CANALLS
AGROECOLOGICAL PRACTICES FOR SUSTAINABLE TRANSITION

D2.5. Methodology for co-creating optimal agroecological practice combinations- final version

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Executive Summary

This deliverable presents a critical evaluation of the co-creation framework initially proposed in CANALLS Deliverable D2.1, drawing on two years of implementation across six Agroecological Living Labs (ALLs) in sub-Saharan Africa. During those two years, one full cycle of co-creation was completed in the six ALLs. Rather than offering a definitive final version, this report consolidates field-based insights and proposes targeted adjustments to enhance the framework's future application, scalability, and impact. The core four-phase structure— (i) identifying challenges and defining objectives, (ii) prototyping solutions, (iii) designing of field experimentation, and (iv) planning for scaling—proved broadly appropriate and was consistently implemented across the ALLs. However, several refinements are needed to strengthen effectiveness and scientific rigor while preserving participatory integrity.

Key recommendations include:

- **Scientific oversight:** Assigning a dedicated scientific person per ALL to oversee field experimentation, ensure quality control, and guide data interpretation.
- **Experimental design:** Guaranteeing a minimum of treatments, number of replications and applying quality control protocols to improve the robustness of trials.
- **Capacity building:** Strengthening training for stakeholders, particularly in data interpretation using scientific reasoning, to mitigate misinterpretation or bias.
- **Workshop facilitation:** Differentiating between high-cost and field-based workshops, promoting cost-efficiency, and equipping facilitators with participatory methods.
- **Participation and ownership:** Encouraging self-funded participation from NGOs, private sector, and government actors, and clarifying cost-sharing expectations early on to foster ownership.
- **Monitoring and evaluation (M&E):** Integrating structured, participatory M&E tools at the ALL and project levels. Emphasis is placed on defining indicators early and exploring low-cost, low-bias data collection alternatives beyond surveys.
- **Digital and AI tools:** Exploring the use of AI-supported tools to improve workshop design, facilitation, data collection, results validation and stakeholder engagement.

These recommendations aim at enhancing the methodology's efficiency, scientific rigor, and alignment with the principles of participatory innovation. By preserving its participatory approach while addressing operational and analytical challenges, the evidence-based recommendations provide a foundation for future initiatives relying on co-creation.

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List of Terms and Definitions

Table 1: Terms and Definitions

Abbreviation	Definition
ANOVA	Analysis of Variance
AEP	Agroecological Practice
ALL	Agroecological Living Lab
CANoLL	CANALLS Network of Living Labs
CRD	Completely Randomized Design
CP	Core Partners
DRC	Democratic Republic of Congo
RCBD	Randomized Complete Block Design
SE	Standard Error
SH	Stakeholder
SDI	Stakeholder Diversity Index
WP	Work Package
WS	Workshop

1. Introduction

1.1. Purpose of Deliverable D2.5

Deliverable D2.5 is an outcome aimed at presenting the final version of the CANALLS methodology for co-creating optimal combinations of agroecological practices. It builds on the initial framework developed in Deliverable D2.1 (M12; attached document), which outlined the conceptual design and co-creation principles.

This report reflects a refined framework developed through two years of implementation and testing across six Agroecological Living Labs (ALLs). Specifically, it:

- Reports deviations from the original framework observed during field application.
- Presents the results of the first co-creation cycle, evaluated for functionality and effectiveness of the ALLs as a platform for co-creation.
- Provides an intercomparison among ALLs.
- Provides recommendations for refinement in the framework.

Deliverable D2.5 is the main outcome of Task 2.1 (Methodology design) within Work Package 2. It is directly connected to Work Package 3, Task 3.3 (Implementation of the framework in the ALLs), which provided the practical basis for testing and refining the methodology. It:

- Demonstrates how the co-creation framework was operationalized across diverse ALL contexts.
- Evaluates its applicability and limitations using data from workshops, experimental trials, surveys, and stakeholder feedback.
- Contributes to CANALLS' overarching aim of enabling agroecological transitions through participatory innovation and multi-actor engagement.

1.2. Structure of the Report

The report is organized in six sections and annexes as below:

- **Section 2** presents a recap of the original methodology from Deliverable D2.1, including key principles and initial design.

