CANALLS
AGROECOLOGICAL PRACTICES FOR SUSTAINABLE TRANSITION

D4.4 Adoption potential of agroecological practices - initial version

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Authors

First Name	Last Name	Beneficiary
Hycenth Tim	Ndah	UHOH
Beatriz	Herrera	UHOH
Fiaboe	Komi	IITA
Precillia	Ijang	IRAD
Emmanuel	Rukundo	IITA
Vicky	Ruganzu	RAB
Eugenio	Giacopelli	UHOH
Roman	Spiegelsberger	UHOH

Collaborators during the AE assessment workshops

First Name	Last Name	Beneficiary
Laura	Eckhardt	UHOH
Shu-Wei	Sue Chow	UHOH
Egbe	Gwendoline Arrika	IRAD
Egesa	Morris	AFAAS
Kemga	Adoph	IITA
Mabah Tene	Gwladys L.	IRAD
Mahot	Hermine Claudine	SCOOPMAN
Mandah	Viviane	IITA
Manguele Fatou	Gaelle S.	IRAD
Munu	Fritz-Austin Ndam	SCOOPMAN
Ndje Mbile	Jean Guy	IRAD
Ngo Minyem	Alvine	SCOOPMAN
Ngouambe	Nestor	AFAAS
Nguepi Nanfah	Bebel Parfait	CAMFAAS
Nsobih	Marie Lizette	SCOOPMAN
Tchouga	Alvine Ornella	IITA

In case you want any additional information, or you want to consult with the authors of this document, please send your inquiries to: h.ndah@uni-hohenheim.de (person in charge of Deliverable)

Quality Reviewers

First Name	Last Name	Beneficiary
Johan	**Six**	**ETHz**
Wivine	**Munyahali**	**UCB**

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Executive Summary

The widespread adoption of sustainability-oriented agricultural innovations by low-income farmers in Sub-Saharan Africa (SSA) faces significant challenges. Often, scaling these innovations requires a carefully coordinated strategy that addresses structural constraints, supports smallholder farmers, empowers women, fosters enabling policy environments, and strengthens agri-food system governance. The CANALLS Project aims to provide critical evidence to support the adoption and scaling of agroecological (AE) innovations. This report (1) presents the methodological steps used in the AE adoption potential (likelihood) assessment and (2) provides initial findings from its application in two case study countries—Cameroon and Rwanda.

Specifically, we used a modified version of the QAToCA (Qualitative expert Assessment Tool for Conservation Agriculture) initially designed to assess the likelihood of adoption of conservation agriculture under various agro-ecological, socio-economic, and cultural conditions in Africa (Ndah et al., 2015, 2014). The Tool assesses regional adoption likelihood by integrating biophysical, socio-economic, and institutional factors. It evaluates nine thematic categories to identify key drivers and constraints, offering a valuable approach for data-scarce regions. Workshops were conducted in Ntui, Cameroon, and Kamonyi, Rwanda, involving multiple stakeholders. The choice of this approach was informed by its multi-dimensional capacity to generate results which (1) provides a comprehensive picture of the relative adoption and diffusion potential of the studied AE practices across targeted Living Labs; (2) forms a basis for restitution and discussions with stakeholders in the various case studies, thereby offering new insights into specific development and diffusion programs; (3) reveal entry points for planning or adjusting ongoing and future promotion efforts; and (4) serves as a knowledge base to understand supporting and hindering factors for AE innovations under specific agroecological, socio-economic, institutional, and cultural conditions in the targeted agroecological Living Labs (ALLs) of CANALLS.

Initial findings from the application in the two CANALLS case study countries (Cameroon and Rwanda) revealed varied AE adoption potential. In **Cameroon's Ntui Living Lab**, foliar fertiliser adoption potential was highest in the Forest Zone (88.94%), decreasing through the Transition Zone (78.42%) to the Savanna Zone (67.43%), highlighting the need for tailored strategies. In **Rwanda's Kamonyi Living Lab**, both erosion control and intercropping showed high overall adoption potential (over 80%). A consistent enabler was strong institutional readiness, including capable promoting organisations, effective dissemination strategies, and supportive political conditions at local and regional levels. Nevertheless, for the **case of Rwanda**, significant barriers emerged at the farm and community levels, with market conditions for agroecological products consistently seen as weak, limiting economic incentives. Moreover, insufficient and adapted training and advisory services were revealed as crucial gaps. Particularly for the **case of Cameroon**, uneven institutional coordination has led to fragmentation. Furthermore, socio-cultural barriers (e.g., low trust, weak farmer organisation, youth disengagement) and practical feasibility constraints (e.g., access to labour and inputs) posed significant challenges to AE adoption. **Specific hindering factors** varied by region, from technical feasibility of AE practice in Cameroon's Forest Zone to institutional and socio-cultural problems in the Savanna, and high financial risk in Rwanda for certain practices.

These results emphasise that successful AE scaling requires moving beyond policy and organisational readiness to address on-the-ground realities. Multi-level strategies are essential to align institutional support with farm-level feasibility. This means tailoring interventions to specific

zones, strengthening market linkages, improving and adapting training, enhancing institutional coordination, and addressing socio-cultural and household constraints. In essence, achieving widespread AE adoption depends on a comprehensive approach that systematically tackles these diverse barriers across all levels.

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List of Terms and Definitions

Abbreviation	Definition
AEPs	Agroecological practices
AFAAS	African Forum for Agricultural Advisory Services
AKIS	Agricultural Knowledge and Innovation Systems
ALL	Agroecological Living Lab
CAMFAAS	Cameroon Forum for Agricultural Advisory Services
CANALLS	Driving agroecological transitions in the humid tropics of Central and Eastern Africa through traNsdisciplinary Agroecology Living LabS
CIRAD	Centre de Cooperation Internationale en Recherche Agronomique pour Le Development
ETHz	Eidgenoessische Technische Hochschule Zuerich
IITA	International Institute of Tropical Agriculture
IRAD	Institut de Recherche Agricole pour le Developement
LL	Living Lab
QAToCA	Qualitative Assessment Tool for Innovations
RAB	Rwanda Agriculture and Animal Resources Development Board
UHOH	University of Hohenheim
WP	Work Package

1 Introduction and background

The uptake of agricultural innovations is often hindered by numerous barriers, particularly among low-income producers. Scaling these innovations requires a carefully coordinated strategy that addresses structural constraints, supports smallholder farmers, empowers women, fosters enabling policy environments, and strengthens agri-food system governance (Klerkx et al., 2012; Hellin, 2012). In the African context, agroecological initiatives tend to emphasise field-level implementation, with limited attention given to upscaling strategies (Anderson et al., 2021). Meanwhile, critics frequently question the economic viability and scalability of agroecological practices, particularly in terms of yield potential, profitability, and market integration (van der Ploeg et al., 2019; Wezel et al., 2020).

Approaches to overcome these adoption and scaling barriers—including the development of viable business models for agroecological produce—remain significantly under-researched, especially within sub-Saharan Africa (Bezner Kerr et al., 2021). The CANALLS Project, set out to address this gap by generating critical evidence to support multiple dimensions of adoption and scaling, including: (i) the implementation of context-appropriate agroecological practices; (ii) governance mechanisms within Agricultural Knowledge and Innovation Systems (AKIS) that facilitate wider adoption; (iii) capacity-building for extension services to guide smallholder farmers through agroecological transitions; (iv) the development and application of Decision Support Tools (DSTs) to identify optimal agroecological strategies; (v) the design of fair, sustainable, and inclusive business models; and (vi) improved service delivery mechanisms to enhance farmer resilience and market participation

Within WP4, Task 4.4 (titled: *Analysis of Adoption Potential to Reveal Hindering and Supporting Factors of Wide Implementation*) aims to assess the likelihood of adoption and sustained engagement in agroecological transition pathways. These pathways with corresponding practices have been co-designed and tested through the co-creation process under WP3. Using a modified version of the Qualitative Assessment Tool for Innovations (QAToCA) (Ndah et al., 2015, 2014) within systematically selected mix-stakeholder workshops, this task: 1) evaluates the potential for adoption and scale-up of agroecological practices in targeted regions; 2) identifies thematic barriers to their widespread implementation; and 3) pinpoints lock-ins and risks (hindering factors) that may hinder agroecological transitions in these areas.

This report presents the methodological steps used in the AE adoption assessment, along with initial findings from its application in two case study countries—Cameroon and Rwanda. These findings aim to inform evidence-based planning and policymaking for context-specific, inclusive, and sustainable agroecological transitions.

2 Methodological approach

2.1 The QAToCA Approach – Introduction

To evaluate the potential for adoption of agroecological innovations within the CANALLS project, the Qualitative Expert Assessment Tool for Conservation Agriculture Adoption (QAToCA) was applied. Originally developed by Ndah et al. (2015) under the EU-funded CA2Africa project, QAToCA is a conceptual, qualitative framework designed to assess the regional adoption likelihood of innovations

under diverse agro-ecological and socio-economic contexts in Africa. Its strength lies in integrating systemic adoption factors that are often overlooked in biophysical and economic models, thus providing a complementary, less data-intensive approach to understanding adoption dynamics.

