

Farmer Led Extension Approach for Livelihood Improvement of Tribal People

Prashant Parida^{1*}, Ranjeet Verma², EDI Oliver King³, Jayanta Kumar Nayak⁴

¹Research Scholar, Shri Venkateshwara University, Gajraula, Amroha, Uttar Pradesh

²Research Supervisor, Shri Venkateshwara University, Gajraula, Amroha, Uttar Pradesh

³M. S. Swaminathan Research Foundation, Chennai, India

⁴Assistant Professor, Department of Anthropology, Central University of Odisha, Koraput

ABSTRACT

Farmer-led extension (FLE) has emerged as a promising alternative to conventional public extension systems, particularly in resource-constrained tribal regions. This study examines the sustainability of the Millet Farmer Facilitator (MFF) approach implemented during 2019–2022 in Kolli Hills (Tamil Nadu) and Koraput (Odisha), India. The study adopted a mixed-method design involving 200 millet farmers (100 from each site) and 10 MFFs selected through an opinion leader approach. Primary data were collected using semi-structured interview schedules and group-based assessments. Sustainability in this study is defined as the continued provision of extension services by MFFs after withdrawal of external project support. The analysis focused on four drivers: institutional linkages, social capital, minimum service charges, and motivation of MFFs. Findings indicate that (i) strong institutional linkages with government departments and local organizations significantly supported continuity of services, (ii) farmer groups and collective activities enhanced social capital and trust, and (iii) modest service charges for inputs and advisory services contributed to financial viability. Additionally, intrinsic motivation and social recognition were critical in sustaining MFF engagement. The study demonstrates that farmer-led extension systems can remain functional beyond project periods when embedded within local institutional and social structures.

Keywords: Farmer-led extension, sustainability, millet farmer facilitators, tribal livelihoods, millet-based farming systems

INTRODUCTION

Farmer-led extension (FLE) approaches have gained prominence in recent decades among researchers and development practitioners due to growing dissatisfaction with the limited effectiveness and fiscal burden of conventional public extension systems. Unlike top-down approaches, FLE emphasizes farmer participation in knowledge generation, dissemination, and decision-making, making it more responsive to local needs and indigenous knowledge systems.

FLE approaches are also referred to as participatory extension, farmer-centered extension, or community-based extension. A common feature across these approaches is the reliance on

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farmer groups and local institutions (Feder et al., 2010; Rivera & Alex, 2004). However, the sustainability of such initiatives remains a critical concern, as many programs decline once external funding ends.

Despite growing implementation, limited empirical research exists on how FLE systems can sustain themselves in tribal and marginal environments.

Study Objective

This study aims to assess the sustainability of the Millet Farmer Facilitator (MFF) approach in tribal regions of Kolli Hills and Koraput.

Research Questions

1. How is the sustainability of MFFs influenced by institutional linkages, social capital, service charges, and motivation?
2. To what extent do farmer groups and local institutional arrangements contribute to the continuation of FLE services after project withdrawal?

METHODOLOGY

Study Design and Sites: The study was conducted under a project initiated in 2019 by the Indian Institute of Millet Research (IIMR) and MSSRF with support from NASF. The intervention targeted millet-based livelihood improvement in:

- **Kolli Hills (Tamil Nadu): 5 villages**
- **Koraput (Odisha): 3 villages**

Sampling Procedure: MFF Selection: MFFs were selected using the **opinion leader method** (Kerlinger, 1998), where farmers nominated and voted for local leaders. Five MFFs were selected per site (total = 10).

Farmer Selection: A total of **200 farmers** (100 per site) were selected. Each MFF led a Millet Farmer Group (MFG) of 20 farmers.

Participation: Participation was **voluntary**, and respondents consented to provide information during interviews.

Distribution: Farmers were evenly distributed across villages, ensuring representation from different socio-economic and agro-ecological contexts.

