical guide for this study, informing the data collection and interpretation of findings related to the factors influencing LF integration.

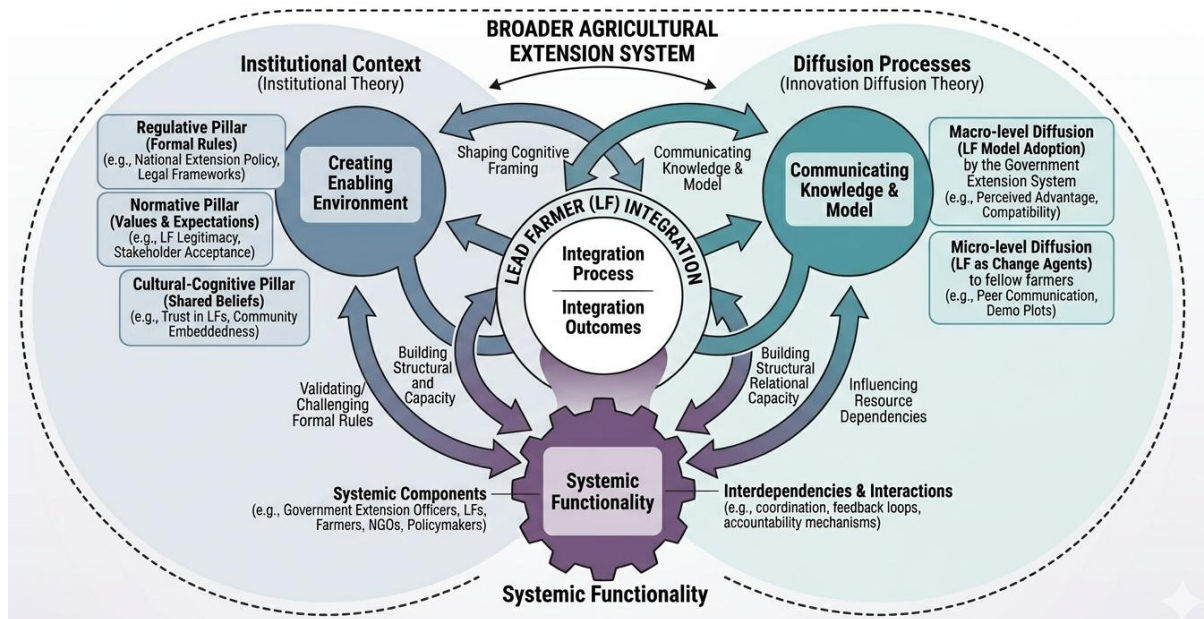
3.1 Research Design

A descriptive cross-sectional research design was employed, integrating quantitative and qualitative approaches within a mixed-methods framework. This design was deemed appropriate as it allowed for the collection of data at a single point in time, providing a snapshot of the prevailing conditions, perceptions, and institutional arrangements related to LF integration (Creswell & Creswell, 2023). The mixed-methods approach facilitated triangulation, enabling the study to capture numerical trends in farmer perceptions while simultaneously exploring the contextual nuances, stakeholder experiences, and systemic factors that quantitative data alone could not adequately address. This combination enhanced the validity and comprehensiveness of the findings, consistent with best practices in social science research (Creswell & Creswell, 2023).

3.2 Study Area

The study was conducted in Kagera Region, located in the north-western zone of Tanzania. The region lies between latitudes 1°00' and 2°45' South and longitudes 30°25' and 32°40' East, bordering Uganda to the north, Rwanda to the west, and the Kagera River to the east. Kagera was purposively selected due to its agro-ecological diversity, the predominance of smallholder farming systems, and the active

Figure 1: Conceptual Framework for the Integration of Lead Farmers into the Government Agricultural Extension System based on Institutional Theory, Innovation Diffusion Theory, and Systems Theory



3.0 Methodology

This section outlines the research approach, study area, sampling strategies, data collection methods, and analytical procedures employed to investigate the factors influencing the integration of Lead Farmers (LFs) into Tanzania's government agricultural extension system. A mixed-methods research design was adopted to capture both the breadth of farmer perceptions and the depth of institutional and operational dynamics shaping LF integration.

presence of community-based extension initiatives involving Lead Farmers. Major crops cultivated include bananas (*Musa* spp.), coffee (*Coffea arabica*), beans (*Phaseolus vulgaris*), and tea (*Camellia sinensis*) (Merumba *et al.*, 2022; United Republic of Tanzania [URT], 2023). Agriculture is the primary livelihood for approximately 77% of the region's population; however, extension service delivery remains constrained, with an extension officer-to-farmer ratio of 1:1,327 (URT, 2023). Several non-governmental organizations, including KADERES, MAVUNO, and Café



Africa Tanzania, have implemented projects supporting LFs in the region, making it a relevant setting for examining the integration of LFs into formal extension structures.

