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TWIGIRE MUHINZI NATIONAL EXTENSION SYSTEM IN RWANDA



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INSTITUTIONALIZING FARMER FIELD SCHOOLS

TWIGIRE MUHINZI NATIONAL EXTENSION SYSTEM IN RWANDA

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Abstract

This report is part of a global study on promising Agriculture Human Capital Investment (AHCI) initiatives and presents evidence from a case study on Institutionalizing Farmer Field School (FFS) Investment: the Twigire Muhinzi National Extension System in Rwanda.

This study adopted a qualitative approach in collecting and documenting the data. Secondary data were collected through a literature review of relevant documents to the case study and through consulting with key informants, including project managers from both the public and the private sectors directly involved with the implementation of Twigire Muhinzi. Primary data were collected through interviews with project managers, FFS facilitators and farmers participating in FFSs under the Twigire Muhinzi Extension system. A sample was taken representing districts in the four provinces, with four districts with the highest share of FFS groups selected in each province. The interviews were conducted by phone in August 2020, audio-recorded, transcribed manually and using NVIVO-QSR (Version 11) software and supplemented by handwritten notes.

The key findings indicate that the types of human capital generated through the FFS approach under Twigire Muhinzi are the following: (i) technical skills (livestock nutrition and management and cropping systems); (ii) social skills (gender, women empowerment, market and value chains and collective action); (iii) functional skills (savings and credit and market analysis); and (iv) empowerment (critical thinking, experimentation, innovation, group or community empowerment and mindset change). The acquired technical skills include competencies in good agricultural practices (GAP), which enable farmers to improve their production and productivity as well as their general wellbeing and livelihood. With enhanced functional skills, farmers are in a better negotiating position for obtaining the desired selling price for their produce.

In conclusion, the FFS approach showcases a situation where an extension approach can improve farmer skills, knowledge and empowerment and thus lead to enhanced adoption of relevant technologies and practices. In Rwanda, mainstreaming the FFS approach into the national extension system along with financial support from public-private partnerships contributed to its scaling up. Other key enabling factors included coordinated support and planning at both central and decentralized levels as well as support from development partners, non-governmental organizations (NGOs) and civil society.

Under the FFS approach in Twigire Muhinzi, the number of farmers trained countrywide each season is constrained by available financing and is usually a small number as compared to the planned number. For any country or organization implementing the FFS approach, there is a need to consider putting in place strategies such as cost-sharing to ensure financial sustainability.

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Abbreviations and acronyms

AHCI	Agriculture Human Capital Investment		
AICP	Agriculture Information and Communication Programme		
ASTI	Agricultural Science and Technology Indicators		
BTC	Belgian Technical Cooperation		
FAO	Food and Agriculture Organization of the United Nations		
FFS	farmer field school		
FP	farmer promoter		
GAP	good agriculture practice		
GDP	gross domestic product		
GoR	Government of Rwanda		
HCI	Human Capital Index		
ICT	information and communication technology		
IFPRI	International Food Policy Research Institute		
IPM	integrated pest management		
IRB	Institutional Review Board		
M&E	monitoring and evaluation		
MINAGRI	Ministry of Agriculture and Animal Resources		
MINALOC	Ministry of Local Government		
MINECOFIN	Ministry of Finance and Economic Planning		
МТ	Master Trainer		
NAEB	National Agricultural Export Development Board		
NGO	non-governmental organization		
NISR	National Institute of Statistics Rwanda		
PIM	CGIAR Research Program on Policies, Institutions, and Markets		
PPP	purchasing power parity		
PSTA	Plan Stratégique pour la Transformation de l'Agriculture (Strategic Plan for the Transformation of Agriculture)		
RAB	Rwanda Agriculture and Animal Resources Development Board		
SPAT	Strategic Plan for Agricultural Transformation		
SRL	Sustainable Rural Livelihood		



Introduction

Sustainable agricultural productivity, food security and poverty reduction remain top goals of governments and development institutions around the world. Progress is under threat from a variety of crises, including climate change and public health emergencies and their associated economic shocks. Along with a growing population and increased demand for agricultural goods for food, fuel and fibre, these concerns necessitate investments in agriculture, rural infrastructure, natural resource management and climate resilience.

Agricultural investments often emphasize the physical and financial capital of farming households, such as land, fertilisers or credit. However, AHCI is crucial for spurring innovation, farm management decisions and empowering smallholders. Human capital is an economic term encompassing assets that increase individual productivity, such as education and health. For the purpose of this study, human capital is defined as the stock of habits, knowledge, social and personality attributes (including creativity) embodied in the ability to perform labour so as to produce economic value (Goldin, 2016). Human capital allows people to effectively utilise other types of capital. For example, farmers' education and knowledge influences their ability to make decisions, adopt new technologies, evaluate risks and manage farm resources.