2.2 Conceptual and theoretical basis of QAToCA

The development of QAToCA is grounded in a systems-thinking perspective, integrating biophysical, socio-economic, and institutional factors that influence the uptake of innovations. The framework builds upon Rogers' Diffusion of Innovations theory (Rogers, 2003), which posits that the adoption of new practices depends on multiple interacting variables, including relative advantage, compatibility, complexity, trialability, and observability. QAToCA version 2.0 draws on empirical data and qualitative research experiences from various sustainability-oriented innovation case studies promoted across Sub-Saharan Africa in the last years, emphasising the holistic nature of the approach rather than relying solely on quantitative indicators (or purely quantitative approaches) for judging and making conclusions on the state of adoption potential across regions.

By integrating various perspectives, QAToCA reflects a transdisciplinary approach, combining insights from agronomy, sociology, and institutional economics to create a nuanced understanding of innovation adoption potential. The tool distinguishes three scales of analysis: field, farm as well as village, and regional levels. It is assumed that the performance of new technologies at the field scale can be assessed using biophysical observation or crop/soil models. At farm and village scales, trade-offs in the allocation of resources can be analysed using bio-economic farm or household models. The adopted theories and concepts behind QAToCA underpin the development of thematic, multi-level indicators that reflect constraints and drivers at regional, village, and farm levels

2.3 Tool structure and modified thematic areas

QAToCA Version 2.0 (Ndah et al., 2015) comprises nine thematic categories (Table 1), each translated into a series of operational questions and qualitative indicators.

Table 1: Thematic components of QAToCA and descriptions

Thematic Categories	Description
A) Feasibility of the innovation	• *Technical relevance and appropriateness*
B) Farm and household conditions	• *Labour, land, capital, and household dynamics*
C) Capacity of the promoting organisation	• *Implementation and technical expertise*
D) Dissemination strategy of the promoting organisation	• *Mode, reach, and effectiveness of knowledge transfer*
E) Political conditions at the regional level	• *National/regional policy and institutional environment*
F) Political conditions at the village level	• *Local governance and informal institutions*
G) Market conditions	• *Access to inputs and product markets*
H) Perception of the community on the innovation	• *Social acceptance, relevance, and compatibility*
I) Awareness of innovation's environmental benefits	• *Understanding of long-term ecological implications*

Within each category, statements are assessed on a scale of 0–5 (following the Likert scale), indicating the legitimacy (strength) of the suggested statement concerning their influence on the adoption potential for the case study area, where:

0 = not sure, has no positive effect on adoption likelihood (even negative);

1 = strongly disagree, has a limited positive effect on adoption;

2 = disagree;

3 = partly agree;

4 = agree;

5 = strongly agree, has a maximum positive influence on adoption likelihood;

N = if you think the statement is not applicable in this case or appropriate.

2.4 Results interpretation and output

QAToCA's results outputs include:

- A relative likelihood score of adoption across case study regions.
- Thematic disaggregation, highlighting which contextual category and corresponding factors most influence adoption potential.
- Visual dashboards (e.g., with graphs and tables) facilitating stakeholder discussion and decision-making about their potential adoption situation.

Because it does not require large empirical datasets, QAToCA is particularly useful in data-scarce contexts while still allowing a rigorous, theory-informed assessment of adoption readiness. Figure 1 gives an overview of how the QAToCA results look like MS-excel spreadsheet format.

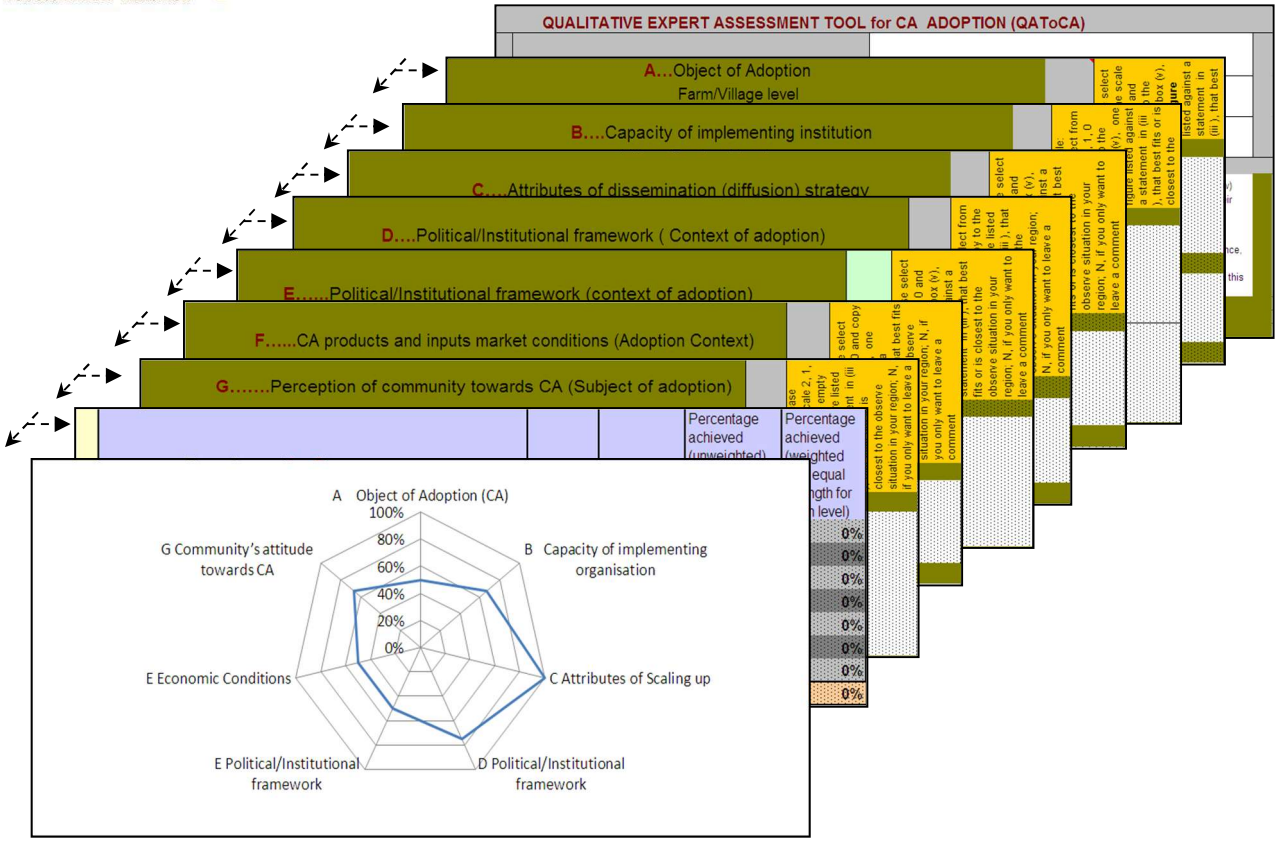


Figure 1: MS Excel sheet overview of QAToCA thematic components

2.5 Application of QAToCA in CANALLS

Within the CANALLS project, QAToCA was adapted to assess the adoption potential of agroecological innovations across multiple case study regions. Given its flexible design, QAToCA was well-suited to capturing contextual socio-economic and institutional variables relevant to agroecology. The tool facilitated structured expert judgment, identifying key factors that influence adoption, ranging from local policy environments to market readiness and community perceptions.

Furthermore, QAToCA's capacity to detect variation in regional adoption potential provided critical inputs for tailoring innovation dissemination strategies within CANALLS. By aggregating scores across thematic categories, project partners could pinpoint both systemic barriers (e.g., weak institutional support) and enabling conditions (e.g., strong farmer receptivity or viable input markets).