3.3 Sampling Techniques and Sample Size

A multi-stage sampling strategy was employed to select participants. In the first stage, three districts; Karagwe, Missenyi, and Bukoba; were purposively selected based on: (i) their active engagement with community-based extension initiatives; (ii) the presence of both government and non-state actors promoting farmer-to-farmer learning; and (iii) variation in the number of trained Lead Farmers across districts. This purposive selection ensured that the study captured diverse implementation contexts.

For the quantitative component, a stratified random sampling technique was applied to select smallholder farmers. The sampling frame was based on the known distribution of trained Lead Farmers in the three districts: Karagwe (381 LFs), Missenyi (215 LFs), and Bukoba (187 LFs). Proportional allocation was used to determine the sample size per stratum, ensuring representativeness across districts. Following Bailey's (1994) recommendation of a minimum of 30 respondents per stratum for meaningful subgroup analysis, a total of 100 smallholder farmers were targeted: 38 from Karagwe, 32 from Missenyi, and 30 from Bukoba. A structured questionnaire was administered, achieving a response rate of 95%, with 95 farmers completing the survey. This final sample remained adequate for district-level comparisons and descriptive analysis.

For the qualitative component, purposive and snowball sampling techniques were employed to identify key informants and focus group participants who possessed direct knowledge and experience with LF initiatives and extension service delivery. A total of 18 Key Informant Interviews (KIIs) were conducted with district extension officers, NGO programme managers and field officers, agricultural researchers, village leaders, and experienced farmers actively engaged in LF activities. Additionally, four Focus Group Discussions (FGDs) were conducted; one in each of the three districts and one cross-district session; each comprising 8 to 10 participants. Participants in FGDs were purposively selected to ensure diversity in gender, age, and farming experience, facilitating rich discussions on LF selection, support structures, roles in extension delivery, and sustainability conditions. Table 1 presents a summary of the sample composition across the quantitative and qualitative components.

Table 1: Sample Composition for the Study

Component	District/Category	Sample Size (n)	Selection Technique
<i>Quantitative</i>	Karagwe	38	Stratified random sampling
	Missenyi	32	Stratified random sampling
	Bukoba	30	Stratified random sampling
	Subtotal	100	
<i>Qualitative</i>	Key Informant Interviews	18	Purposive sampling
	Focus Group Discussions	4 (8–10 each)	Purposive sampling
	Subtotal	18 KIIs, 4 FGDs	
<i>Total Participants</i>		95 (survey)	

Note: The quantitative survey achieved a 95% response rate, resulting in 95 completed questionnaires.

As indicated in Table 1, the study comprised 95 smallholder farmers who completed the structured survey, 18 key informants who participated in in-depth interviews, and 32 to 40 farmers across four focus group discussions. This composition ensured a comprehensive dataset that balanced statistical representation with contextual depth.

3.4 Data Collection Instruments

Data were collected using three primary instruments, each tailored to the specific objectives and respondent categories.

Structured Questionnaire: A structured questionnaire was administered to 95 smallholder farmers to capture quantitative data on demographic characteristics, farming practices, interactions with Lead Farmers, and perceptions of LF integration. The questionnaire consisted of closed-ended questions, with Likert-scale items used to measure perceptions of LF effectiveness, collaboration with government extension officers, and contributions to productivity. The unit of analysis for the quantitative component was the smallholder farmer, as the primary recipient of LF services.

Key Informant Interview (KII) Guide: A semi-structured interview guide was developed to gather in-depth qualitative data from institutional stakeholders involved in extension service delivery. The guide covered topics such as institutional coordination, policy frameworks, operational challenges, resource allocation, and conditions necessary for formal LF integration. KIIs were conducted with 18 respondents, including district agricultural officers, ward extension officers, NGO representatives, researchers from the Tanzania Agricultural Research Institute (TARI), and village leaders.

Focus Group Discussion (FGD) Guide: A thematic guide was used to facilitate four FGDs, each lasting between 90



and 120 minutes. The discussions explored community-level perspectives on LF selection processes, the nature of support provided to LFs, their roles in extension delivery, and factors influencing their sustainability. Participants were encouraged to share experiences, success stories, and challenges, fostering interactive dialogue that generated rich qualitative data.

3.5 Validity and Reliability

To ensure the validity of the data collection instruments, the questionnaire, KII guide, and FGD guide were developed based on the study objectives and informed by a comprehensive review of literature on agricultural extension, farmer-to-farmer approaches, and institutional integration. The instruments were reviewed by three academic experts in agricultural extension and rural development from Sokoine University of Agriculture to assess content validity, clarity, and contextual appropriateness. Following this review, the instruments were pre-tested in a ward outside the main study area, and feedback was used to refine question wording, sequencing, and structure to eliminate ambiguity and ensure relevance.