As part of a global study on promising AHCl initiatives, this case study presents evidence from the Institutionalizing FFS Investment: The Twigire Muhinzi National Extension System in Rwanda project. The global study, commissioned by the Food and Agriculture Organization of the United Nations (FAO) and led by IFPRI with support from PIM, examines opportunities for both public and private investment in human capital in agriculture. The study aims to fill knowledge gaps about promising investments in programmes that develop agriculture human capital, particularly across different target groups such as smallholders, women and youth.

Case studies were selected according to a set of criteria following a broad assessment using literature reviews and expert inputs. Criteria included

documentation of impact, scalability, replicability and institutionalisation, inclusion and empowerment, holistic integration and sustainability. Nine case studies were selected across geographies from a typology of agriculture human capital. The selection process involved a series of workshops during which technical experts discussed potential cases, case study selection and case study teams. This case study adds perspectives on investing in the FFS approach as part of Twigire Muhinzi in Rwanda.





Chapter 1 Background

Rwanda is a small country, with arable land estimated to be 48 percent of the total area of 26 338 km² and with an average farm size of 0.6 ha (FAO, 2016). This is relatively small compared with neighbouring countries. For instance, Kenya's arable land is 10.19 percent of 580 367 km², with the average farm size being about 2.5 ha, while Uganda's arable land is 37.8 percent of the total area of 241 550 km², with average farm size of 2.5 ha (FAO, 2015).

Agriculture is the backbone of economic growth in Rwanda, and the majority of rural households (96 percent) are directly reliant on agriculture as their main or only source of income (MINAGRI, 2017). The Government of Rwanda (GoR) updated its National Agricultural policy in 2017, which put emphasis on agricultural transformation for improved productivity, especially intensification, while taking into consideration the fostering of skills development through strengthened agriculture knowledge and information systems. The national agriculture policy emphasizes that the interface with farmers, mainly through the agricultural extension service, is a key priority to be addressed (MINAGRI, 2017).

In 2008, the government introduced the FFS approach initially to promote integrated pest management (IPM) and later to assist farmers with general crop management. In 2014, GoR adopted a decentralized farmer-to-farmer extension system referred to as Twigire Muhinzi, which means "self-reliance in farming". Twigire Muhinzi has two main approaches: the farmer promoter (FP) approach and the FFS approach.

Table 1

Key agricultural, human capital and enabling environment indicators in Rwanda

Indicator category	Indicator name	Latest data available	Indicator value
General	Total population	2019	12 626 950
	Rural population (% of total population)	2019	82.7%
	Number (%) of smallholder or family farmers	2017	53.3%
	Poverty headcount ratio at USD 1.90 (%)	2016	55.5%
	Rural poverty headcount ratio (%)	2010	48.7%
	Prevalence of undernourishment (%)	2017	36.8%
	Human Capital Index (HCI) score	2017	37.0%
Enabling	Expected years of school, male and female	2018	Male: 6.3 Female: 6.8
environment: educational	Primary completion rate, total	2018	86.5%
attainment	Literacy rate, adult total (% of people aged 15 and above)	2018	73.2%
Enabling environment:	National agricultural research expenditure data as share of agricultural gross domestic product (GDP) (ASTI)	2016	27.3%
funding	Agriculture expenditure (% of total spending)	2019	5.0%
Enabling	Mobile subscriptions (per 100 people)	2018	78.8%
environment:	Secure internet servers (per 100 people)	2019	90.0%
indicators	Access to electricity (% of population)	2018	34.7%
Enabling environment: policies	National Agriculture Policy Fourth Strategic plan for Transformation of Agriculture (PSTA 4)	2017 2018	Yes

SOURCES: World Bank (2020), ASTI (2020), FAO (2020), MINECOFIN (2013), NISR (2018)

NOTE: The poverty headcount ratio indicates the percentage of the population living on less than USD 1.90 per person per day in 2016 purchasing power parity (PPP). The agriculture expenditure indicator comes from FAOSTAT's Government Expenditure data (share of total outlays). National agricultural research expenditure data as share of agricultural GDP (ASTI) is indicated as spending total (in million dollars at constant 2011 PPP).

As shown in Table 1, Rwanda has relatively good information and communication technology (ICT) infrastructure, including internet connections and mobile phone penetration. ICT opens new opportunities for agriculture extension and plays a significant role in improving access to extension and advisory services by farmers through mobile phones and other electronic media such as radio and television.





Chapter 2 Overview of case

TWIGIRE MUHINZI EXTENSION SYSTEM

Twigire Muhinzi is GoR's homegrown decentralized farmer-oriented national system for delivering agricultural extension and advisory services (Rwanda Agriculture Board, 2015). It was designed with the specific goals of maintaining national food security, improving crop productivity, increasing farmers' income and improving livelihoods. The pillars envisaged to make this extension system successful are:

- · demand-driven technology development and dissemination;
- good training and facilitation of extension agents to enable them to carry out their duties;
- creation of ideal conditions for technology transfer and exchange of information between producers, farmer organizations and different partners; and
- improved access to agricultural technologies and knowledge by farmers.