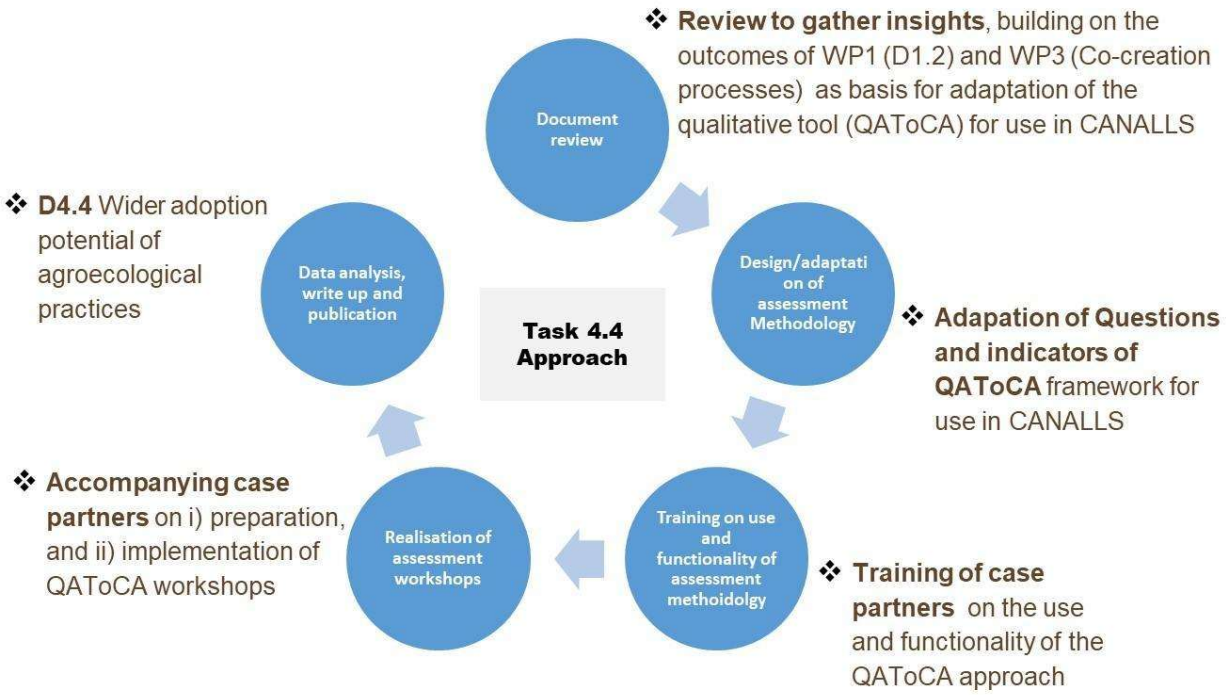


Figure 2: Approach for integrating and using the QAToCA in CANALLS

Figure 2 presents the approach adopted for adapting and applying QAToCA framework to assess the adoption potential of AE within the CANALLS project. This approach is represented as a closed circle process composed of several key steps, each feeding into the next as follows:

2.5.1 Document Review for Insight Gathering

The process was initiated with a thorough review of existing documents, with a particular emphasis on the outcomes from WP1 (D1.2) and WP3 (Co-creation processes) within the CANALLS project. The objective of this review was to compile insights and lessons learned, which subsequently constituted the fundamental knowledge base. These insights inform the adaptation of specific indicators within the QAToCA tool for its intended use in the context of the CANALLS project.

2.5.2 Design and Adaptation of Assessment Methodology

Based on the results of the document review, the subsequent phase involved adapting questions and indicators within the QAToCA framework to ensure its contextual appropriateness. The assessment methodology has been meticulously tailored to align with the objectives and implementation environments of the CANALLS project.

2.5.3 Training of Case Partners

Following the adaptation of the methodology, case partners were instructed in the utilisation and implementation of the QAToCA approach through a series of online sessions. This training ensured that partners have a clear understanding of the tool's functionality and are equipped to use it effectively during workshops.

2.5.4 Implementation with Case Partners

The trained case partners were then accompanied in two stages. First, they prepared for the workshops. Second, they implemented self-testing of the functionality of the tool. At this stage, the co-facilitators of the QAToCA assessment workshops from the local partner organisations were trained. This step enabled local partners to gain practical experience with the tool through a combination of hands-on sessions and online tutorials.

2.5.5 Realization of Assessment Workshops

Following the preparatory phase, a series of AE assessment workshops were conducted, providing a practical platform for applying the adapted QAToCA methodology to real-world case studies within the CANALLS framework. The first implementation took place in Cameroon in early December 2024, where researchers from UHOH collaborated with trained local facilitators from IRAD, IITA, SCOOPMAN, and CAMFAAS. The second implementation occurred in Rwanda in late December 2024, led by two trained MSc students from UHOH, working alongside local case partners from RAB and IITA.

2.5.6 Data analysis, write-up

The data collected during the AE assessment workshops, as structured by the QAToCA tool, was initially analysed in situ using the tool's built-in data integration functionality. The system's automatic visualisation feature enabled immediate display of the results, facilitating real-time feedback and adjustments within the same workshop sessions. The insights derived from these results, in conjunction with field observations and notes from broader discussions held during the workshops, formed the basis for drafting this deliverable (D4.4: Initial Version, Month 30).

It is imperative to acknowledge that while this first version of the Deliverable confines its findings to the AE assessments conducted in Cameroon and Rwanda, the final version of the deliverable, scheduled for release in Month 42, will include results from the instrument's application in the remaining project countries: the Democratic Republic of the Congo (DRC) and Burundi (BR). This will, in effect, complete the circle of the methodological approach for this task as highlighted in Figure 2.

3 Results

3.1 Overview of targeted AE practices

In the CANALLS project, precisely as an outcome of the co-creation workshops conducted under Work Package 3 (WP3), key agricultural challenges were identified, and proposed combinations of agroecological practices (AEPs) tailored to specific crops and regions were proposed

Table 2: Challenges and propped agroecological practices across CANALLS Living Labs (LLs)

Location	Crop	Main Challenges	Proposed AEP Combinations
Ntui	Cocoa	Pests, Low soil fertility, and Shade management	Biopesticides, Foliar fertilisers, and Improved shade management
Kamonyi	Cassava	Soil erosion, Low soil fertility	Anti-erosion practices, Organic + inorganic fertilizers, Intercropping
Bujumbura	Maize-bean intercrop	Pests, Low soil fertility	Biopesticides, Organic fertilisers
Biega	Coffee	Low soil fertility, Old variety, Pests	Biopesticides, Anti-erosion practices, Organic fertilisers, Cover crops
Kabare	Coffee	Pests, Poor crop management, and ageing trees	Biopesticides, Organic fertilisers, Cover crops
Uvira	Rice, Cassava	Pests, Low soil fertility, Drought	Biopesticides, Organic + inorganic fertilizers

In Ntui, where cocoa is the dominant crop, farmers face issues such as pests, low soil fertility, and the need for improved shade management. Recommended solutions include the use of biopesticides, foliar fertilisers, and enhanced shade management strategies. In Kamonyi, cassava production is hindered by soil erosion and low soil fertility. To address these, anti-erosion practices, the combination of organic and inorganic fertilisers, and intercropping methods are suggested. For Bujumbura, where maize and beans are intercropped, pests and soil fertility decline are the major concerns; biopesticides and organic fertiliser combinations are recommended here. In Biega, coffee farming suffers from poor soil fertility, ageing varieties, and pest infestations. Proposed AEPs include biopesticides, anti-erosion measures, organic fertilisers, and the use of cover crops. Meanwhile, in Kabare, coffee growers contend with pest pressure, generally poor crop management, and ageing coffee trees, though specific AEPs were not detailed. Finally, in Uvira, where rice and cassava are cultivated, pests, low soil fertility, and drought pose significant challenges. Solutions focus on biopesticides and the integrated use of organic and inorganic fertilisers. This collective input from farmers highlights the localised nature of agricultural challenges and emphasises the need for context-specific, sustainable solutions.

3.2 AE adoption potential in Cameroon-case of Ntui LL

3.2.1 Overall adoption potential

Results have revealed differentiated overall adoption potential of foliar fertiliser across three agroecological zones in Ntui, Cameroon—namely, the Forest Zone, Transition Zone, and Savanna Zone. The Forest Zone exhibits the highest adoption potential at 88.94%, indicating a strong readiness and favourable conditions for foliar fertiliser use in this region.

This could be attributed to better access to agricultural inputs, higher farmer awareness, or more intensive farming practices. The Transition Zone follows with a substantial 78.42% adoption potential, suggesting moderate but promising conditions for uptake, possibly requiring targeted support to fully realise its potential. In contrast, the Savanna Zone shows the lowest adoption potential at 67.43%, signalling significant barriers—such as limited access to products, lower awareness, or economic

constraints—that may hinder adoption. These differences underscore the importance of zone-specific strategies to promote foliar fertiliser use, with a particular need to address constraints in the Savanna Zone while reinforcing and scaling adoption in the Forest and Transition Zones.

3.2.2 Thematic influence on adoption potential in Ntui

The bar chart (Figure 3) illustrates the adoption potential of foliar fertilisers across three ecological zones—Savanna, Forest, and Transition—based on several influencing factors. Overall, the Forest Zone demonstrates the highest potential for adoption, consistently scoring the highest or near the top in most categories, particularly in community perception, market conditions, dissemination strategy, and the capacity of promoting organisations.