Reliability in the quantitative component was enhanced through consistent administration of the structured questionnaire by trained research assistants, who received standardized training on interview techniques and ethical protocols. Given the exploratory nature of the study and its focus on descriptive analysis of perceptions rather than scale development, formal statistical reliability tests (e.g., Cronbach's alpha) were not applied. Instead, the study employed triangulation, comparing and contrasting quantitative survey data with qualitative findings from KIIs and FGDs, to enhance the credibility, consistency, and robustness of the findings (Creswell & Creswell, 2023).

3.6 Data Analysis

Quantitative data from the structured questionnaires were coded and entered into IBM SPSS Statistics (Version 26) for analysis. Descriptive statistics, including frequencies, percentages, and means, were generated to summarize respondents' socio-economic characteristics, their interactions with Lead Farmers, and their perceptions regarding LF roles and integration. This analytical approach was appropriate given the study's exploratory focus on identifying patterns and trends rather than testing causal hypotheses.

Qualitative data from KIIs and FGDs were transcribed verbatim and subjected to thematic analysis following the procedures outlined by Braun and Clarke (2006). The analysis involved familiarization with the data, generation of initial codes, identification of themes, and refinement of themes to ensure coherence and relevance. Manual coding was applied to identify recurring patterns, divergent views, and emergent themes related to institutional support, coordination, supervision, policy frameworks, and challenges

surrounding LF integration. Thematic analysis allowed for the extraction of rich, contextual insights that complemented and provided explanatory depth to the quantitative findings.

3.7 Ethical Considerations

The study adhered to established ethical guidelines for research involving human participants. Formal research clearance was obtained from the relevant authorities at both national and regional levels. Permission was granted by the Ministry responsible through a letter referenced Ref. No. AB.307/323/01/196, and by the Kagera Regional Administrative Secretariat through a letter referenced Na.HA.78/147/17. Prior to data collection, informed consent was obtained from all participants after clearly explaining the purpose of the study, the voluntary nature of participation, and their right to withdraw at any stage without consequence. Confidentiality and anonymity were ensured by avoiding the use of personal identifiers, using alphanumeric codes for participants, and securely storing all research data in password-protected files accessible only to the research team. Data were used solely for academic and research purposes.

4.0 RESULTS AND DISCUSSION

This section presents the findings of the study organized according to the three research objectives. Quantitative data from the household survey (n=95) are presented using descriptive statistics, including frequencies, percentages, means, and standard deviations. Qualitative insights from Key Informant Interviews (KIIs, n=18) and Focus Group Discussions (FGDs, n=4) are integrated to provide contextual depth. The results are structured into three subsections: (i) roles of Lead Farmers in enhancing agricultural productivity; (ii) farmers' perceptions of Lead Farmer integration; and (iii) factors influencing the integration of Lead Farmers into the government extension system. Where appropriate, comparative patterns across districts are highlighted.

4.1 Demographic Characteristics of Respondents

A total of 95 smallholder farmers participated in the quantitative survey. As presented in Table 2, the majority of respondents were male (77.9%), while female respondents accounted for 22.1%. This gender distribution reflects the prevailing pattern of male-dominated agricultural decision-making in the study area, though it also highlights the need for targeted efforts to ensure women's voices are captured in extension interventions. In terms of age, 82.1% of respondents were aged between 18 and 55 years, representing the economically active population segment most engaged in agricultural production. Educational attainment was relatively modest, with 66.3% having completed primary education and 31.6% attaining secondary education or higher, suggesting that most respondents possess basic literacy levels adequate for engaging with extension messages. Farming was reported as the primary



occupation by 91.6% of respondents, underscoring the centrality of agriculture to household livelihoods. Farming experience averaged 15.8 years (SD = 2.8), indicating substantial exposure to agricultural practices, while mean farm size was 2.3 acres, reflecting the predominance of smallholder farming systems in the study area.

Table 2: Demographic Characteristics of Respondents (n=95)

Characteristic	Category	Frequency	Percentage (%)	Mean (SD)
Gender	Male	74	77.9	15.8 (2.8)
	Female	21	22.1	
Age Group	18–35 years	37	38.9	
	36–55 years	41	43.2	
	>55 years	17	17.9	
Education Level	No formal education	2	2.1	
	Primary education	63	66.3	
	Secondary and above	30	31.6	
Primary Occupation	Farming	87	91.6	
	Other	8	8.4	
Farming Experience	1–10 years	33	34.7	
	11–30 years	40	42.1	
	Above 30 years	22	23.2	
Farm Size (acres)				2.3 (1.1)

Source: Survey Data (2025)

As shown in Table 2, the mean farming experience of 15.8 years (SD = 2.8) and mean farm size of 2.3 acres (SD = 1.1) are consistent with the profile of smallholder farmers in Tanzania's agricultural systems, where limited formal education, reliance on farming as the primary livelihood, and small landholdings are typical (URT, 2023). The average farming experience of nearly 16 years suggests that respondents possess considerable practical knowledge, which is significant given that Lead Farmers are selected partly based on their farming expertise and ability to mentor others (Ringo *et al.*, 2023).