The thematic areas for Twigire Muhinzi are the capacity development of a critical mass of frontline extension agents (ensuring that they all remain motivated to continue serving the farming community) and the empowerment of farmers to make smart decisions based on observation and analysis, thereby applying improved, appropriate and sustainable agricultural technologies and practices. The extension system is based on two complementary types of farmer-to-farmer extension approaches: the farmer promoter approach and the FFS approach.

The first (farmer promoter) approach has farmers organized in Twigire groups supervised by farmer promoters. In these groups, farmers have access to basic extension messages through demonstration plots in each village. The groups meet three times per season, during which they are trained on GAPs. There are two agricultural seasons in Rwanda: season A (September to February) and season B (March to July).

The FFS approach aims in part to gradually reach all farmers with in-depth knowledge by offering an experimental learning experience in FFS plots. Farmers are organized in FFS groups facilitated by a trained FFS facilitator, and they meet every week. The aim is to build the decision-making skills of farmers to enable them to adopt GAPs.

THEORY OF CHANGE

The theory of change for the linear model of the FFS approach identified capacity building of FFS facilitators, training of farmers by FFS facilitators through season-long training, field days and experimentation through demo plots and training in the cross-cutting themes of gender, nutrition and the environment as the most important outputs for change. The theory suggests that the FFS approach should develop the knowledge, skills and capacity of farmers in various aspects so as to achieve impacts, including increased productivity and higher incomes.

The key assumption of the theory is that if the FFS approach is effectively implemented, knowledge, skills and abilities will be imparted to farmers, resulting in the adoption of technologies and good agricultural practices, as illustrated in Figure 1.

SCALING UP THE FFS APPROACH

The FFS approach was introduced in Rwanda in 2008 as a tool for IPM. Twigire Muhinzi was introduced in Rwanda in 2014, with the FFS approach integrated into Twigire Muhinzi in 2016 together with the farmer promoter approach, with the target of reaching all farmers in Rwanda.



Figure 1

Theory of change of FFS approach under Twigire Muhinzi

SOURCE: Authors' representation.



Figure 2 FFS approach scaling up and institutionalization into Twigire Muhinzi

SOURCE: Authors' representation.

The FFS groups are generally commodity specific. Hence, the FFS approach is implemented in terms of providing advisory services to groups of farmers who are involved in the production of specific crops or livestock. The FFS approach was scaled up to the national level when it was integrated into Twigire Muhinzi (Figure 2).

Institutionalization in the context of this case study refers to the permanent integration of FFS into the national agricultural research and extension system as a means for technology dissemination, empowerment and capacity building among rural communities. At its inception in Rwanda, the FFS approach remained a separate activity from the national extension system and was implemented as a project to complement regular agricultural extension activities. However, it was later integrated into Twigire Muhinzi as part of the national extension system, hence institutionalization. Twigire Muhinzi is aligned with one of the pillars of the national agricultural policy that is dedicated to capacity building in farmers.

ORGANIZATIONS IMPLEMENTING TWIGIRE MUHINZI

The Ministry of Agriculture (MINAGRI) is responsible for providing strategic guidance and oversight of Twigire Muhinzi. This is in line with the decentralized nature of the agriculture services and ensures more efficient extension delivery. Twigire Muhinzi is jointly implemented by the Rwanda Agriculture and Animal Resources Development Board (RAB) and the National Agricultural Export Development Board (NAEB). RAB is responsible for technical support to the programme, while daily coordination is the responsibility of districts. The extension system is managed by the RAB Department of Crop Research and Technology Transfer and is supported by various NGOs and projects for its implementation. Institutions of higher learning and universities support the production of extension materials, while the Agriculture Information and Communication Programme (AICP) supports the collection, packaging, management and dissemination and sharing of agricultural information with agriculture sector actors. At district level, extension services are implemented by the Ministry of Local Government (MINALOC) closer to field level, thus allowing for better targeting, wider outreach and greater impact (Figure 3). Currently, there are 14 200 farmer promoters and 2500 FFS facilitators who train farmers groups (FG) through demonstration plots, field days and village meetings. Through Twigire Muhinzi, 59 453 farmer groups composed of 1013782 farmers countrywide have been established, with 69 percent of Rwandan farmers accessing extension and advisory services through Twigire Muhinzi (MINAGRI et al., 2016).

TYPE OF HUMAN CAPITAL USING AHCI TYPOLOGY

Training of Farmers

The FFS approach is a form of non-formal education with experimental plots and a facilitator. It aims at building farmers' analytical and experimentation capacity and technical skills. Its popular motto is "The plant is the teacher." The FP approach works with groups of 15–20 farmers (Twigire groups) and has a demonstration plot and a farmer promoter. Its motto is "Seeing is believing." Both FFS facilitators and FPs are farmers selected from among the community, based on the following criteria: (i) being honest and accountable farmers in the community, with reading and writing skills; (ii) being willing and able to attend a season-long training away from their home (in the case of FFS facilitators); and (iii) being willing to spend time training other farmers in their community. FFS group members meet once a week at the experimental plots. The discoverybased training focuses on GAPs for a single crop per season and includes agro-ecosystem analysis, which is a thorough study of the agricultural environment that considers aspects of ecology and socioeconomics (Rwanda Agriculture Board, 2017).