Data Collection: A semi-structured schedule was used covering:

- Socio-economic characteristics
- Farming systems and agro-ecology
- Training exposure
- Perceptions of MFF services
- Sustainability indicators

Five MFF were selected from both sites of Kolli Hills and Koraput. Millet Farmer Groups (MFGs) were formed comprising of 20 millet farmers headed by one MFF. In all 200 farmers were selected, 100 farmers were selected from Kolli Hills and 100 farmers were selected from Koraput.

MEASUREMENT OF SUSTAINABILITY DRIVERS

Each sustainability driver was operationalized as follows:

1. Linkages with Organizations

- Measured through presence/absence of connections with institutions (agriculture departments, NGOs, SHGs, etc.)
- Responses: Yes (2), No (1)
- Respondents: MFFs and farmers

2. Social Capital

- Measured through indicators such as group cohesion, trust, participation, and collective activities
- Responses: High (3), Medium (2), Low (1)
- Respondents: Farmers

3. Minimum Service Charges

- Assessed through farmer willingness to pay for services
- Binary responses: Yes/No
- Weighted Score (MWS) = (Yes × 2) + (No × 1)

4. Motivation of MFFs

- Measured through perceived benefits: social recognition, knowledge gain, financial incentives
- Responses: Strong (3), Moderate (2), Weak (1)
- Respondents: MFFs

Mean Weighted Score Calculation

$$MWS = \frac{\sum (Response \times Weight)}{Total\ Respondents}$$

Project Implementation

The project involved training MFFs, forming farmer groups, establishing demonstration plots, and creating institutional linkages.

Analytical Approach

- Data were coded and tabulated
- Weighted scores were calculated for ranking variables
- Descriptive statistics (frequency, percentage) were used
- Comparative analysis was conducted across sites
- Qualitative responses were thematically analyzed

RESULTS AND DISCUSSION

Sustainability of MFFs: The FLE approaches considered sustainable if it has compatibility with the environment; ability of the program to support itself financially without external support and institutional sustainability; the local institutions have ability to sustain community-based extension systems once funding is withdrawn. Looking at sustainability from the perspective of donor-funded extension programs involving MFFs, this paper defines sustainability as the continuation of the provision of extension services by MFFs following the end of donor support. Drawing from theoretical reflections on sustainability of FLE programs, it is evident that in order to develop sustainable programs, several drivers of sustainability are essential (Figure-1):

- i. Linkages with organizations such as state agriculture and horticulture department
- ii. Social capital which involves building social support and cohesion through farmer groups such as MFGs, FPOs, SHGs, etc.
- iii. Minimum service charges involving continual support of MFFs to farmers.
- iv. Motivation of the Millet farmer facilitator (MFFs) to keep them interested in providing extension services.

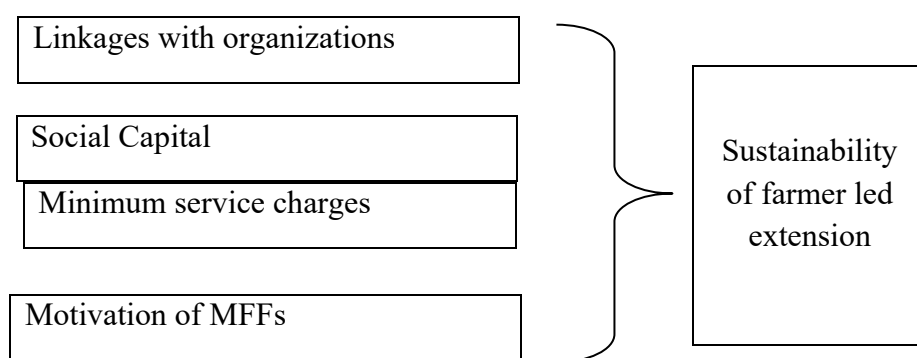


Figure-1: Drivers of sustainability of farmer led extension

Description of Millet Farmer Facilitators (MFFs): Selection of millet farmer facilitators was one of the core activities of the project in order to render extension services effectively it was imperative that they should be accepted by fellow farmers of the village and community. To avoid biasness and any kind of favoritism, method of opinion leader selection was followed