4.2 Roles of Lead Farmers in Enhancing Agricultural Productivity

The first research objective sought to assess the roles played by Lead Farmers in enhancing agricultural productivity. Table 3 presents farmers' perceptions of factors contributing to changes in crop productivity, ranked by frequency of response.

Table 3: Factors Contributing to Changes in Crop Productivity (n=95)

Factor	Frequency	Percentage (%)	Rank
Improved seed	77	81.9	1
Lead Farmer support	75	79.8	2
Fertilizers and other inputs	71	75.5	3
Favourable weather conditions	70	74.5	4
Better market access	53	56.4	5

Source: Survey Data (2025)

As indicated in Table 3, improved seed use was the most frequently reported factor (81.9%), followed closely by support from Lead Farmers (79.8%). The high ranking of LF support relative to other factors indicates that farmers perceive LFs as a significant source of technical guidance and practical support within local production systems. Fertilizers and other inputs were reported by 75.5% of respondents, while favourable weather conditions (74.5%) and better market access (56.4%) were also noted as contributing factors.

To further understand the perceived contribution of LFs, farmers were asked to rate their agreement with statements regarding LF effectiveness. Table 4 presents the mean scores and standard deviations for these perception statements, measured on a 5-point Likert scale (1 = Strongly Disagree, 5 = Strongly Agree).

Table 4: Farmers' Perceptions of Lead Farmer Effectiveness (n=95)

Statement	Mean	SD	Interpretation
LFs provide timely agricultural advice	4.21	0.68	Agree
LFs demonstrate improved farming practices effectively	4.08	0.72	Agree
LFs help solve farming problems quickly	3.95	0.81	Agree
LFs are trustworthy sources of information	4.32	0.59	Strongly Agree
LFs contribute to increased crop yields	4.15	0.65	Agree

Note: Scale: 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree

As shown in Table 4, the highest mean score was recorded for the statement "LFs are trustworthy sources of information" (M = 4.32, SD = 0.59), indicating that trust is a central attribute underpinning LF effectiveness. This finding is consistent with Kiptot and Franzel (2015), who found that the shared social and economic background between LFs and farmers enhances credibility and receptivity to extension messages. The statement "LFs provide timely agricultural advice" also received a high mean score (M = 4.21, SD = 0.68), reflecting the accessibility and responsiveness of LFs



compared to government extension officers who often serve large geographical areas (Urassa *et al.*, 2023).

A comparative analysis across districts revealed some variation in perceptions of LF effectiveness. As presented in Table 5, farmers in Karagwe reported the highest mean score for LF trustworthiness (M = 4.45, SD = 0.52), while those in Bukoba reported slightly lower scores (M = 4.18, SD = 0.63). This variation may be attributed to differences in the duration and intensity of LF interventions across districts, as noted by key informants during interviews.

Table 5: District-wise Comparison of LF Effectiveness Perceptions (n=95)

Statement	Karagwe (n=36)	Missenyi (n=30)	Bukoba (n=29)
	Mean (SD)	Mean (SD)	Mean (SD)
LFs provide timely agricultural advice	4.28 (0.64)	4.20 (0.71)	4.14 (0.69)
LFs demonstrate improved farming practices effectively	4.15 (0.68)	4.03 (0.75)	4.05 (0.72)
LFs help solve farming problems quickly	4.02 (0.77)	3.93 (0.84)	3.89 (0.82)
LFs are trustworthy sources of information	4.45 (0.52)	4.30 (0.61)	4.18 (0.63)
LFs contribute to increased crop yields	4.22 (0.61)	4.12 (0.68)	4.09 (0.66)

Source: Survey Data (2025)

Qualitative findings from KIIs and FGDs provided further insights into the specific roles played by LFs. Thematic analysis of qualitative data revealed five recurring roles: complementarity to formal extension services; enhanced accessibility and responsiveness; demonstration-based learning; facilitation of technology adoption through peer communication; and strengthening of trust through shared farming experience.