Gender balance is also considered in the identification and training of FFS facilitators. To qualify as a facilitator, selected farmers go through a seasonlong training. The holistic curriculum includes facilitation skills, management, planning, how to conduct training, mobilization, general agronomic skills, harvesting and post-harvest practices, and group development topics such as conflict resolution, management of group resources, collective marketing, managing and maintaining groups, and legal and institutional mechanisms for group self-regulation. MINAGRI issues certificates, and facilitators are expected to scale up and scale out the skills acquired by training farmer groups (FG) in their locality and providing technical backstopping for the farmer promoters.



Figure 3 Twigire Muhinzi extension system

SOURCE: Adopted from Musabyimana et al. (2018).

THEORY OF CHANGE AND DESCRIPTION OF HUMAN CAPITAL AND CAPACITY-BUILDING COMPONENT PROCESS

FFS facilitators are trained by FFS Master Trainers (MT) through a whole season; the FFS MTs are trained by international MTs.

The FFS facilitator creates new FFS groups and establishes new experimental plots. According to the plan, in the first season the FFS facilitator works intensively with new FFS groups, facilitating each group at least once a week. In the second season, the FFS group still meets every week in their learning plot, but the FFS facilitator only joins them once every two weeks. From the third season onwards, the facilitator only visits a group upon request for a special reason.

INNOVATION THAT STANDS OUT IN THE FFS APPROACH UNDER TWIGIRE MUHINZI

Twigire Muhinzi is an extension approach founded on local culture and practices, including volunteerism. In the Rwandan model, the FFS facilitators are always farmers rather than government or NGO staff. This allows benefits such as peer-to-peer training, communication in local languages and sensitivity to local culture, farming practices and farmers' needs. From a financial perspective, farmer facilitators require less transport and financial support than formal extensionists. They can also operate more independently outside formal hierarchical structures.



Figure 4 Twigire Muhinzi capacity building process

SOURCE: Authors' representation.







Chapter 3 Details of case

Target group, value chain and commodities

The FFS approach under Twigire Muhinzi targets smallholder farmers in Rwanda, who number approximately 9.5 million, or 75.9 percent of the total population (NISR, 2018). Rwandan farmers are relatively young, averaging 44 years of age, with a median age between 35 and 44 years (NISR, 2018).

The FFS approach under Twigire Muhinzi focuses on priority food crops (bananas, wheat, maize, rice, Irish potato, cassava, soya beans, and beans), cash crops (coffee, horticulture) and livestock priority (dairy and meat) value chains as stipulated in the GoR's medium- and long-term development planning framework (MINECOFIN, 2013).

The FFS approach serves farmers in all agro-ecological zones. Rwanda has a diversity of agriculture production systems spread throughout its various agro-ecological zones.

FUNDING MODEL

Funding for the FFS under Twigire Muhinzi comes from the national treasury. MINAGRI makes earmarked transfers to districts for the implementation of Twigire Muhinzi at decentralized level.

The FFS facilitators in each district are part of a FFS facilitator cooperative that works as a professional service provider. These FFS facilitator cooperatives sign a three-party, performance-based contract with RAB and the district. They commit to creating new FFS groups and to implementing all essential FFS activities with those groups. Payments to the facilitators are linked to performance. Hiring FFS facilitator cooperatives as service providers costs approximately USD 129 per FFS group each season.

The incentives for the FFS facilitators comes mainly from the payment they receive through the tripartite contract. Initially they were paid as individuals, but since 2015 they have been organized into FFS facilitators' cooperatives.

Various bilateral agencies and NGOs also make substantial contributions to support agricultural extension service delivery in Rwanda through specific projects and activities. For example, Belgian Technical Cooperation (BTC) supported the capacity building of FFS facilitators and the establishment of FFS groups, and the One-Acre Fund continues to support the implementation of the FP approach.







Chapter 4 Methodology

This case study incorporates secondary data sources and primary qualitative data to elucidate the opportunities and challenges that the Twigire Muhinzi FFS approach encounters in developing human capital among smallholder farmers in Rwanda.

DATA COLLECTION APPROACH

General demographic human capital indicators for Rwanda were extracted from a variety of secondary data sources to contextualize the project environment. Demographic indicators, ICT and educational attainment indicators were compiled from The World Bank Open Data website and its HCI (World Bank, 2018, 2020). Agricultural research investment indicators were compiled from the Agricultural Science and Technology Indicators (ASTI) database, which houses datasets on agricultural research expenditures and human resource capacity in low- and middle-income countries (IFPRI, 2020). Information on agriculture expenditure was also downloaded from FAOSTAT (FAO, 2020).