(Kerlinger F. N., 1998) where in fellow farmers from each village were asked to nominate 3-4 farmers as a leader who support them voluntarily in adopting good agricultural practices. Thereafter, each group member was asked to offer his opinion to two such nominated volunteers by writing their name in folded piece of paper, confidentially. Their opinions were counted and selected the person who got higher opinions from the group members. In this way, total 10 millets farmers' facilitators (MFFs) from both sites (five from each site) sites were selected. Initially orientation was done about project activities to the MFFs and their group members. Basic information of farmers, farming and resources related to millets cultivation was collected.

Information, training and extension needs of the MFFs were identified and need-based trainings programmes was conducted for MFFs in the pre-and-mid season on improved production technologies, extension materials were compiled on production and processing technologies and provided to MFFs. Rapport building was made with all local stakeholders, Tribal University, Block Development Officers, Panchayats, Krishi Vigyan Kendras, Non-Governmental Organizations for millets promotion and marketing through exhibitions and *melas* (fairs).

The characteristics of MFF were studied. Each village was defined in relation to a millets production, which consists of MFFs trained by the organizations. In order to meet its objectives of reaching many millet farmers with improved agricultural technologies, the IIMR and MSSRF in partnership with local scientists and experts trained MFFs to disseminate information on improved agricultural practices to millet farmers. MFFs were initially empowered by the project experts to setup demonstration plots, provide input support, knowledge support, farm implement services, extension services, extension materials, market integration, training through Farm Field School (FFS) and establishing facilities of primary processing unit, value addition supported by Millet Farmer Groups (MFGs), Farmer Producer Organizations (FPOs) and linkages with local extension agencies. The MFFs were supported time to time on the basis of feedback and organizing periodic training. The MFFs trained millet farmers in their respective farmer groups. The millet farmer groups are composed of 20 farmers under each MFF. They were with the state agriculture and horticulture department to continue providing the services to farmers such as providing inputs and extension advisory services, etc. The state agriculture department was sensitized to continue services of MFFs in that area. In Kolli Hills of Tamil Nadu and Koraput of Odisha, millet farmer facilitator formed into five millet farmer group, each group consisting of 20 farmers (Table-1).

Table-1: Groups formed by millet farmer facilitators

Location	MFFs	Village	Group members
Kolli hills (Tamilnadu)	Mr. Ramesh	Palapadi (Keelmathi, Melmathi, Orpuram and Ulavukadu)	20
	Mr. Thangaraj	Aleripatti (Chinnamangalam and Periyamangalam)	20

	Mrs. Vennila	Orpuram (Naduvalavu and Aruvankadu)	20
	Mrs. Ponkodi	Ettadiparai (Ennampalli and Koluthakadu)	20
	Mrs. Parameshwari	Pellakadu (Senkadu)	20
Koraput (Odisha)	Mr. Kusa Jani	Bagraguda	20
	Mrs. Kamala Khara		20
	Mr. Jaga Majhi	Tala limca	20
	Mrs Bhagabati Majhi		20
	Mr. Gopal Gouda	Aminguda	20

First, we describe the MFFs, their training activities and the views of the farmers they have trained. Next, we assess the findings relevant to each of the four drivers of sustainability: Linkages with organizations, Local institutional support and MFF's motivation. The survey revealed that about 50% of the interviewed MFFs were men and 50% were female (Table-2). Fifty percent of the farmers were in the age group of 20-30 followed by 30 % in the age group of 40-50 respectively. Equal gender representation (50% male, 50% female) and a younger age profile (50% aged 20–30) indicate inclusiveness and youth engagement.