Complementarity to Formal Extension Services: LFs were consistently described as strengthening the work of government extension officers. Due to staffing shortages and logistical constraints, public agents often fail to reach all farmers regularly. As a District Agricultural Officer in Karagwe explained:

“LFs are helping us reach places we cannot always go. They are like our hands in the villages.” (KII, District Agricultural Officer, Karagwe District Council, 13 January 2025).

Integration was not perceived as a replacement for formal officers but as a strategy to expand coverage and responsiveness within existing institutional limitations. This finding aligns with Franzel *et al.* (2019), who observed that

farmer-to-farmer extension models effectively complement public systems when appropriately coordinated.

Enhanced Accessibility and Responsiveness: The regular presence of LFs within farming communities was identified as a key factor in providing timely and relevant support. A Ward Agricultural Officer in Missenyi noted:

“Farmers turn to LFs first because they are always present and understand the situation on the ground.” (KII, Ward Agricultural Officer, Missenyi District Council, 6 January 2025).

This accessibility was directly associated with quicker problem-solving, better decision-making, and greater uptake of new practices, a finding consistent with Chirwa and Dorward (2017), who documented similar outcomes in Malawi.

Demonstration-Based Learning and Knowledge Sharing: Demonstration plots managed by LFs were highlighted as an effective tool for knowledge dissemination. An NGO Programme Officer in Karagwe remarked:

“When results are visible on a neighbour’s farm, people are more willing to try.” (KII, NGO Programme Officer, Karagwe District, 15 January 2025).

This practical learning approach was particularly important in areas with limited formal extension training, echoing observations by Ragasa (2020) on the effectiveness of experiential learning in agricultural extension.

Facilitating Adoption Through Peer Communication: LFs served as key facilitators in promoting the uptake of agricultural innovations by using peer-based communication strategies. A District Agricultural Officer in Bukoba explained:

“LFs explain in ways that others can relate to.” (KII, District Agricultural Officer, Bukoba District Council, 10 January 2025).

This ability to translate technical guidance into familiar language and locally relevant examples made LF support more accessible and credible, aligning with findings from Goodluck *et al.* (2024) that farmers receiving support from both government officers and LFs experienced greater productivity.

Strengthening Trust Through Shared Experience: The shared social and economic background between LFs and other farmers enhanced the credibility of extension messages. An experienced farmer in Karagwe stated:



“The LF gives us courage because we know he also farms with us. He takes the same risks.” (FGD Participant, Karagwe District, 15 January 2025).

This trust-based dynamic strengthened farmers’ engagement with extension messages and created a supportive environment for change, consistent with the findings of Murekezi *et al.* (2018) on farmer-led training in Uganda.

4.3 Farmers’ Perceptions of Lead Farmer Integration into the Government Extension System

The second research objective examined farmers’ perceptions regarding the integration of Lead Farmers into the government extension system. This section presents both quantitative and qualitative findings, exploring the extent to which farmers perceive collaboration between LFs and government extension officers, the perceived benefits and challenges of formal integration, and the factors shaping these perceptions. Understanding these perceptions is critical because farmer acceptance and recognition of LFs as legitimate extension actors constitute a foundational element of successful institutional integration (Kiptot & Franzel, 2015; Ragasa, 2020).

Table 6 presents the distribution of responses regarding farmers’ perceptions of collaboration between Lead Farmers and government extension officers.

Table 6: Farmers’ Perceptions of LF-Government Collaboration (n=95)

Statement: LFs work collaboratively with government extension officers	Frequency	Percentage (%)
Agree	77	81.0
Disagree	3	3.2
Undecided	15	15.8

Source: Survey Data (2025)

As shown in Table 6, a substantial majority (81.0%) of farmers agreed that Lead Farmers work collaboratively with government extension officers, while only 3.2% disagreed and 15.8% remained undecided. These findings suggest broad acceptance of LFs as complementary actors within extension service delivery at the community level. The high level of agreement indicates that from the farmers’ perspective, LFs and government officers are not operating in parallel or competing spheres but rather function in a manner that farmers perceive as synergistic. This perception is significant because perceived synergy between formal and informal extension actors is a prerequisite for successful institutional integration (Simpson *et al.*, 2015).

To further explore perceptions of integration, farmers were asked to rate their agreement with statements about the potential benefits and challenges of formal LF integration.

Table 7 presents the mean scores for these perception statements.