- **Section 3** outlines how the methodology was implemented across the five ALLs, including the support provided, roll-out sequence, and deviations or adaptations from the initial framework.

- **Section 4** provides a comprehensive evaluation of implementation performance in each ALL, organized under two dimensions: Structural Functionality and Coordination,

and Achievement of Expected Outcomes. It includes both quantitative indicators and qualitative insights.

- **Section 5** synthesizes cross-ALL challenges and lessons learned from both co-creation workshops and field experiments.
- **Section 6** presents the key enhancements to the initial framework.
- **Annexes** provide supporting documentation.

2. Recap of the Initial Methodology (D2.1)

2.1. Objectives of the Framework

Deliverable D2.1 (submitted in M12) introduced the CANALLS methodology for co-creating optimal combinations of AEPs. The aim was to provide the ALLs with a participatory, stepwise approach to identify, design, and optimize AEPs adapted to local conditions. This initial framework offered both conceptual guidance and practical tools to ensure that innovation efforts were co-owned by farmers, researchers, and other local actors.

2.2. Conceptual Foundations

The methodology was grounded in the recognition that agroecological transitions are complex, requiring not only technical solutions but also institutional, organizational, and behavioral change. Co-creation was defined as a collaborative process involving farmers, researchers, value chain actors, government institutions, NGOs, and others in joint problem diagnosis, solution design, and field testing.

Rather than promoting externally imposed solutions, the framework emphasized stakeholders-led innovation to enhance legitimacy, relevance, and adoption. Facilitation and governance were identified as critical to managing diverse perspectives, balancing power dynamics, and ensuring inclusive representation.

Sustainability of the process itself was also a core principle for the design; co-creation platforms were envisioned to continue functioning independently beyond the lifespan of CANALLS.

2.3. Co-creation Process

The methodology proposed a four-step process (see Figure 1):

- **1. Identify the Challenge and Define Objective.** This phase focuses on problem diagnosis and establishing the purpose of the co-creation process. During the first

workshop, stakeholders collaboratively define the local agroecological challenges of the focus crop(s) to address and set the objectives for the ALL.

- **2. Prototype Solutions and Plan Experiments.** The second phase is dedicated to defining the AEPs to be tested. In the second workshop, and follow up meetings with stakeholders, prototype AEPs are developed and experimentation methods are agreed upon. Practical planning includes selecting sites, assigning responsibilities, and defining and developing the required tools for experimentation and data collection.
- **3. Evaluate Prototypes in the Field.** During this phase, experiments are implemented and monitored. Field visits, data collection, and joint reviews help assess the performance of AEPs.
- **4. Analyze results and plan next steps and co-creation cycle.** Based on evaluation results, stakeholders develop strategies for scaling successful AEPs and initiate a new cycle of co-creation. The third workshop supports adoption planning and defines next steps, promoting continuity, institutional integration, and long-term impact of the ALL.

This phased structure allows for adaptive, stakeholder-led innovation processes that connect practical experimentation with broader system transformation goals.