Table-2: Socio-demographic characteristics of MFFs selected for the study

Sr.No	Parameters	Percent of MFFs
	Gender (n=10)	
1	Male	50
2	Female	50
	Total	100
	Age (n=10)	
1	20-30	50
2	31-40	20
3	41-50	30
	Total	100

Reasons to select MFFs by fellow farmers: Reasons to select MFFs by the fellow farmers were ascertained and these were ranked based-on mean weighted score (MWS) estimated by quantifying of their opinion (Figure-2). It is revealed that leadership quality was found to be top-most reason (MSW=186) followed by, communication behavior was second most reason

(MWS=183) as ranked by the group members. Cooperativeness was on ranked third (MWS=181), he/she represent the whole group was on fourth rank (MWS=172) and co-ordinates the group's activities was on fifth (MWS=162), were major reasons out of eight expressed by the fellow group members for selection of the MFFs. It elicited that the farmers liked the volunteers' farmers who have leadership qualities, communication skill and responsive to meet out needs of all the members of the group.

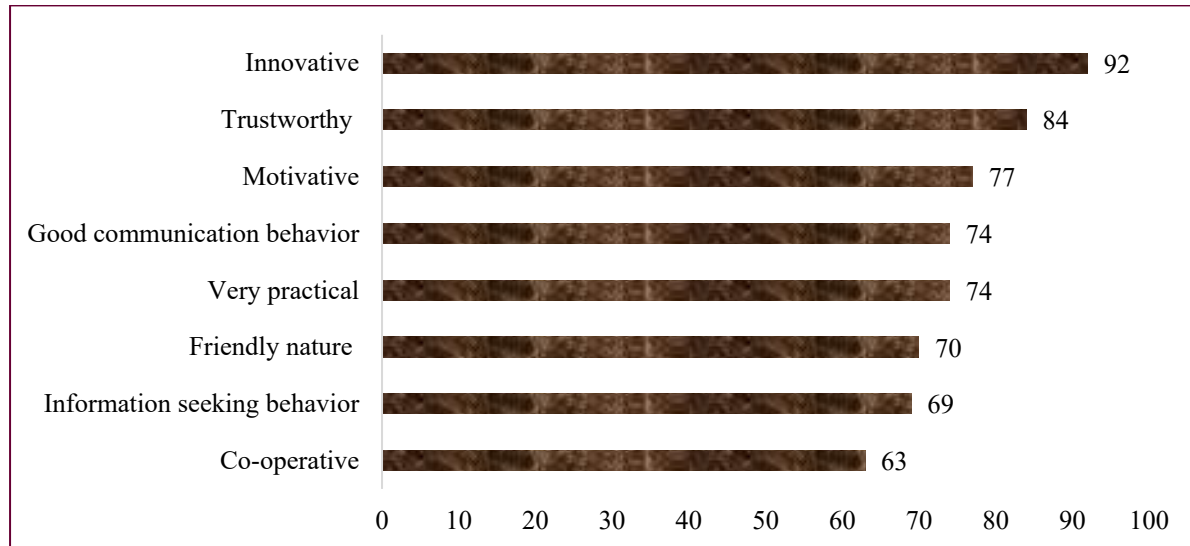


Figure-2: Reasons why MFFs are important to them

Leadership (MWS=186), communication skills (MWS=183), and cooperativeness (MWS=181) were the top-ranked criteria, indicating that social credibility drives acceptance of MFFs.

Areas in which farmers have received training from MFFs: It was evident from Table-3 that 125 farmers attended the training on improved agronomic practices by MFFs followed by 75 farmers attended training on using of finger millet and pulses seeders, 70 farmers attended training on seed treatment with bio-pesticides, 65 farmers attended training on preparation and application of *handikhata*, *jeebamrita* and *amirtjal*, 62 farmers attended training organic compost making, 60 farmers attended training on operating of processing unit's 45 farmers attended training on Honey bee queen rearing and collection of honey from bee hive boxes and 32 farmers attended training on Preparation of ragi malt with flavor of coco powder, chikli, mixture etc.