Table 7: Farmers’ Perceptions of LF Integration Benefits and Challenges (n=95)

Statement	Mean	SD	Interpretation
Benefits			
Formal recognition would increase LF motivation	4.38	0.55	Strongly Agree
LFs should receive government support (inputs, training)	4.45	0.51	Strongly Agree
Integrating LFs would improve extension service coverage	4.28	0.62	Agree
LFs deserve official status within extension system	4.32	0.58	Agree
Challenges			
Lack of government resources limits LF integration	4.15	0.67	Agree
Unclear policies hinder LF formalization	4.22	0.60	Agree
NGOs and government use different LF selection criteria	3.88	0.79	Agree

Note: Scale: 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree

As presented in Table 7, the strongest agreement was recorded for the statement that LFs should receive government support (M = 4.45, SD = 0.51), indicating strong farmer demand for institutional backing of LFs. Formal recognition as a factor that would increase LF motivation also received a high mean score (M = 4.38, SD = 0.55), reinforcing the importance of legitimacy in sustaining LF engagement. These findings align with Simpson *et al.* (2015), who observed that without structured facilitation and recognition, motivation and performance of community-based extension agents tend to decline.

Regarding challenges, farmers agreed that unclear policies hinder LF formalization (M = 4.22, SD = 0.60) and that lack of government resources limits integration (M = 4.15, SD = 0.67). These perceptions reflect the institutional and resource constraints identified in the broader literature on agricultural extension in Tanzania (Mkumbo *et al.*, 2022; URT, 2021).

Qualitative findings from KIIs and FGDs reinforced and expanded upon these perceptions, revealing several key themes regarding what farmers view as success factors and the relevance of integrating LFs within the formal extension framework.

Need for Official Recognition and Legitimacy: Despite the presence of LFs within communities, many respondents emphasized the need for visible, formal recognition by



government institutions. An experienced village leader in Missenyi explained:

“If they are given badges or uniforms, people will trust and listen to them more.” (KII, Village Leader, Missenyi District, 7 January 2025).

The lack of a government-issued identity was seen as a challenge, particularly in areas where farmers are unfamiliar with LFs or question their authority. Formal integration was viewed as a solution that would confer legitimacy and encourage broader community trust, consistent with Khaila *et al.* (2015), who noted that official recognition enhances the credibility of community-based extension agents.

Expectation for Improved Accountability and Commitment: Several key informants observed that LFs' effectiveness varied widely depending on individual motivation and follow-up. A District Agricultural Officer noted:

“When LFs are recognized by the government, they will work harder because people will respect them more.” (KII, District Agricultural Officer, Karagwe District Council, 14 January 2025).

An agricultural researcher in Bukoba added:

“In the absence of formal oversight, some LFs are inconsistent or inactive.” (KII, Researcher, Bukoba District, 9 January 2025).

Formal integration was therefore linked to improved accountability, as government recognition was expected to enforce consistent performance standards and regular engagement with farmers, a finding supported by Mphepo and Urassa (2022) in the Malawian context.

effectively transfer knowledge. An NGO field officer in Karagwe explained:

“They know farming, but training someone else needs skills. The government should teach them how to teach.” (KII, NGO Field Officer, Karagwe District, 14 January 2025).

Limited access to refresher training and technical updates was cited as a gap, with many calling for structured, ongoing capacity-building. Integration was expected to provide LFs with access to institutional support, strengthening their role as effective intermediaries, echoing the recommendations of Franzel *et al.* (2019).

4.4 Factors Influencing the Integration of Lead Farmers into the Government Agricultural Extension System

The third research objective sought to identify the factors influencing the successful integration of Lead Farmers into the government agricultural extension system. Insights gathered from KIIs and FGDs provided an in-depth understanding of the systemic and institutional conditions perceived to influence integration. Thematic analysis revealed four interrelated factors, presented in Table 8 with illustrative quotes and supporting literature.

Political Commitment and Leadership Prioritization: Across study locations, participants consistently observed that the lack of political prioritization at the national level undermines efforts to formally engage LFs. A District Agricultural Officer in Missenyi noted:

“Unless it comes from above, most councils won't take it seriously.” (KII, District Agricultural Officer, Missenyi District Council, 7 January 2025).

Table 8: Factors Influencing LF Integration with Thematic Evidence

Factor	Illustrative Quote	Supporting Literature
<i>Political Commitment and Leadership Prioritization</i>	<i>“Unless it comes from above, most councils won't take it seriously.”</i> (District Agricultural Officer, Missenyi)	Simpson <i>et al.</i> (2015); URT (2021)
<i>Institutional Harmonization and Coordinated Frameworks</i>	<i>“Every project has its way of using LFs. There's no common system.”</i> (District Agricultural Officer, Karagwe)	Franzel <i>et al.</i> (2019); Ragasa (2020)
<i>Administrative and Resource Preparedness</i>	<i>“Even if the ministry gives a directive today, we don't have financial lines or administrative instructions.”</i> (District Agricultural Officer, Bukoba)	Mphepo & Urassa (2022); Mkumbo <i>et al.</i> (2022)
<i>Absence of Clear Policy Frameworks</i>	<i>“Recognition is only the first layer. If planning, budgeting, and coordination are missing, then it becomes symbolic.”</i> (Researcher, TARI Bukoba)	Scott (2014); Rivera & Qamar (2019)

Source: Key Informant Interviews (2025)

Desire for Continued Training and Technical Backstopping: Both KII and FGD participants commonly expressed concern that, although LFs are skilled farmers, they lack the necessary training and facilitation skills to

This perception highlights the role of high-level commitment in influencing sectoral agenda-setting and formal institutional adoption. Participants noted that while district officers may support LFs informally, the absence of clear directives from the Ministry of Agriculture hinders structured adoption. This finding aligns with Simpson *et al.*



(2015), who emphasized that policy-level commitment is essential for the successful implementation of farmer-to-farmer approaches.