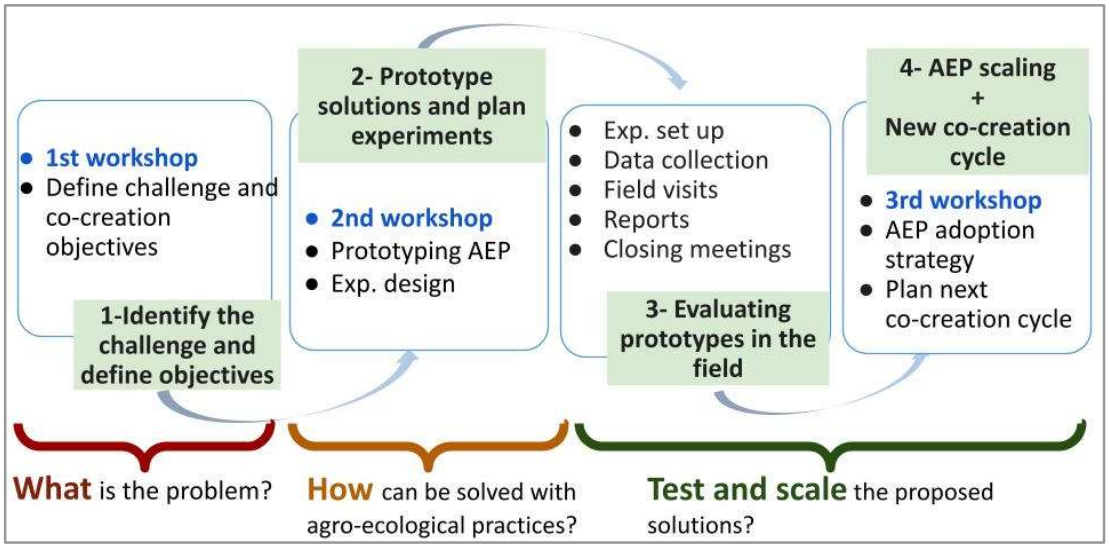

Figure 1. Conceptual structure of the CANALLS co-creation framework. Diagram illustrating the four phases of co-creation and their links to AEP development and evaluation.

2.4. Strategy for Sustainability and Exit

Beyond the stepwise process, D2.1 placed strong emphasis on the long-term sustainability of the ALL platforms. The framework recognized that co-creation requires mid- to long-term commitment and risks losing momentum once project funding ends. To address this, several strategic measures were proposed:

- Planning from the outset for handover of governance and financing to local actors (farmers' organizations, cooperatives, local research and extension systems).
- Building capacity among facilitators and stakeholders, including training on facilitation, coordination, monitoring, and evaluation.
- Developing ownership and governance structures within the ALLs that empower local stakeholders to manage the process independently.
- Embedding monitoring and evaluation mechanisms to assess efficacy (results achieved), efficiency (resources vs. outputs), and sustainability (capacity to continue beyond CANALLS).

Together, these components aimed to ensure that the co-creation framework was not only a research tool but also a durable innovation platform, capable of driving agroecological transitions beyond the lifespan of the project.

3. Implementation of the Methodology in the Six ALLs: Deviations and Refinements

3.1. Support Package for Implementation

Each Agroecological Living Lab (ALL) was provided with a harmonized implementation package to facilitate the operationalization of the co-creation methodology. This included:

- A guidance document outlining the sequencing of workshops and field activities.
- PowerPoint templates to standardize presentations across sites.
- Printed handouts summarizing objectives and background materials.
- Workshop agendas tailored to local context and timing.
- Ongoing support through coordination calls with the Task 3.3 lead.
- Joint facilitation of workshops by the methodology designer (Task 2.1) and the Task 3.3 leader in about 50% of ALLs.

An example of the complete support package used in the Ntui ALL is provided in attachment to this report.

3.2. Sequential Roll-out and Iterative Refinement

The implementation followed a phased approach where Ntui (Cameroon) was the first ALL to apply the methodology due to favorable seasonal timing and readiness of local stakeholders. As the pilot site, it enabled practical testing of materials and activities. Lessons learned were then used to improve the package while applying it to the other ALLs.

This adaptive approach allowed continuous refinement, ensuring that tools and processes were tailored to the diverse contexts of the five ALLs while maintaining overall methodological coherence.

3.3. Timeline of Co-creation Activities

Steps 1 and 2 were completed in all ALLs within four months (Figure 2). Implementation then advanced into Step 3 (implementation of the experimental phase), although contextual challenges influenced the pace and scope of activities.

In the Democratic Republic of Congo (DRC) ALLs, armed conflict disrupted the implementation process halfway through Step 3. This led to the cancellation of field visits in groups with ALL's stakeholders, the abandonment of some trial plots, and a reduced quality and quantity of data collection. Nevertheless, all ALLs succeeded in completing the co-creation cycle; Step 4 with the 3rd co-creation workshop.