Table-3: Areas in which farmers have received training from MFFs

Sr.No	Event	No of MFFs	No of participants
1	Improved agronomic Practices – Line sowing, LT and SMI	10	125
2	Organic compost making	5	62

3	Preparation and application of Handikhata, Jeebamrita and Amirthakarasisal	10	65
4	Seed Treatment with Bio Pesticides	10	70
5	Using of finger millet and pulses seeders	5	75
6	Honey bee queen rearing and collection of honey from bee hive boxes	10	48
7	Preparation of ragi malt with flavor of coco powder, chikli, mixture etc.	4	32
8	Operating of Processing unit's	4	60
9	Running of Millet thresher	2	40
10	Awareness creation on FPO for millet producer groups	1	20

A majority of farmers received training in:

- Improved agronomic practices (125 farmers)
- Seed treatment (70 farmers)
- Organic inputs (65 farmers)

This demonstrates the active role of MFFs in knowledge dissemination.

Ways used by the MFFs to transfer information to fellow farmers: The MFFs used first “meetings” as a way to transfer information to fellow farmers on top priority (MWS=280) so that messages could be communicated in effective manner. Thereafter, personal contact and verbal explanation like informal lecture were second (MWS=271) and third (MWS=252) ways used by them to pass useful latest information to their group members. Sometimes, the MFFs used demonstrations (MWS=216) on seed treatment, sowing, power-operated weeding and processing related activities and field boards, posters (MWS=252) as ways to pass on the information which were on fourth and fifth ranks, respectively (Figure-3). Overall, meetings, personal contact and verbal explanation were found to be frequently used ways for passing information to their fellow farmers. It might be more used by the MFFs due to having more personal contact-oriented ways and therefore, more effective too.

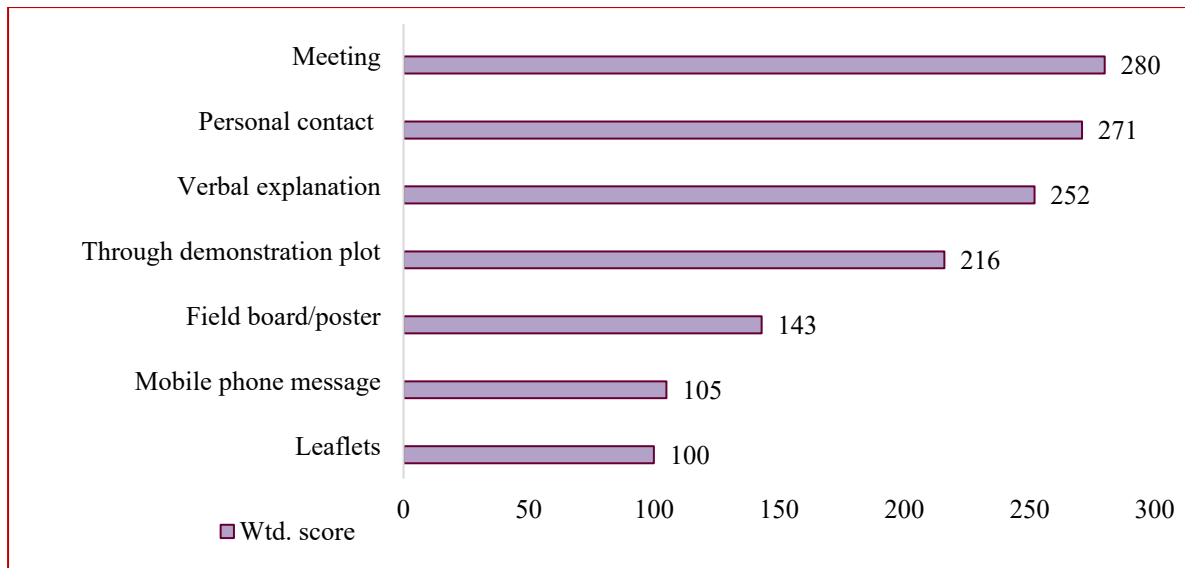


Figure-3: Ways used by MFFs to transfer information

Drivers for sustainability of Millet Farmer Facilitators (Figure-4):