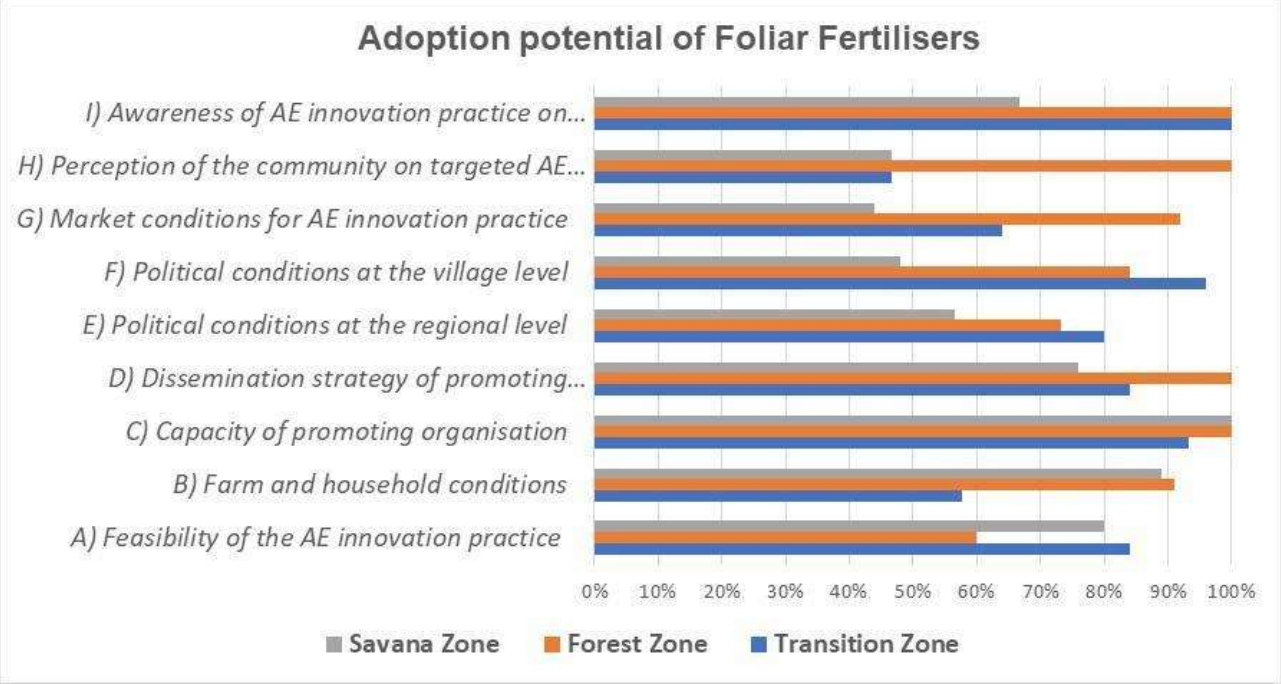


Figure 3: Adoption potential for Foliar Fertilizers in Ntui

The Transition Zone also shows strong potential, especially in areas like political conditions at the village level and the overall feasibility of the innovation practice, indicating a favourable environment for implementation despite slightly weaker market conditions. In contrast, the Savanna Zone generally shows lower scores across most factors, with notable gaps in areas such as community perception, market conditions, and regional political support, which may hinder adoption efforts. All three zones exhibit high awareness of AE innovation practices, suggesting that knowledge dissemination has been broadly successful. However, for the successful implementation and scaling of foliar fertilisers, targeted strategies tailored to each zone's strengths and weaknesses will be essential, focusing on building market and political support in the Savanna Zone, reinforcing existing structures in the Forest Zone, and enhancing market viability in the Transition Zone.

3.2.3 Hindering factors to adoption potential in Ntui LL

The hindering factors affecting Agroecology (AE) adoption across the NtuiLL zones in Cameroon vary significantly by region. In the **Forest Zone**, key barriers are concentrated around limited farmer training, insufficient household labour, lack of media promotion, and inadequate initial support from promoting organisations, including both technical inputs and local networks. The **Savanna Zone** faces the broadest range of challenges, spanning institutional weaknesses (e.g., lack of monitoring and evaluation systems, weak leadership), socio-cultural constraints (e.g., low trust, youth disengagement), poor market access, and unclear land rights. In the **Transition Zone**, the primary issues relate to AE's poor compatibility with existing farming systems, weak social organisation, and the inability of organisations to coordinate with relevant stakeholders. Notably, unclear land rights are a cross-cutting barrier for both the Savanna and Transition Zones, while only the need for repeated training is shared between the Forest and Transition Zones (Table 3).

Table 3: Overview of hindering factors to AE adoption across transition zones in Ntui LL

Hindering Factor Category	Forest Zone	Savanna Zone	Transition Zone
• Need for multiple trainings	✓		✓
• Labour shortage	✓		
• Lack of mass media promotion	✓		
• Lack of inputs/monetary handouts	✓		
• Absence of local support organisations	✓		
• Weak M&E systems		✓	
• Lack of shared vision/trust		✓	
• Social/political/ethnic tensions		✓	
• Lack of supportive government programs		✓	
• Weak government leadership		✓	
• Poor land rights regulation		✓	✓
• Poor market access/structures		✓	
• Lack of stakeholder engagement		✓	
• Youth unwillingness/inadequate job creation		✓	
• Low self-reliance of the target group		✓	
• Lack of entrepreneurial engagement		✓	
• AE not fitting existing systems			✓
• Poor social organisation			✓
• Lack of partner collaboration			✓

Table 3, illustrates the distribution of specific critically hindering factor categories affecting Agroecology (AE) adoption across three ecological zones in the NtuiLL of Cameroon: Forest, Savanna, and Transition. In the **Forest Zone**, technical barriers dominate (40%), followed evenly by institutional, socio-cultural, and policy/governance factors (each 20%), with no significant market or economic challenges reported. The **Savanna Zone** presents a more balanced yet complex challenge profile, with institutional and socio-cultural constraints each accounting for 26.7%, and policy/governance and market/economic factors both at 20%; technical issues are the least represented (6.7%).

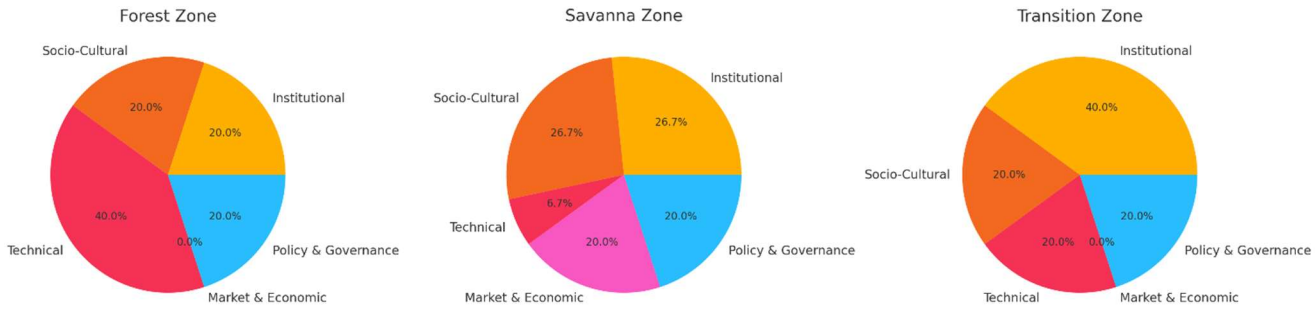


Figure 4: Proportion of hindering factors per type in each region of Ntui LL

In the **Transition Zone**, institutional challenges are the most prominent (40%), while socio-cultural, technical, and policy/governance barriers each account for 20%, and market/economic barriers are absent. Figure 4, highlights regional disparities in constraint types and underscores the need for zone-specific strategies in AE implementation for the Ntui LL.

Figure 5: Photo impression AE adoption potential assessment workshop, Dec. 2024, Ntui

3.3 AE adoption potential in Rwanda-case of Kamonyi LL

Figure 6: Impression for the QAToCA Workshop in Rwanda

3.3.1 Overall adoption potential for Erosion Control Vs intercropping

Figure 7, shows the overall adoption potential of Agroecological (AE) practices - Erosion Control and Intercropping, as assessed by two balanced multi-stakeholder groups during the QAToCA workshop in Kamonyi, Rwanda. For both groups, both AE practices demonstrate high adoption potential, with Group 1 and Group 2 scoring above 80% for each practice. Notably, intercropping shows slightly higher adoption rates than erosion control in both groups, suggesting a strong interest and feasibility for its integration into local farming systems. These results indicate a generally favourable environment for AE uptake in the region