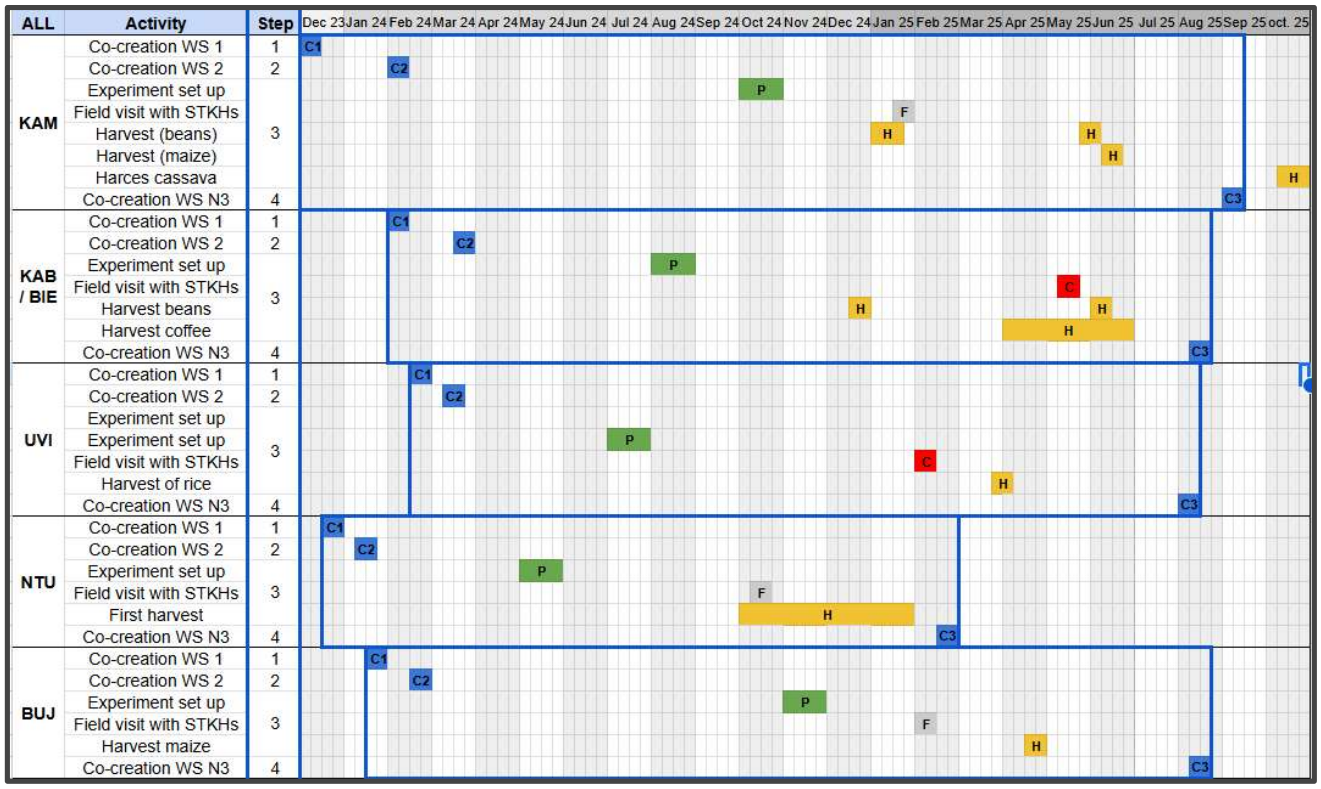

Figure 2. Calendar of co-creation activities in the ALLs. ***C1–C3 = co-creation workshops 1 to 3, P = experiment setup/planting, F = field visits with stakeholders, H = harvest, C = canceled visits in DRC ALLs.***

3.4. Adjustments in the ALL Landscape

While CANALLS originally envisaged eight ALLs, adjustments were made during implementation:

- **Ntui (Cameroon)** – first ALL to implement the methodology, serving as a pilot for iterative refinement, completed one co-creation cycle.
- **Kamonyi (Rwanda)** – completed one co-creation cycle.
- **Bujumbura (Burundi)** – completed one co-creation cycle.
- **Kabare/Bieaga (DRC)** – The Biega and Kabare ALLs were combined due to contextual similarities, geographic proximity, and the need to optimize resources (both financial and human). We are now on call this ALL Kabare-Biega – completed one co-creation cycle.
- **Uvira (DRC)** – completed one co-creation cycle.