Secondary data were collected on enabling factors for human capital development as well as details of Twigire Muhinzi. A literature review of national policies and strategies, project documents and other relevant publications was conducted. Topics of interest included the following: (i) the policy environment of Twigire Muhinzi; (ii) degree of decentralization; (iii) funding mechanisms; (iv) extent of institutionalization of FFS approaches by the public and private sectors; (v) monitoring and evaluation (M&E); (vi) targeting of participants in the creation of FFS groups; (vii) networking among stakeholders and harmonization; and (viii) standardization of processes and procedures.

Primary data were collected on the knowledge and skills acquired by the participants and their impact on the participants' capacities and changes in agricultural, managerial and social practices. This was done using interview guides and questionnaires.

Questionnaires were administered to farmers through phone calls, with the questions read out to them in the local language (Kinyarwanda), their answers audio-recorded, noted by the note-takers and then translated into English. The in-depth interviews were scheduled based on times convenient for the farmers, and each took 40–45 minutes. At 100 percent, the response rate was high, in fact it was 100 percent.

Key informants were called to and requested to give a convenient time for them. While some were interviewed during the initial phone call, others called back to schedule their interview. The key informant guide was used to probe for information, each interview taking 40–45 minutes. One person asked the questions while the other recorded in both audio and writing. The interviews were transcribed manually and using NVIVO-QSR (Version 11).

Sampling

A representative sample was drawn taking due consideration of the following criteria:

- representation of districts in the four provinces by selecting four districts with the highest share of FFS groups per province, hence a total of 16 districts, with one FFS facilitator purposively selected from each district. The sample therefore included 16 FFS facilitators;
- from the list of FFS groups, four groups were purposively selected from each district based on groups with the highest membership;
- for each of the selected groups, a list of all members, including their contact information, was obtained from the chairpersons of the respective district FFS cooperatives. From this list, the farmers to be included in the survey were purposively selected to ensure gender balance and inclusion of youth. The selected farmers were contacted to schedule interviews, and all 32 contacted farmers 19 men and 13 women agreed to the interviews, hence a 100 percent response rate. Of the 32 farmers, eight were youths and one was a person living with a disability;
- the sample included seven project managers, two from public institutions and five from private institutions, all of them involved in implementation of the FFS approach under Twigire Muhinzi as key informants.

DATA ANALYSIS

All the interviews were transcribed and analysed using the constant comparative method, with the transcription done automatically and crosschecked for accuracy by the data analyst. This approach involves breaking down the data into discrete "incidents" (Glaser and Strauss, 1967) or "units" (Lincoln and Guba, 1985) and coding these into categories. The data were separated from the original transcript using NVIVO-QSR (Version 11) in order to identify their essential elements. The interview data were analysed on the basis of systematic coding following the approach suggested by Saldana (2012). A combination of deductive and inductive coding of responses was made, with themes developed based on emerging similarities of expressions. This led to the identification of common categories and themes guided by field and audio notes grouped into the following:

- skills and knowledge;
- empowerment;
- GAPs learnt and adopted;
- impact on production and livelihoods; and
- gender and social inclusion (women, youth, persons living with disabilities).

Ethical approval: The International Food Policy Research Institute Institutional Review Board for Social, Behavioural and Educational Research approved the methods of data collection (IRB Approval Number: DSGD-20-0621).







Chapter 5 Evidence base for success in human capital development

Goals of FFS approach in Twigire Muhinzi

The overall goals of the FFS approach under Twigire Muhinzi are: (i) to impart farmers with knowledge and skills that make them experts in their respective commodities' production and management; (ii) to amplify the farmers' ability to make critical and informed decisions that render their farming profitable; (iii) to empower farmers with new ways of thinking and solving problems; and (iv) help farmers learn how to organize themselves and their communities. To achieve these objectives various types of human capital are generated through the FFS approach under Twigire Muhinzi, as shown in Figure 5.

HUMAN CAPITAL DEVELOPED AMONG THE TARGET POPULATION

The case study presents evidence on the human capital (knowledge, skills and empowerment) generated among farmers through the FFS approach in Twigire Muhinzi as outlined in this section.

Hard or technical skills

Most of the farmers interviewed grow several crops in order to guard against shock in case one crop fails. However, the choice of crops is guided by crop intensification priority crops (Kathiresan, 2011).

Data show that both farmers and FFS facilitators interviewed across the four provinces acquired technical skills through participation in the FFS groups under Twigire Muhinzi. The acquired technical skills include: (i) competencies in GAPs, including use of proper plant spacing; (ii) soil fertility management by adopting the use of appropriate amounts of farmyard or compost manure and fertilizer; (iii) integrated pest and disease management for crops; and (iv) respecting the seasonal farming calendar and constant farm observations and visits (agroecosystem analysis model). These skills are in line with the outputs outlined in the Twigire Muhinzi (MINAGRI, 2016). As one FFS facilitator stated,



Figure 5 Types of human capital generated through the FFS approach under Twigire Muhinzi

SOURCE: Authors' representation.

"I now have the ability to grow my rice better using a nursery where seeds are well treated. I was even able to apply the techniques I learnt from the FFS to produce enough to even take to the market."