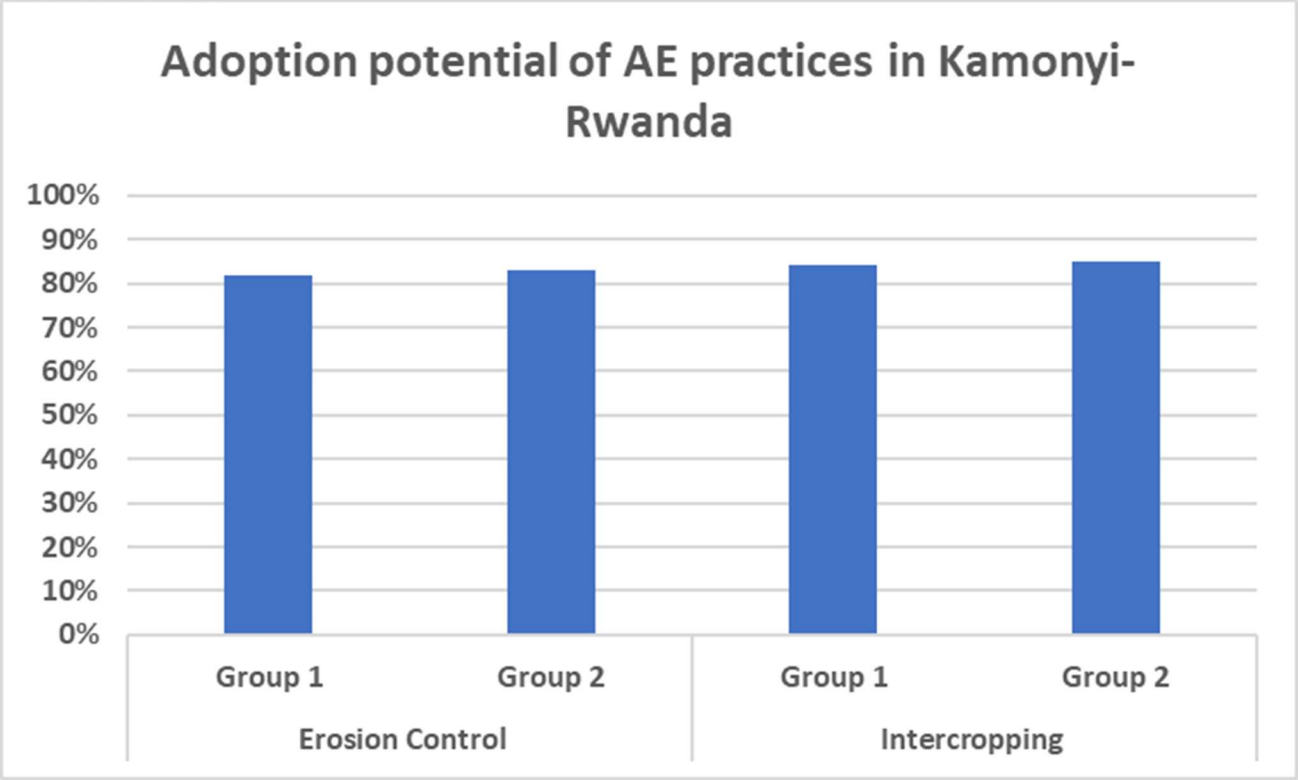


Figure 7: Overall adoption potential of AE practices in Kamonyi LL- Rwanda

3.3.2 Thematic influence on adoption potential - case of intercropping and erosion control in Kamonyi LL

Figure 8, illustrates the combined average scores from both Group 1 and Group 2 across key thematic categories of factors influencing the adoption potential of intercropping practices. The highest-rated factor is political conditions at the village level, indicating strong local governance support for AE initiatives. Other factors with high scores include the dissemination strategy and capacity of the promoting organisation, suggesting that institutional communication and capability are well-recognised by farmers. In contrast, farm and household conditions and market conditions received the lowest scores, highlighting potential constraints at the household level and limited access to viable markets. Overall, while institutional and political environments appear conducive to AE adoption, socio-economic and logistical challenges still pose significant barriers.

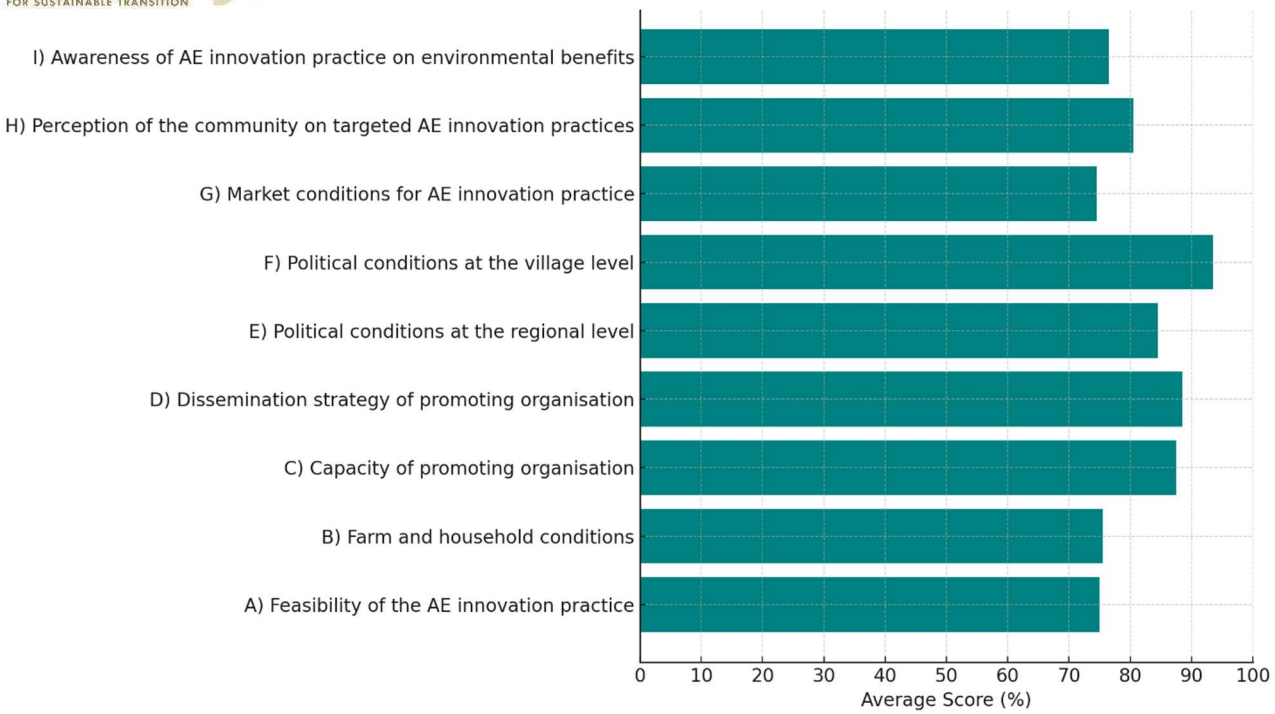


Figure 8: Average scores (Groups 1 & 2) for thematic influence on intercropping adoption in Kamonyi LL – Rwanda

Figure 9 presents combined average scores (from Group 1 and Group 2) for thematic categories of factors influencing the adoption of erosion control practices. The results reveal that institutional strength and governance support are key enablers: the capacity of the promoting organisation (92.5%), dissemination strategy (90%), and political conditions at both regional (89%) and village levels (83.5%) received the highest ratings. These findings suggest that QAToCA workshop stakeholders viewed organisational readiness and policy environment as highly conducive to adopting erosion control measures.

In contrast, more practical and community-level constraints appear to limit adoption. For instance, market conditions (62.5%; Category G) emerged as hindering adoption potential, followed by relatively lower scores in feasibility of the practice (75%; Category A) and farm and household conditions (76.5%; Category B) (Figure 9). This indicates that while structural and administrative support exists, economic incentives, market access, and household-level capacity and technological know-how for the soil erosion control measure remain major challenges.

Overall, these results underscore a strong top-down readiness but highlight the need to strengthen grassroots-level enablers, such as resource accessibility, farmer engagement, technological complexity, and viable market connections, to fully unlock the adoption potential of erosion control practices.

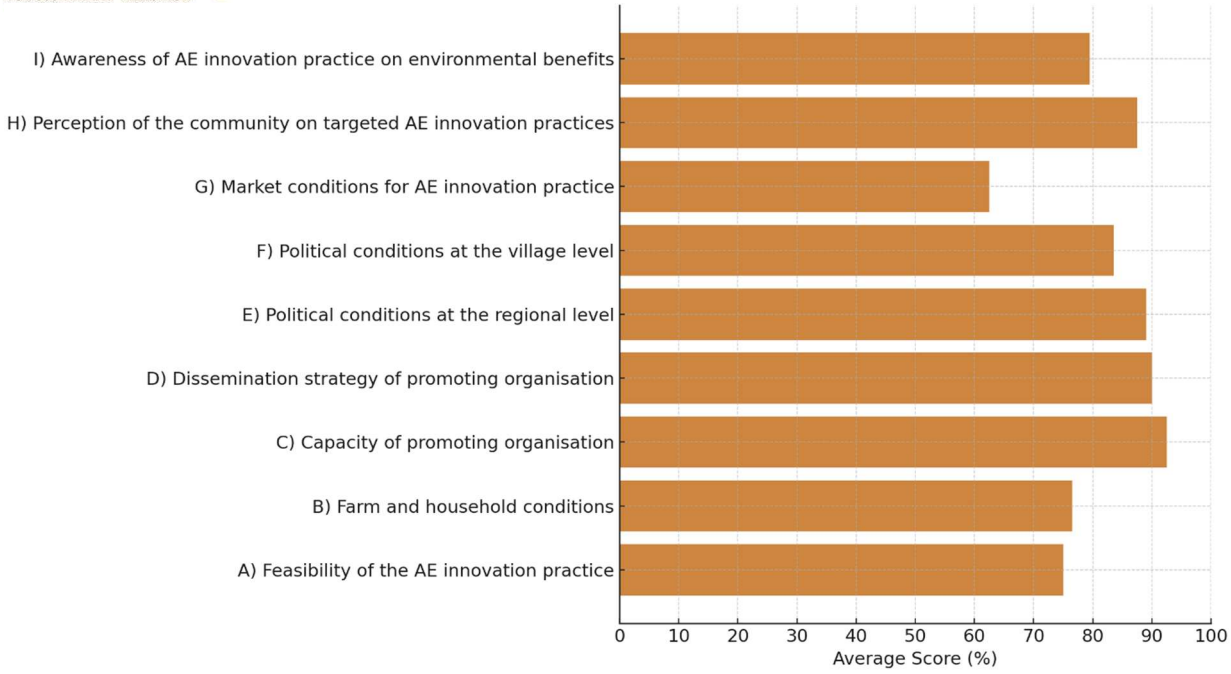


Figure 9: Average scores for thematic influence on erosion control adoption (Groups 1 and 2)

Figure 10, compares the average scores for each thematic category of factors influencing adoption potential between intercropping and erosion control AE practices in Kamonyi. Both practices show high overall support, particularly in organisational capacity, dissemination strategy, and political conditions, indicating strong institutional and governance backing.