In contrast:

- **Giheta (Burundi)** was never intended as a co-creation site, but rather as an example of a well-developed value chain.
- **Bunia (DRC)** was excluded from co-creation activities from the outset, due to persistent insecurity linked to M23 rebels' activity.

3.5. Deviations from the Initial Framework

The implementation process broadly followed the steps outlined in Deliverable D2.1. However, several deviations were observed:

- **Security-related limitations in DRC:** Despite conducting all major workshops and experimental phases, conflict restricted stakeholder visits and compromised data quality in some cases.
- **Consolidation of two ALLs**: Biega and Kabare were merged to reduce logistical complexity and align stakeholder engagement strategies as both ALLS are holding coffee-based systems.
- **Exclusion of two ALLs from activities of this deliverable:** Bunia and Giheta were excluded from the activities of deliverable D2.5 due to security issues in Bunia and scope redefinition for Giheta.
- **Absence of the originally proposed feedback mechanism (see figure 3) with broader farmer populations.** D2.1 envisioned a structured system to connect workshop outputs with broader farmer communities. However, because it requires more resource than it was budgeted and more facilitation capacity than it was planned, this feedback loop was not implemented in any of the ALLs. The lack of this connection limited the representativeness of decisions and slowed potential diffusion of the practices beyond workshop participants.

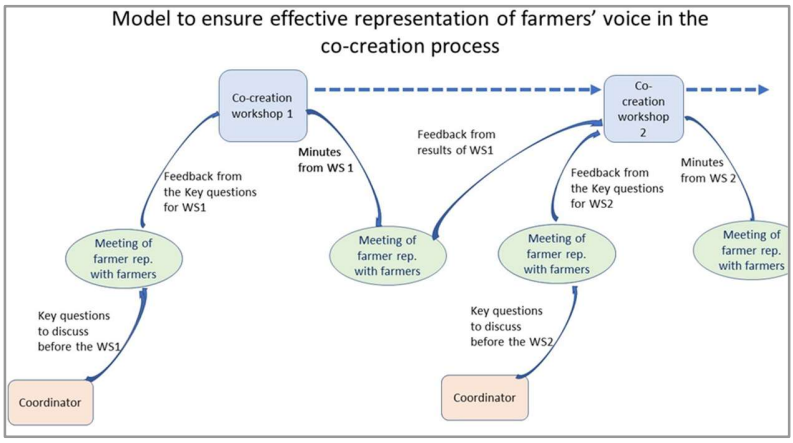

Figure 3. Proposed communication approach to ensure that the voice of farmers is brought to the workshops and that they then get feedback from the discussion and conclusions that happened on it.

- **Underdeveloped sustainability and transition strategies.** The original methodology emphasized planning for sustainability from the outset, including governance transition, local financing, and capacity building. While these issues were nominally included in monthly coordination calls and in the agenda of Workshop 3, no ALL produced a concrete sustainability plan. Discussions around sustainability were often deprioritized in favor of urgent logistical and technical matters. As a result, continuity beyond the project timeline remains uncertain across ALLs, and no clear exit or handover strategy was put in place up to date (M36) and no training of coordination and facilitation were conducted.

Despite these deviations, all five ALLs, active regarding D2.5, completed one cycle of the co-creation methodology.

4. Implementation Insights from the ALLs

4.1. Overview of Evaluation Approach

This section evaluates how the CANALLS co-creation framework functions in the five D 2.5-active ALLs.

- Structural Functionality and Coordination: Investigates how effectively ALLs included and engaged stakeholders, coordinated tasks, and maintained governance.

- Achievement of Expected Outcomes: Assesses the relevance and quality of co-created agroecological practices (AEPs), stakeholder benefits, and scientific robustness.

To address the complexity and diversity across ALLs, a participatory, mixed-methods evaluation approach was used, blending self-assessment and cross-evaluation techniques. Data were collected from:

- Reports from three co-creation workshops per ALL.
- Individual and stakeholder-group surveys at the end of the co-creation cycle (co-creation workshop #3).
- Individual surveys to ALL coordinators and task leaders, assessing participation, coordination, and perceived ownership.
- Individual surveys are sent via google forms and paper to representatives of each stakeholder group after the completion of the co-creation cycle.
- Descriptive data from experimental trials and financial reporting.
- Survey to researchers that participated in a session where each ALL represented the activities and results of the 1st cycle of co-creation. This session was the first activity of the CANoLL platform.