Through the adoption of GAPs, various outcomes were achieved, and many farmers attested to an increase in production, either in quality or quantity. The adopted GAPs included: (i) row planting and plant spacing; (ii) nursery bed transplanting; (iii) early planting and weeding; (iv) mulching; (v) soil and water conservation; (vi) improved varieties of seeds and seed selection; (vii) crop rotation; (viii) improved post-harvest handling; and (ix) fertilizer use. These outcomes were also identified during the capitalization of Twigire Muhinzi (Wennink and Mur, 2016).

"By applying what I was learning day by day, my family and I rehabilitated our banana plantation. In addition, making my own compost has helped me save money previously used to procure it", reported a farmer in the Western province, while an FFS facilitator said, "As a result of being trained on positive selection of Irish potato seed, I managed to invest in a seed bank." The increase in production through the adopted GAPs was also noted by a national NGO project manager who stressed that "Farmers received the education and training in response to their needs." The project manager further noted that in the implementation of the FFS approach under Twigire Muhinzi, farmers have been made to understand that they can harvest more by planting in rows, using correct spacing and timely weeding. Farmers and FFS facilitators in FFS groups under Twigire Muhinzi also acquired technical skills in livestock nutrition and management. Some of the highlighted skills were fodder and forage agronomy, animal nutrition (knowing how to ration feed and fodder), fodder conservation, pest control and animal health. A farmer in the Southern province explained that adopting these skills changed his ability to carry out agricultural work: "I have been able to measure and prepare adequate quantities of animal feed for my cows and I can properly mix the different fodder." This in turn has improved dairy production for farmers as nutrition is one of the major factors that directly influence milk production. "I now know how to conserve fodder so that even in the dry season, I can feed my cows and continue producing milk," reported another farmer from the Eastern province.

Soft or functional skills

With enhanced skills, farmers are now in a better negotiating position for obtaining the desired selling price for their produce, especially through cooperation as an FFS group or cooperative under Twigire Muhinzi. This has changed the farmers' approach to farming, causing them to shift to a more intentional approach that factors in market trends when making decisions on key factors of production such as planting or selecting varieties. As one of the farmers reported, "Planning my agricultural activities respects the farming calendar and the best time to target the market for higher profitability."

As a measure for improving farmers' access to credit through the FFS approach, Twigire Muhinzi promotes voluntary saving and borrowing among group members. This is intended to mitigate the challenges posed by limited agricultural financing, especially for smallholder farmers, cushioning farmers against selling their produce at unfavourable prices but also building a culture of saving among farmers so as to help them build capital for financing other income-generating activities. The promotion of savings therefore serves as a key component in improving household wellbeing as well as supporting cooperation and working together with other farmers and community members generally. In all instances where savings were reported, credit and loans were also mentioned. This is because the pooled funds are also used to provide loans for seed, inputs and other household needs. Most farmers said that this was a key component of their group's activities and fostered financial development for FFS groups and individuals alike.

Through the FFS trainings, FFS groups under Twigire Muhinzi also acquire knowledge on how to better market their produce, an outcome commonly cited by both farmers and facilitators. This in turn influences group dynamics as members can identify with the benefits of being part of a group. As a farmer stated, "Experiences from the FFS group help me make informed decisions from an informed point of view in terms of how to relate with fellow group members and how to make economic gains from belonging to our group."

Empowerment

Participation in FFS groups under Twigire Muhinzi not only enables farmers to build their ability to carry out farm work through adoption of GAPs but also gives them the ability to make well informed decisions. Interviewees reported increased confidence as a result of their participation in FFS, which in turn translated into an ability to make decisions that positively affected production and productivity. The way interviewees responded about their decision-making abilities illustrates how decisions made are based on the specific competencies gained through the FFS approach. Through an extensive season-long hands-on

approach, farmers can experiment and compare traditional and new practices that lead to mindset change. As one farmer said, "through a practical and experimental approach, I was able to see for myself which practices gave the most yield and I was therefore able to adopt what works best for my farm."

During the FFS sessions, farmers discuss their problems and support each other in coming up with solutions through knowledge and experience sharing. Surveyed farmers and facilitators alike affirmed the role of the FFS approach in enabling them to innovate and solve their own problems.

The environment for these FFS groups significantly promotes the critical thinking skills farmers need if they are to shift from subsistence to market-oriented farming, with a greater impact on their lives. As an FFS facilitator puts it, "when choosing my farm investment, I make projections and base my decision on the expected yield so that I am sure it's worth it."

The farmers also reported easier access to seed and inputs as well as access to local agronomists as a result of being in an FFS group. This is because the service providers find it easier to work with farmers who have already been grouped together than with those that are spread out in the community. One project manager observed that it is easier for the farmers in FFS groups under Twigire Muhinzi to receive timely and appropriate technical backstopping from the FFS facilitators and other service providers.

With the skills and positive mindset acquired and with improved production, many of the farmers have become opinion leaders who have influence over the communities where they live and beyond. As a horticulture farmer reports: "I am now a very influential farmer in the community, who is even visited by neighbours and foreigners."