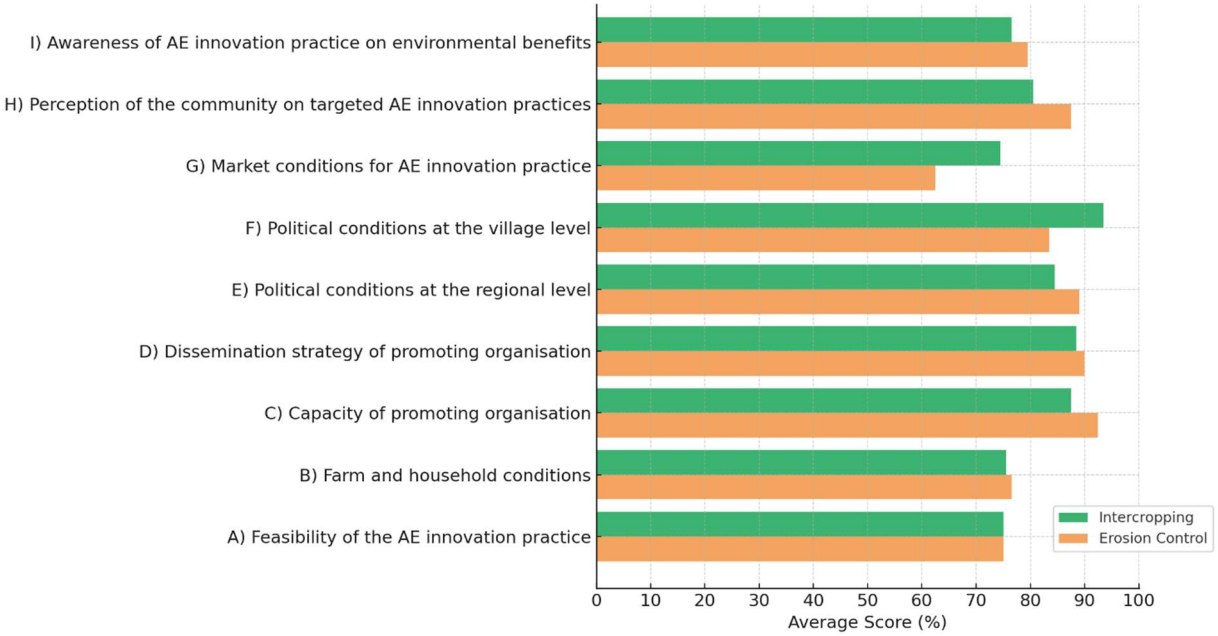


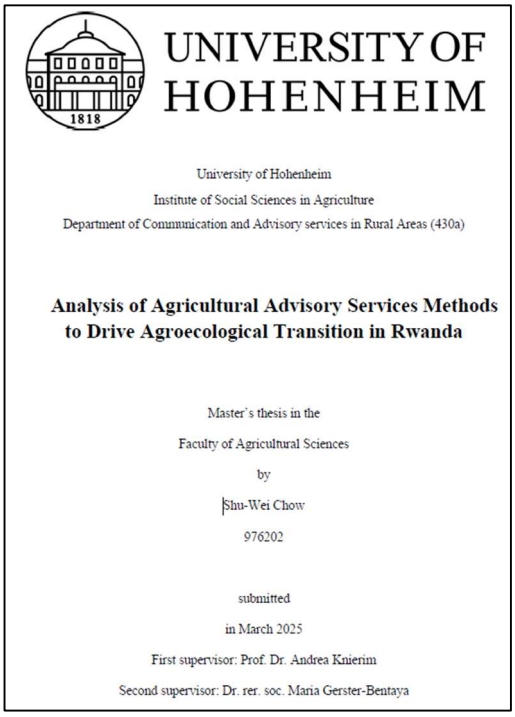
Figure 10: Factors influencing adoption potential between intercropping and erosion control AE practices in Kamonyi

Intercropping leads slightly in political conditions at the village level and community perception, while erosion control has higher scores in organisational capacity, dissemination, and environmental awareness. Notably, market conditions remain the weakest factor for both practices, especially erosion control.

3.3.3 Zoom in MSC topic 1: Agricultural advisory services methods to drive AE transition in Rwanda

Topic: *Analysis of Agricultural Advisory Services Methods to Drive Agroecological Transition in Rwanda, Master's thesis in the Faculty of Agricultural Sciences by Shu-Wei Chow, March 2025*

This MSc thesis aimed to evaluate and show potential to enhance the effectiveness of agricultural advisory service (AAS) methods to support the agroecological transition in Rwanda, with a particular focus on the Kamonyi District. The study explored how AAS can facilitate the adoption of agroecological practices (AEPs) by identifying advisory approaches that align with agroecological principles such as participation, knowledge co-creation, and local relevance. Using a mixed-methods approach—comprising literature review, focus group discussions with farmers, and interviews with advisors and key informants—the research identified that group-based advisory methods, especially farmer-to-farmer learning, demonstrations, and Farmer Field Schools, were most preferred and effective in fostering AEP adoption. Digital tools like SMS, IVR, and USSD were recognised as having high potential for scaling knowledge dissemination, but their effectiveness depends on content co-creation, user literacy, and accessibility. Key observations indicate that adoption of AEPs is positively influenced by advisory methods that encourage participatory learning and are tailored to local conditions. However, adoption is hindered by factors such as top-down content design, limited digital literacy, inadequate infrastructure, and the dominance of input-heavy state-led programs. The study recommends integrating advisory services within farmer groups, prioritising participatory methods, training farmers and advisors in agroecological principles and digital tools, and developing inclusive, demand-driven digital content. These strategies are essential to creating an enabling environment for sustainable agricultural transformation through agroecology in Rwanda.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University of Hohenheim
Institute of Social Sciences in Agriculture
Department of Communication and Advisory services in Rural Areas (430a)

Analysis of Agricultural Advisory Services Methods to Drive Agroecological Transition in Rwanda

Master's thesis in the
Faculty of Agricultural Sciences
by
Shu-Wei Chow
976202

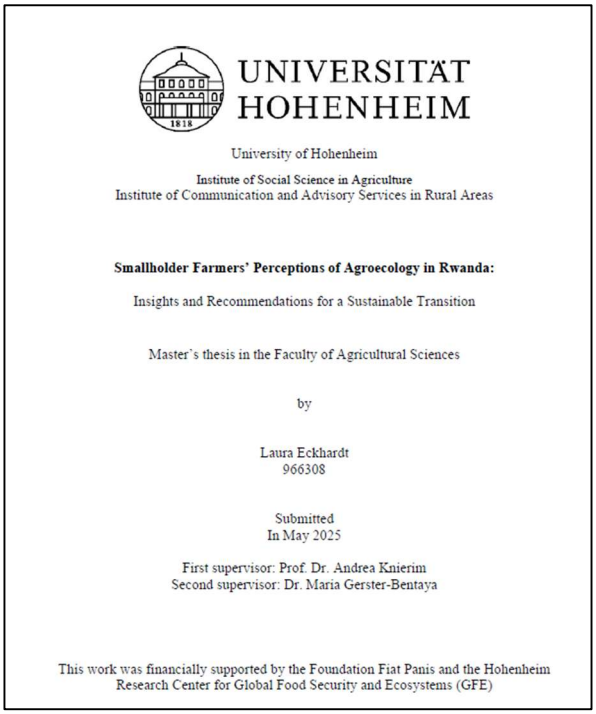
submitted
in March 2025
First supervisor: Prof. Dr. Andrea Knierim
Second supervisor: Dr. rer. soc. Maria Gerster-Bentaya

Figure 11: Front page of Shu-Wei Chow's MSc thesis

3.3.4 Zoom in MSc topic 2: Farmers' Perceptions of Agroecology in Rwanda

Topic: Smallholder Farmers' Perceptions of Agroecology in Rwanda: Insights and Recommendations for a Sustainable Transition Master's thesis in the Faculty of Agricultural Sciences, Laura Eckhardt

This master's thesis investigates smallholder farmers' perceptions of agroecology in Kamonyi, Rwanda, using the CANALLs project as a case study. The research employs a Participatory Rural Appraisal approach to explore how farmers understand agroecology, what challenges they face in adopting it, and what factors support a sustainable agricultural transition. It reveals that while agroecology is often linked to improved productivity, food security, and ecological resilience, its framework remains poorly understood. Findings underscore that participation in Agroecological Living Labs (ALLs) enhances both farmers' comprehension of agroecological principles and their sense of empowerment. Key barriers **include climate change, land scarcity, income instability, and limited access to knowledge, resources, and political support**. Conversely, supportive factors include knowledge exchange, training, community networks, and participatory approaches. The thesis recommends co-creation of knowledge, increased institutional backing, tailored training, and improved access to markets and inputs. The adoption potential of agroecological practices hinges on enabling environments that address systemic constraints and recognise farmers' insights. These findings are crucial for shaping context-specific, farmer-led strategies aligned with the 13 principles of agroecology to guide sustainable transformation across Rwanda.