Indicators, both qualitative and quantitative were adapted from validated frameworks in participatory research and innovation systems. Quantitative metrics were standardized to a 0–1 scale for comparability.

Statistical analyses followed a dual approach:

- Kruskal–Wallis tests were applied to ordinal indicators (e.g., Likert-scale responses), suitable for comparing medians across groups without assuming normality.
- One-way ANOVA was used for continuous variables to test mean differences across ALLs, assuming normal distribution and homoscedasticity.
- For indicators constructed with >1 metric or variable measured, values were averaged and for calculation of the combined standard errors we used:

  $SE_{combined} = \sqrt{((SE_1^2 + SE_2^2 + ... + SE_n^2)/n)}$.

4.2. Structural Functionality and Coordination

This section evaluates how well each ALL functioned structurally and how effectively coordination was managed across key governance dimensions. It draws from a combination of stakeholder surveys, coordinator feedback, workshop records, and project monitoring data.

The analysis focuses on the following indicators, which will be presented in more detail below:

- **Stakeholder Diversity:** Alignment of participant composition with targeted representation across stakeholder groups.
- **Multi-stakeholder Participation:** Depth and breadth of engagement from different stakeholder groups.

- **Active Farmer Involvement:** Level of participation and commitment from farmers as central actors.
- **Ownership by ALL Stakeholders:** Perception of co-ownership and capacity for independent continuation.
- **Stakeholder Relationships:** Emergence of new collaborative and trust-based relationships.
- **Coordination Quality:** Effectiveness across leadership, communication, financial management, and decision-making inclusive

4.2.1. Stakeholder Diversity

Stakeholder diverse participation is essential for co-creation. The CANALLS framework prioritized farmer inclusion while encouraging participation from government, academia, civil society, and value chain actors.

To assess diversity, we developed a Stakeholder Diversity Index (SDI), comparing workshop composition against a target:

- At least 33% farmers
- Remaining 67% equally distributed among six categories: government, academia, research, civil society, NGOs, value chain actors

Deviation from this ideal reduced the base score. A coverage ratio (R) was calculated to reflect the number of stakeholder categories present. The final score was computed using:

Score = BaseScore × R^k, where k = 5

Fewer than six categories resulted in lower scores. Final SDI was averaged across the three workshops.

Key Results:

- ANOVA showed significant differences across ALLs (p=0.004).
- Uvira had the highest scores; Bujumbura the lowest.
- Figure 4 presents the SDI per ALL, averaged across workshops. Disaggregated workshop-level data and ANOVA are included in Annex I

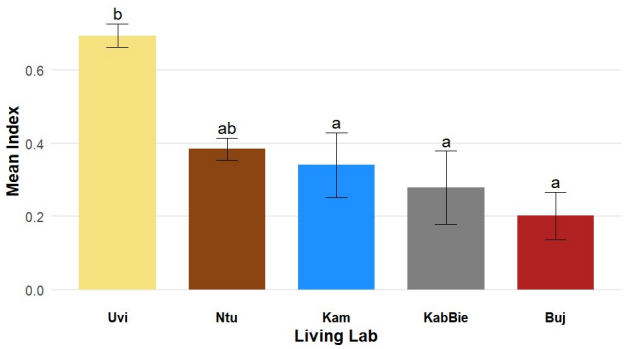

Figure 4. Mean Diversity Index per Living Lab (SDI) averaged across workshops for each ALL in CANALLS.

Bar chart comparing stakeholder composition alignment relative to target proportions for farmers, government, academia, NGOs and value-chain actors across each ALL.

4.2.2. Multi-stakeholder Participation

Multi-stakeholder participation reflects the extent to which different stakeholder groups were actively involved in co-creation processes, beyond simple presence (reflected in 4.2.1). The previous indicator (Stakeholder Diversity) assesses the presence, this one the active participation and influence on ALL activities.