The majority of interviewed farmers stated that their livelihoods have improved as a result of participating in FFS. They observed they can buy basic necessities: for example, they bought good clothes and shoes, rehabilitated or renovated their houses, or could afford health insurance and school fees for their children.

Social skills

Through FFS groups under Twigire Muhinzi, farmers' confidence in themselves individually and as a group has been greatly enhanced. One of the core characteristics of the FFS model under Twigire Muhinzi is the participatory approach, where everyone plays a role and all voices are heard. Farmers are therefore able to learn to express their opinions and easily interact with other group members. This also fosters healthier relationships and cohesiveness among the FFS groups. As a female farmer said, "by being a member of an FFS group, I have been able to improve my interpersonal relationships, and I am no longer a loner". Working in a group clearly fosters a sense of belonging and inclusion. The surveyed farmers also reported that there is greater influence from their peers in FFS groups as there is now a sense of not being left behind in the adoption of better practices and mindset change. Many farmers also mentioned resilience and food security as a result of being in groups in the FFS approach under Twigire Muhinzi.

The FFS approach also achieved improved knowledge of gender equality among beneficiaries of a gender training that targeted FFS facilitators. 53 percent of the trained FFS facilitators nationwide are women, and FFS groups across the four provinces of Rwanda consist of 61 percent women. The overall objective of the FFS training was to equip FFS facilitators with practical knowledge and skills in gender equality and prevention of gender-based violence and discrimination. Once trained, the FFS facilitators were able to sensitize the FFS groups on gender equality with a view to achieving the following: prevention of gender-based violence, increased participation of women in economic decision-making at household level, and increased management of farming activities by men and women working as equal partners. The overall outcome was more equal gender power relations at the individual household level (Rwanda Agriculture Board, 2010).

The surveyed farmers also alluded to one of the most important changes resulting from their training being more shared roles between men and women in agricultural work. While women still dominate farm activities (land preparation, planting, weeding and harvesting), men were reported to be more involved in farm work. For example, one female farmer reported that men were getting more involved in more labour-intensive agricultural activities in particular. Most women also said that they now have a say in decision making, both in their homes and in the groups.







Chapter 6 Analysis of case and recommendations

Factors that make the FFS approach under Twigire Muhinzi successful

Rwanda has managed to institutionalize and scale up the FFS approach by incorporating it in the national system, Twigire Muhinzi, which brings together the FFS model and the farmer promoter approach to reach all farmers (or at least all villages) in the country.

FFS is successful in its own right as an effective method for enhancing farmers' skills and knowledge following the principles of experimentation and learning, especially over specific identified farmer needs and problems. Various studies have observed the impact of FFS, which include farmers' ability to improve their productivity and livelihoods (Butt *et al.*, 2015), increase their leadership role in community-based activities (Braun *et al.*, 2006), knowledge gains among farmers (Rola *et al.*, 2002; Praneetvatakul and Waibel, 2002), empowerment (Züger Cáceres, 2003), and farmer networking and capacity for collective action (Braun and Duveskog, 2008).

The FFS principles of experimentation and the farm as the classroom are highly applicable for both literate and illiterate farmers (Davis *et al.*, 2012). Even those with low levels of education can improve their skills through FFS.

Other countries and organizations aiming to emulate this model in successfully developing the skills and capabilities of beneficiaries and farmers in their own contexts should include the following enabling factors:

Integration into national policies and strategies

The FFS approach under Twigire Muhinzi is also to some extent the operationalization of Rwandan national agricultural policy, which emphasizes building the capacities and skills of all farmers in the country.

Coordinated support and planning at both central and decentralized levels

Two sector ministries are involved in the implementation of Twigire Muhinzi: MINAGRI through RAB, and MINALOC through the districts. Ownership by and support from these Ministries and the decentralized government structures are vital for the success of the model.

Support from development partners, NGOs and civil society

The FFS approach was not only incorporated into the national extension system, but also adopted by donor agencies, civil society and community organizations. Twigire Muhinzi has the support of development partners and NGOs such as the One Acre Fund and the Hinga Weze Project, which provide both financial and technical support to its implementation.

The power of peer trainers: farmer-to-farmer extension

The introduction of farmer-to-farmer extension is a key success factor in Twigire Muhinzi. FFS facilitators and farmer promoters are selected from among smallholder farmers and become frontline extension agents in the national agricultural extension system. Being members of the local communities, they easily reach farmers in their community, understand the farmers' needs and speak the farmers' language.

Distinctive but complementary roles of FFS facilitators and farmer promoters

In Twigire Muhinzi, the FFS approach is implemented alongside the farmer promoter approach. Although farmer promoters and FFS facilitators have distinctive roles, they are mutually reinforcing roles that contribute to the successful performance of the extension system. Innovative agricultural practices, which have proven their relevance and effectiveness in FFS experimental plots, are disseminated to the farmers by the farmer promoters through Twigire Group demonstration plots. This provides a channel for the rapid dissemination of GAPs among farmers as the FFS approach itself would take a longer time (i.e. season-long), allowing for a sustainable scaling up of access to extension services by smallholder farmers. This complementary nature of FFS has contributed to its success.