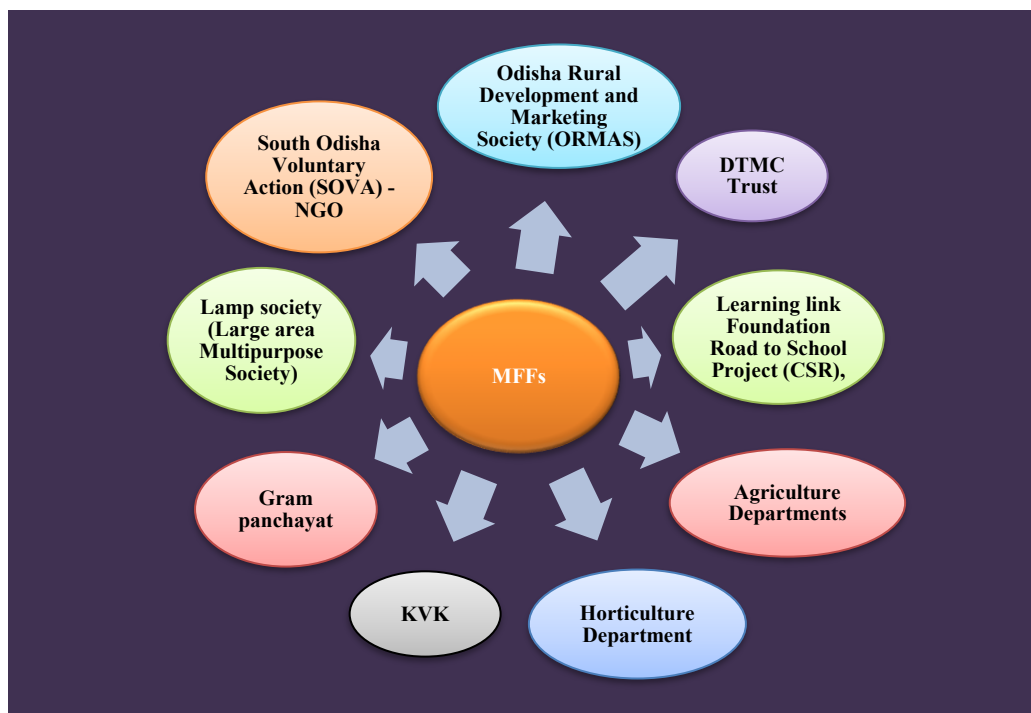


Figure-4: Farmers reason why MFFs are important to them

- 1. Linkages with other organizations through MFFs:** MFFs are affiliated with the women self-help groups for loan facilities. Skill development on sewing to women's SHG through Lamp society. State Agriculture and horticulture department are linked with the MFFs to provide inputs for formation of Millet Producer Groups, information and extension services to farmers on improved agricultural practices for farmers. Dissemination of improved technologies through Demonstrations by MFFs, Facilities of Millet Processing and Value addition, Benefits of government schemes at village level, Opportunities of formal and

informal education through learning link foundation road to school, health and sanitation in the tribal areas through South Odisha Voluntary Action –NGO, Awareness on Millet Allied Farming and latest technologies by MFFs, Facilities of Millet Processing and Value addition, Managing Millet seed Banks and maintenance of agricultural resource center by MFFs.

Strong linkages with agriculture departments, NGOs, and SHGs enabled continued access to inputs and advisory services. Evidence shows that MFFs maintained service delivery through these networks after project support declined.