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University of Hohenheim

Institute of Social Science in Agriculture
Institute of Communication and Advisory Services in Rural Areas

Smallholder Farmers' Perceptions of Agroecology in Rwanda:

Insights and Recommendations for a Sustainable Transition

Master's thesis in the Faculty of Agricultural Sciences

by

Laura Eckhardt
966308

Submitted
In May 2025

First supervisor: Prof. Dr. Andrea Knierim
Second supervisor: Dr. Maria Gerster-Bentaya

This work was financially supported by the Foundation Fiat Panis and the Hohenheim Research Center for Global Food Security and Ecosystems (GFE)

Figure 12: Front page of Laura Eckhardt's MSc thesis

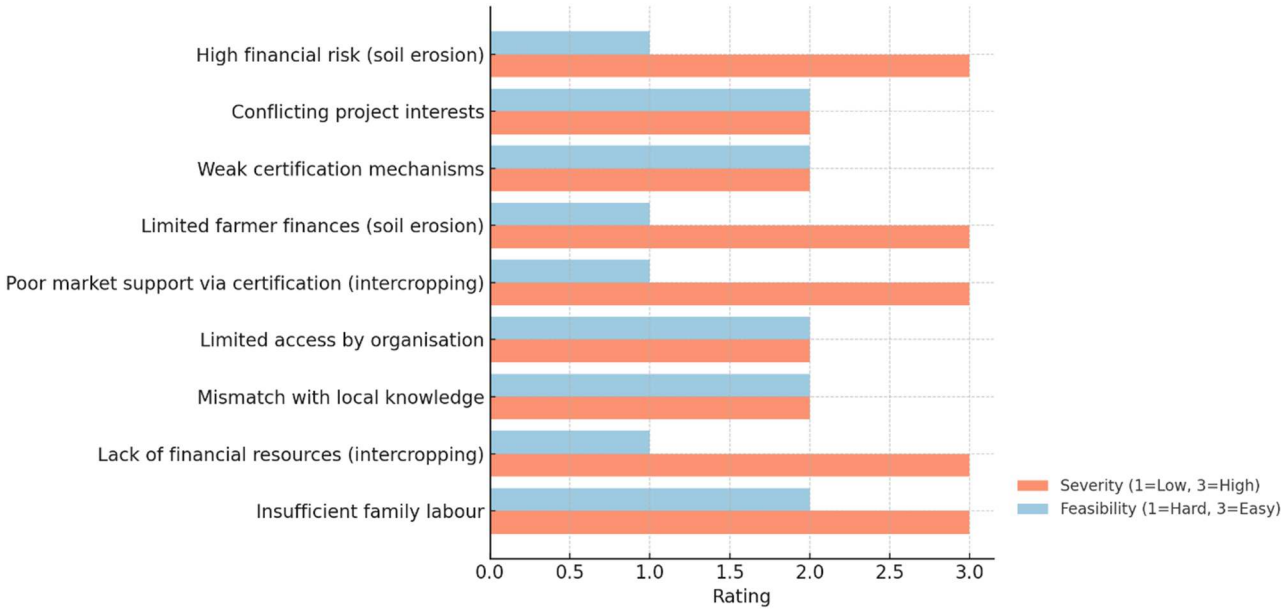

Figure 13: Overview of hindering factors for adoption of AE practices in Kamonyi LL – Rwanda

The above figure (Figure 13) presents a comparative view with regard to the severity and feasibility ratings of various constraints affecting agroecology in Rwanda, particularly the case of intercropping and soil erosion. Each constraint is rated on two scales: Severity (orange bars, where 1 = Low and 3 = High) and Feasibility (blue bars, where 1 = Hard and 3 = Easy). The most severe constraints include High financial risk (soil erosion) and Poor market support via certification (intercropping), both scoring a severity rating of 3.

Figure 14: Picture impressions of the AE adoption potential assessment workshop in Rwanda

However, these same issues are associated with low feasibility, indicating that while they are pressing concerns, they are also difficult to address. Other constraints, such as Weak certification mechanisms, Conflicting project interests, and Limited farmer finances (for affording soil erosion prevention measures), also score high on severity but vary in feasibility. Interestingly, some constraints like Mismatch with local knowledge and Limited access by organisation are rated moderately on both scales, suggesting a balanced challenge. The chart underscores a critical insight: the most severe issues are often the hardest to resolve, highlighting a significant barrier to improving agricultural certification practices and outcomes.

4 Discussion

The adoption potential of agroecological (AE) practices is shaped by a complex interplay of institutional, socio-political, and household-level factors. Assessment workshop results from Cameroon (Ntui Living Lab) and Rwanda (Kamonyi) provide valuable comparative insights into these dynamics, illustrating both enabling conditions and persistent constraints across ecological zones and

AE innovations. While there is widespread awareness of AE principles across both countries, the likelihood of adoption varies significantly by region, zones, and practice type.

Across both case studies, one of the most consistent findings is the strong role played by institutional readiness. Factors such as the capacity of promoting organisations, the effectiveness of dissemination strategies, and supportive political conditions at village and regional levels emerged as key enablers of adoption. In Rwanda's Kamonyi Living Lab, for example, stakeholders rated political conditions, organisational capacity, and communication efforts among the highest, particularly in the case of erosion control practices. Similarly, in Cameroon's Forest Zone, strong community perception, robust promotion strategies, and a relatively enabling market context contributed to a higher adoption potential compared to other zones.

However, these strengths do not automatically translate into widespread adoption. While institutional and governance frameworks are increasingly aligned with AE objectives, the workshops highlighted a range of practice- and zone-specific barriers that prevent AE innovations from taking root at the farm level. In Cameroon, adoption potential follows ecological and institutional lines. The Forest Zone benefits from relatively favourable conditions, while the Savanna Zone presents the most complex challenges, including weak institutions, poor market access, low social trust, and insecure land tenure. The Transition Zone reflects mixed potential, with ongoing coordination challenges and farming systems less compatible with AE innovations. In Rwanda, the adoption potential for both intercropping and erosion control was generally high, but feasibility at the household level remains a concern, particularly regarding access to labour, inputs, and viable markets. Erosion control measures in Rwanda, in particular, faced greater practical limitations despite strong institutional support.

These results illustrate a recurring pattern: the further one moves from policy and organisational levels to the realities of farming households; the more adoption constraints emerge. This underlines the need for multi-level strategies that align institutional readiness with on-the-ground feasibility. Several cross-cutting challenges stand out in both countries:

- Market conditions are consistently rated among the weakest enabling factors. Limited access to viable markets reduces the economic incentive for farmers to invest in AE practices, especially in more marginal areas.
- Training and advisory services remain insufficient. Stakeholders in both settings emphasized the need for more consistent, locally adapted, and repeated training efforts that account for farmers' existing knowledge systems and constraints.
- Institutional coordination is uneven. In Cameroon's Transition Zone, for example, organisations struggle to align their efforts, resulting in fragmentation and inefficiencies. This issue is relevant across both countries, where multi-actor collaboration is essential to support AE transitions.
- Socio-cultural barriers, including low levels of trust, weak farmer organisation, and youth disengagement, particularly affect more vulnerable zones such as Cameroon's Savanna.

In light of these findings, the study points to several strategic implications for more effective AE scaling:

- Interventions should be tailored to specific zones and farming systems. In Cameroon, this may mean strengthening technical support and farmer training in the Forest Zone, improving governance and market linkages in the Savanna, and enhancing coordination mechanisms in the Transition Zone.
- AE practice design should better align with household realities. For example, erosion control in Rwanda could benefit from simplified, more accessible techniques, while intercropping efforts might be expanded by reducing input barriers and reinforcing advisory services.
- Grassroots enablers require targeted investment. Improving land tenure clarity, facilitating access to tools and labour, and creating stronger market incentives are all essential for long-term adoption. Innovative models such as cooperatives or AE product certification may help enhance market returns.

The Master's thesis, integrated in this assessment, further reinforces the importance of participatory approaches. It emphasises that AE transitions are more likely to succeed when farmers are meaningfully engaged, their perspectives taken seriously, and advisory services are co-created to fit their local context. Without such farmer-centred mechanisms, even strong institutional and political support risks remaining disconnected from everyday agricultural realities.