Institutional Harmonization and Coordinated Frameworks: Findings established that institutional harmonization and coordinated frameworks are key factors influencing LF integration. Respondents across districts pointed to the absence of a unified structure guiding LF engagement, leading to fragmented implementation approaches among government departments, NGOs, and local leadership. A District Agricultural Officer in Karagwe explained:

“Every project has its way of using LFs. There’s no common system.” (KII, District Agricultural Officer, Karagwe District Council, 16 January 2025).

This inconsistency affects the extent to which LFs are effectively linked to formal extension structures, often resulting in poor follow-up, weak supervision, and lack of accountability. An NGO facilitator in Bukoba added:

“We train LFs, but government officers don’t always follow up. Sometimes, village leaders are not even aware.” (KII, NGO Facilitator, Bukoba District, 11 January 2025).

This lack of collaboration weakens institutional ownership and limits sustainability once project support ends. Participants emphasized that harmonized frameworks are essential for consistency, clarity, and long-term impact, a perspective supported by Franzel *et al.* (2019) and Ragasa (2020).

Administrative and Resource Preparedness: KIIs and FGDs revealed that administrative and resource preparedness is a key factor influencing LF integration. While LFs are widely recognized for their contribution, participants stressed that recognition alone is insufficient. A District Agricultural Officer in Bukoba noted:

“Even if the ministry gives a directive today, we at the district level don’t have financial lines or administrative instructions on how to engage LFs. Otherwise, we remain stuck between policy and practice.” (KII, District Agricultural Officer, Bukoba District Council, 11 January 2025).

Financial limitations were seen as a major constraint, as LFs often fund their own transport and communication, which participants viewed as both demotivating and inequitable. An NGO Programme Officer in Karagwe observed:

“When our projects end, there’s no continuity. Integration won’t succeed unless councils are financially ready to take over support. It’s about

commitment to budgeting and supervision.” (KII, NGO Programme Officer, Karagwe District, 14 January 2025).

A researcher at TARI in Bukoba added:

“Recognition is only the first layer. If planning, budgeting, and coordination are missing, then it becomes symbolic.” (KII, Researcher, TARI Bukoba District, 12 January 2025).

These perspectives reflect a shared understanding that administrative and financial readiness determines whether integration can occur in practice, consistent with the findings of Mphepo and Urassa (2022) on the importance of budgeting and planning for sustainable extension models.

Absence of Clear Policy Frameworks: The absence of clear policy frameworks defining the role of LFs within extension institutions emerged as a fundamental barrier. Participants noted that without explicit policy guidelines, LFs remain in a liminal space, recognized by communities and projects but invisible to formal systems. This lack of policy clarity contributes to inconsistent training, uneven support, and limited accountability mechanisms, undermining the long-term sustainability of LF contributions. This finding resonates with the institutional theory perspective advanced by Scott (2014), which emphasizes the regulative pillar's role in shaping organizational behavior and institutional legitimacy, and with Rivera and Qamar (2019), who underscore the importance of clear policy frameworks for coordinating extension actors.

5.0 Conclusions and Recommendations

This study set out to assess the integration of Lead Farmers into Tanzania’s government agricultural extension system, using Kagera Region as a case study, with a specific focus on identifying the factors influencing successful integration, examining farmers’ perceptions, and assessing the roles played by LFs in enhancing agricultural productivity. The findings conclusively demonstrate that Lead Farmers occupy a critical yet precarious position within the agricultural extension landscape. They are widely valued by farming communities for their accessibility, trustworthiness, and practical expertise, with 79.8% of surveyed farmers attributing productivity improvements to LF support and 81.0% perceiving positive collaboration between LFs and government extension officers. The qualitative evidence further illuminates the multifaceted roles LFs play; complementing formal extension services, enhancing responsiveness, facilitating demonstration-based learning, and building trust through shared farming experience; roles that are particularly vital in a context where the extension officer-to-farmer ratio stands at a staggering 1:1,327 in Kagera Region. However, the study also reveals a fundamental paradox: despite their demonstrable



effectiveness at the grassroots level, LFs operate within an institutional vacuum characterized by the absence of clear policy frameworks, fragmented coordination among stakeholders, inadequate administrative and financial preparedness, and a lack of political commitment to formalize their roles. These constraints, rooted in the regulative, normative, and cultural-cognitive pillars of the institutional environment, render LF contributions informal, project-dependent, and ultimately unsustainable, perpetuating a cycle where valuable community-based capacity remains untapped and unsecured within the formal extension system.