2. **Social Capital:** Social capital is an asset that is produced when people come together for a common purpose and create trusting relationships. Every MFF is having a MFG for which they provide training from time to time. The MFGs in this study that have active MFFs can still go strong even after the end of donor support. They are composed of both men and women farmers who have come together to benefit from the training offered by MFFs. Initially, the MFGs were formed solely to receive training on millet farming system and value addition. Over time, they can diversify their activities to include economic activities such as sale of millets after processing and value addition. The MFGs can frame their own bylaws that regulate the activities. Engagement in economic activities by MFGs is based on the spirit of collective action, reciprocity and trust which are important ingredients of social capital. In an activity such as buying of primary processing unit, members contribute an agreed amount of money periodically and buy the primary processing unit for the use of all its members.

Active MFGs continued functioning beyond the project period. Collective activities such as processing, marketing, and savings strengthened trust and cooperation, supporting sustainability.

3. **Minimum service chargeable to sustain the MFFs role:** Minimum service chargeable to sustain the role of MFFs was measured by collecting their opinions through personal interviews (Table-4).

Table-4: Minimum Service chargeable to sustain the MFFs role (n=100)

S. No.	MFF services	Yes	No	Wt. Score	Rank
1	Seeds of HYV	96	4	196	I
2	Bio-fertilizer	90	10	190	II
3	Custom hiring services of implements	89	11	189	III
4	Marketing	68	32	168	IV
5	Skills for value-added products	67	33	167	V
6	Latest technology intervention	51	49	151	VI

7	Bee keeping consultancy	41	59	141	VII
8	Animal consultancy	32	68	132	VIII

Farmers expressed willingness to pay for:

- Seeds (MWS=196)
- Biofertilizers (MWS=190)
- Equipment services (MWS=189)

This indicates financial viability of MFF services.

It was revealed that the seeds of HYV (MWS=196) on rank first because it was one of the important inputs according to majority of the group members. They also perceived that the use of biofertilizer (MWS=190) as second rank as expressed by the group members. Custom hiring services of the implements was ranked third by the group members and marketing as fourth followed by skills of value-added products, latest technology intervention, bee keeping industry and animal consultancy were ranked fifth, sixth, seventh and eighth. It indicates that information given by the MFF was more valuable, usable and easy to understand also.

4. **Motivation of MFFs:** After the exit of FLE project, MFFs should remain motivated through various means to provide training to their peers. MFFs shall perceive advantages of working with MFGs, FPOs and SHGs sheds light on some of these motivations. First, MFFs shall benefit from the knowledge they gain as MFFs, which they apply to their own farms as well as in training others. Second, they note social benefits, such as networking opportunities and higher social status from being a MFF and being associated with the MFGs and FPOs. Third, they obtain inputs and other materials for use in their training and demonstrations. Fourth, they obtain indirect financial benefits, from selling seed from demonstration plots or receiving credit from the Organizations on a priority basis. Many MFFs are motivated by their wish to help their peers. These incentives shall appear to sustain following the exit of the FLE project and hence help reinforce MFFs' motivation, which in turn contributes to the sustainability of the MFFs approach.

MFFs remained engaged due to:

- Knowledge gains applied to their farms
- Social recognition and leadership status
- Indirect financial benefits

These findings confirm that intrinsic and extrinsic motivations sustain participation.

LIMITATIONS

This study has several limitations:

- The small number of MFFs (n=10) limits generalizability

- The study is confined to two locations (Kolli Hills and Koraput)
- The project-supported context may have positively influenced outcomes
- Long-term sustainability beyond the study period was not assessed

These factors should be considered when interpreting the findings.

CONCLUSION

The study demonstrates that the MFF approach continued functioning beyond project support in both study sites. Evidence shows that sustainability was associated with strong institutional linkages, active farmer groups, willingness to pay for services, and sustained motivation of facilitators. These factors collectively enabled the continuation of extension services.

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Availability of data and material Data generated to this study is presented in tables and figures in the manuscript.

Declarations

Disclosure statement

No potential conflict of interest was reported by the authors.

Consent for publication

The authors agreed that the findings of the study shall be published.

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