Ultimately, the findings from Cameroon and Rwanda illustrate the dual challenge of agroecological transitions: aligning top-down readiness with bottom-up feasibility. Bridging this gap will require not only institutional commitment and policy coherence but also sustained efforts to understand and support farmers' lived experiences and adaptive capacities.

5 Conclusions

This first version of Deliverable D4.4 demonstrates the utility of the QAToCA framework in showing regional dynamics of adoption potential for AE practices. It confirms that while favourable political and institutional frameworks exist in both Cameroon and Rwanda, the actual uptake of AEPs depends heavily on contextual features. In Cameroon, zone-specific barriers point to the need for differentiated strategies that target institutional gaps in the Savanna Zone, strengthen stakeholder collaboration in the Transition Zone, and reinforce existing momentum in the Forest Zone. In Rwanda, despite strong institutional capacity, constraints related to household economics and market readiness must be addressed to scale promising practices like intercropping and erosion control.

Overall, the findings support the CANALLS project's hypothesis that AE transitions are most viable when enabling conditions at both institutional and community levels are aligned. The QAToCA tool proves valuable not only for assessing adoption potential but also for guiding targeted interventions and adaptive dissemination strategies. Findings further confirm that adoption potential varies significantly by zone and practice. In Cameroon, geographic differences reveal the need for differentiated strategies, while in Rwanda, practice-specific constraints underline the importance of addressing household-level and market-related challenges. Crucially, the results reinforce that enabling conditions must extend beyond policy and institutional readiness. Effective AE scaling requires targeted, context-sensitive interventions that bridge governance structures with the everyday capacities and constraints of farming communities.

In summary, this first application of the QAToCA approach in Cameroon and Rwanda has highlighted its value in capturing the contextual complexity of agroecological adoption. While institutional and political support emerged as strong enablers across both sites, actual uptake depends on how well these align with on-the-ground realities. The QAToCA tool, therefore, offers a practical entry point for improvement by informing possible intervening strategies and signalling where to invest in coordination, training, or market development to support more inclusive and sustainable agroecological transitions.

6 Outlook

As next steps, the University of Hohenheim (UHOH) will undertake the following key actions to ensure the completion and submission of Deliverable D4.4 – final Version (Due for M42):

Finalisation of the AE adoption potential assessment for Burundi: UHOH will continue collaborating closely with local partners in Burundi to finalise the assessment of Agricultural Extension (AE) adoption potential. This includes ensuring full validation of the collected data and its integration according to the Task 4.4 analytical framework.

Finalisation of the AE adoption potential assessment for the DRC: The assessment for the DRC will be completed with a strong focus on harmonising methodologies with those used in previous country studies to maintain analytical consistency. Given the challenging situation on the ground, close and continuous dialogue with the country team will be essential to identify and implement a feasible approach for carrying out this task.

Integration of findings and revision of Deliverable D4.4 (initial Version): Insights and results from the Burundi and DRC assessments will be used to update and enrich the current (initial) version of Deliverable D4.4. The revised version will offer a broader and more comparative perspective on AE adoption across the different countries and Living Labs within the CANALS project.

Finalisation and submission of Deliverable D4.4 (M 42): The final version of Deliverable D4.4 (an improved version of this report) will consolidate findings from all participating countries and will be prepared for submission by Month 42 of the project timeline.

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8 Annex

8.1 Adapted QAToCA assessment statements and scale

A... Object of adoption (Farm/village level)								
	Statement	**Totally agree**	**agreed**	**Partially agree**	**no agreement**	**Not at all in agreement**	**Not sure**	**Comment**
A1	A maximum of two trainings are needed for a correct application of agroecology.							
A2	Household labour is usually sufficient to implement agroecology.							
A3	The benefit of agroecology is easily observable through increased yields on the test plots or on other (neighbouring) fields.							
A4	Agroecology can be tested on a small plot of farmers' fields, partially adopted and extended in stages.							
A5	Agroecology is integrated into the existing agricultural system.							

B...Farm and household characteristics/constraints (Farm/household level)								
	Statement	**Totally agree**	**agreed**	**Partially agree**	**no agreement**	**Not at all in agreement**	**Not sure**	**Comment**
B1	Average farmers have sufficient financial resources to cover the costs of agroecology.							
B2	Existing knowledge of traditional/indigenous agriculture is similar to agroecology.							
B3	The level of social organisation of the community meets the requirements of agroecology.							
B4	Farmers have access to inputs and these are available on the farm.							
B5	Farmers have access to machinery inputs for agroecology.							
B6	No minimum plot size is required to implement agroecology.							
B7	The economic risk of implementing the agroecology is low for farmers.							
B8	The introduction of agroecology leads to the improvement of the social status of farmers.							

C.... Capacity of the implementing institution (Village/regional level)								
	Statement	**Totally agree**	**agreed**	**Partially agree**	**no agreement**	**Not at all in agreement**	**Not sure**	**Comment**
C1	The promoting institution has a clear vision and there is a common strategy to achieve the objectives.							
C2	The promoting organisation has qualified staff (technical and management).							
C3	The organisation's leaders have a good reputation among farmers.							
C4	The promoting organisation has access to existing branches and stakeholders in the target area.							
C5	The promoting organisation has worked in the region before.							
C6	The organisation is able to collaborate with relevant partners and networks (donors, policy makers and researchers).							

D.... Attributes of the dissemination strategy (dissemination) (Village/regional level)								
	Statement	**Totally agree**	**agreed**	**Partially agree**	**no agreement**	**Not at all in agreement**	**Not sure**	**Comment**
D1	The target group and the geographical area of dissemination are carefully identified.							
D2	There is a clear and realistic timetable for the delivery of activities, including an exit strategy.							
D3	Targets and indicators for results are defined and data is frequently collected for monitoring and evaluation (M&E).							
D4	The promotion agency uses existing information channels such as self-help groups, schools, etc.							
D5	Lead farmers were selected to promote agroecology.							
D6	Information on agroecology is provided in a way that is understandable for each target group.							
D7	There is a good relationship between the organisation and the farmers, including a reliable feedback mechanism.							
D8	The promoting organisation enables farmers to become independent after the end of the project.							
D9	The promoting organisation promotes agroecology through mass media, such as radio, television or newspapers.							
D10	The organisation only provides farmers with a minimum package of (technical) inputs and no financial support.							

E.... Policy/institutional framework (context of adoption) Regional level								
	Statement	**Totally agree**	**agreed**	**Partially agree**	**no agreement**	**Not at all in agreement**	**Not sure**	**Comment**
E1	There are no social, political or ethnic conflicts in the project area.							
E2	There are government programmes in place that support the diffusion of agroecology.							
E3	The government encourages adoption through outreach programmes.							
E4	National policies reach the village level through local agricultural agencies.							
E5	Farmers are free to organise themselves into interest groups of their choice.							

F..... Policy/institutional framework at village level (context of adoption)								
	Statement	**Totally agree**	**agreed**	**Partially agree**	**no agreement**	**Not at all in agreement**	**Not sure**	**Comment**
F1	There is a local government with strong leadership that is committed to achieving development goals.							
F2	There are local private organisations that are willing to support the diffusion of agroecology.							
F3	Local customs do not prevent the introduction of agroecology.							
F4	Regulations concerning private and communal land rights are effectively implemented.							
F5	The settlement pattern allows extension workers easy access to farmers.							

G..... market conditions for products and inputs (adoption context) Village/regional level								
	Statement	**Totally agree**	**agreed**	**Partially agree**	**no agreement**	**Not at all in agreement**	**Not sure**	**Comment**
G1	Local market structures exist to absorb the increased production created by agroecology.							
G2	The market facilities are easily accessible to farmers at any time of the year.							
G3	Other service providers are interested in introducing and adopting agroecology.							
G4	The farm to market routes are accessible all year round.							
G5	Services are available to help farmers meet certification standards.							

H..... Community perception of agroecology (Adoption topic) Village/regional level								
	Statement	**Totally agree**	**agreed**	**Partially agree**	**no agreement**	**Not at all in agreement**	**Not sure**	**Comment**
H1	Project activities do not interfere with the other interests of non-adopters.							
H2	Agroecology is accepted and supported by the village leaders.							
H3	Young farmers benefit from the income opportunities created by agroecology.							
H4	Women farmers benefit from the income opportunities created by agroecology.							
H5	Individual farmers are autonomous and able to contribute financially and/or physically to the promotion of agroecology.							
H6	Community members are already involved in business activities and have experience in general farm management.							

I....Knowledge of the role of agroecology on other benefits (Village/regional level)								
	Statement	**Totally agree**	**agreed**	**Partially agree**	**no agreement**	**Not at all in agreement**	**Not sure**	**Comment**
I1	Farmers are aware of the benefits of agroecology under climate change conditions.							
I2	Farmers are aware of the potential yield gains of agroecology.							
I3	The first benefits of practising agroecology are seen in the short term.							
I4	The introduction of agroecology does not increase the pressure on natural resources.							