The empirical contributions of this study are twofold. First, it moves beyond the prevailing project-level assessments of LF effectiveness to provide a systems-level analysis of the institutional and operational determinants of LF integration, thereby addressing a significant gap in the literature on agricultural extension in sub-Saharan Africa. By applying an integrated theoretical framework combining Institutional Theory, Innovation Diffusion Theory, and Systems Theory, the study demonstrates that the integration of community-based extension actors is not merely a technical or logistical challenge but fundamentally a question of institutional design, policy coherence, and systemic functionality. Second, the study contributes context-specific empirical evidence from Tanzania's Kagera Region, a region characterized by agricultural diversity and persistent extension constraints; that can inform national-level policy deliberations. The finding that 81.0% of farmers perceive LFs as already working collaboratively with government officers, coupled with strong farmer endorsement of formal government support for LFs (mean agreement of 4.45 out of 5), underscores that the social and normative foundations for integration are already in place. What is lacking is the regulative scaffolding; formal policies, budget lines, coordination mechanisms, and accountability structures; that would enable these informal arrangements to be institutionalized as a durable component of the public extension system.

The policy implications of these findings are profound and urgent. The current reliance on donor-funded, project-based LF initiatives represents a missed opportunity for systemic strengthening of agricultural extension in Tanzania. While these initiatives have successfully demonstrated the value of LFs, their fragmentation and lack of alignment with government structures undermine scalability and sustainability. The study's findings suggest that without deliberate policy action, Tanzania risks perpetuating a dual extension system; a formal but under-resourced public system and a vibrant but informal community-based system; that fails to leverage the synergies between them. Policymakers at the Ministry of Agriculture and local government authorities must recognize that the integration of

LFs is not about replacing government extension officers but about creating a coherent, multi-layered extension system where LFs function as recognized, supported, and accountable frontline agents. This requires moving beyond symbolic recognition to concrete institutional mechanisms: policy guidelines that define LF selection, training, supervision, and performance standards; budgetary allocations that provide LFs with modest incentives, transport, and communication support; and coordination platforms that bring together government officers, NGOs, village leaders, and LFs in joint planning and monitoring. The empirical evidence from this study, including the district-wise variations in perceptions (with Karagwe showing higher collaboration scores due to longer NGO engagement), further suggests that integration is not a uniform process but one that must accommodate local contexts while adhering to national standards.

From an empirical research perspective, this study opens several avenues for further investigation. Future research should employ longitudinal designs to track the sustainability of LF contributions over time and to assess the impact of formal integration on extension coverage and agricultural productivity outcomes. Comparative studies across regions with varying LF implementation models would help identify best practices and contextual factors that condition integration success. Additionally, research is needed on the political economy of extension system reform, examining the interests, incentives, and power dynamics that shape policy decisions regarding the formalization of community-based extension actors. Such studies would complement the institutional analysis presented here and provide deeper insights into the pathways to sustainable extension system strengthening.

In conclusion, this study affirms that Lead Farmers are not merely a temporary solution to extension service gaps but represent a potentially transformative force for agricultural development in Tanzania; if, and only if, they are accorded the formal recognition, structured support, and institutional embedding that their contributions warrant. The 79.8% of farmers who credit LFs for productivity improvements, the 81.0% who perceive effective LF-government collaboration, and the strong farmer demand for government support (mean 4.45) collectively signal that the conditions for successful integration are ripe. However, the persistence of unclear policies, fragmented coordination, and inadequate resources (with mean agreement scores of 4.22, 4.15, and 4.18 respectively on challenge statements) serves as a stark reminder that good intentions and project-level successes are insufficient. The transformation of LFs from informal, project-dependent actors to recognized, sustainable components of the public extension system require a deliberate, coordinated, and politically committed effort to build the institutional architecture that can support them. As



Tanzania pursues its agricultural transformation agenda, the integration of Lead Farmers represents not just an opportunity to extend the reach of extension services but a strategic imperative to build a more resilient, responsive, and inclusive agricultural system, one that harnesses the knowledge, trust, and commitment of farmers themselves as the frontline of agricultural development.

Declaration of Conflict of Interest

We are hereby declaring that there are no known competing financial interests or personal relationships that could have influenced the research and findings presented in this paper.

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