The power of farmers working in groups

Both farmer promoters and FFS facilitators use local groups as an entry point for extension. Twigire Groups allow access to extension and advisory services provision by many farmers within a short time and with relatively few resources.

Field plots as classrooms and the "seeing is believing" motto

For both Twigire and FFS groups equally, field plots are another success factor. Field plots provide real-life cases of applying innovative technologies. For the smallholder farmers, a majority with six to seven years of schooling (World Bank, 2018), the plots provide practical evidence, thanks to which farmers do not need complex explanations for them to understand the technologies and innovations.

TYPES OF PRODUCERS FOR WHICH THE FFS APPROACH WORKS BEST

FFS is a group extension method and is therefore appropriate for producers with high social capital, and who are also ready to come together as a group. These types of producers could easily be integrated into FFS groups. Because of its participatory nature, the FFS approach works best for farmers who are close to each other (within walking distance) and able to congregate easily once a week throughout each growing season (normally three months) without incurring any transport costs.

Since an FFS covers a single subject or commodity per season, the approach works best when the producers have the same needs and interests in crop or livestock production. Producers in a particular FFS should have about the same level of knowledge or standard of living to ensure they can easily fit in and learn from their social network.

COMMODITIES, VALUE CHAINS OR ENTERPRISES FOR WHICH THE FFS APPROACH WORKS BEST

As discussed earlier, the FFS approach was initially introduced to promote IPM. Over time, as observed in Twigire Muhinzi, the approach has proved responsive to farmers' needs over a wide range of crops, livestock and even special topics such as climate and agribusiness. In addition, the FFS approach provides opportunities for farmers to acquire skills and knowledge along various value chains. Over the years, the scope of the FFS approach has expanded far beyond IPM to include overall training in skills needed to improve agricultural production and beyond. In the recent past, the FFS approach has included other issues such as water management, marketing networks, community development and strengthening producer groups.

From this perspective there are no commodities, value chains or enterprises for which the FFS approach works best; however, the approach can be employed to enhance participants' human capital in any commodity, value chain or enterprise based on their needs.

CONDITIONS NECESSARY FOR IMPLEMENTING THE FFS APPROACH ELSEWHERE

The FFS approach showcases a situation where an extension approach can improve farmer skills, knowledge and empowerment, and thus lead to adoption of improved technologies and practices. In Rwanda, mainstreaming the FFS approach into the national extension system and financial support from public– private partnerships contributed to its scaling up. There is sufficient evidence that given the appropriate enabling environment (policy support) and financial support, the FFS approach can be scaled up and institutionalized.

According to Davis (2006), FFS up-scaling requires mobilization of adequate human and material resources to replicate the model, and also additional organization and finance to facilitate, channel and control the flow of information, goods and services efficiently and effectively.

Muilerman and Vellema (2017) also observed that the FFS approach can be scaled up through institutionalization in nationwide professional extension services.

Potential limitations and areas for improvement

- The main limitation of the FFS approach is its cost. Intense training activities are expensive in terms of cost incurred per farmer trained. Using the FFS approach under Twigire Muhinzi, the number of farmers trained countrywide each season is constrained by available financing and usually results in a smaller number of trainees per season compared to the planned number. For any country or organization implementing the FFS approach, there is therefore a need to consider putting in place strategies such as cost-sharing to ensure financial sustainability.
- National government funding is not sustainable, and cost-effectiveness and financial sustainability could be improved if the beneficiaries, who are the farmers, could partially (or ideally fully) fund FFS activities.
- Training enough FFS facilitators to reach all smallholder farmers in the country is a key limitation. However, an FFS facilitator can be trained on more than one crop or animal species and manage more than one FFS group each season, thus reaching more farmers. The private sector could also be induced to train more facilitators on commodities of interest to them, thus increasing the number of FFS facilitators.





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Investing in farmers - or agriculture human capital - is crucial to addressing challenges in our agri-food systems. A global study carried out by the FAO Investment Centre and the International Food Policy Research Institute, with support from the CGIAR Research Programme on Policies, Institutions and Markets and the FAO Research and Extension Unit, looks at agriculture human capital investments, from trends to promising initiatives. One of the nine featured case studies is the Twigire Muhinzi National Extension System in Rwanda. Twigire Muhinzi is the government's homegrown, decentralized and farmer-oriented national system based on two complementary types of farmer-to-farmer extension approaches: farmer promoters and farmer field schools. The model showcases how an extension approach can improve farmer skills, knowledge and empowerment and thus lead to enhanced adoption of relevant technologies and practices. In Rwanda, mainstreaming the farmer field school approach into the national extension system along with financial support from public-private partnerships contributed to its scaling up. This publication is part of the Country Investment Highlights series under the FAO Investment Centre's Knowledge for Investment (K4I) programme.