To assess this dimension, we constructed a composite indicator that captures the extent and quality of participation by different stakeholder groups. The indicator integrates data from four distinct sources:

- Individual stakeholder surveys: In this survey the stakeholders representing different groups expressed how they perceived their inclusiveness, and influence over decisions.
- Cross-evaluation survey in the 3rd co-creation workshop. Stakeholder groups in the workshop rated the level of participation of other groups, enabling triangulation and correction of self-bias.
- Survey to ALL coordinators. In this survey sent to all ALL coordinators, they assessed how actively each stakeholder group within their ALLs contributed to discussions, decision-making, and follow-up actions.
- Survey to task leads. The leads of each task within CANALLs project and directly interacting with stakeholders of each ALL, provided an external assessment of the quality and regularity of stakeholders' groups engagement over time.

Each stakeholder group received a separate score per metric. The overall participation score for each group was calculated by averaging the four metric scores. The ALL-level score was then calculated as the average of all stakeholder group scores within that ALL.

Key Findings:

- Kamonyi scored the highest in this indicator, and Kabare/Biega the smallest (Figures 5 and 6).

- Kabare-Biega and Uvira showed more fragmented participation, with some groups (notably farmers and civil society) feeling underrepresented or disengaged during decision-making phases.
- Burundi's ALL presented moderate scores, with strong individual engagement but lower coordination-level assessments of inclusivity.

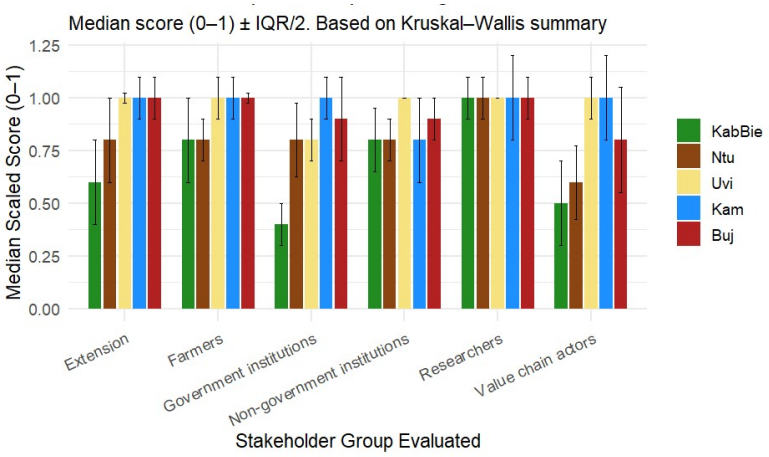

Figure 5. Stakeholder group participation ratings per ALL.

Bar plot summarizing the cross-evaluated of the participation levels of distinct stakeholder groups in each ALL.

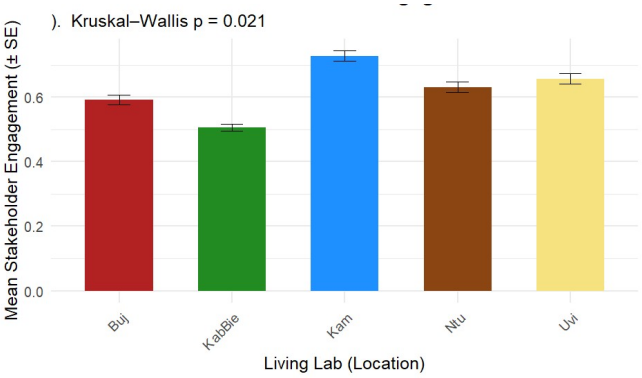

Figure 6. Composite scores of multi-stakeholder participation per ALL.

Comparative chart of participation indicator values (0-1 scale) by ALL, reflecting depth of engagement across groups.

4.2.3 Active Farmers' Involvement

Farmers meaningful engagement in co-creation processes is essential for the relevance, applicability, and eventual adoption of agroecological practices. Beyond presence, active involvement entails farmers actively participating in discussions, interpreting results, and influencing decisions. While this criterion is partially embedded within the 2 previous criteria (4.2.1 and 4.2.2) we created this due to the reliance of farmers as a key stakeholder group.

This indicator captures both quantitative and qualitative aspects of farmer participation through two complementary metrics:

- Proportion of farmer participants in each co-creation workshop, calculated against the ideal target of 33%. This measures whether the intended representativeness was met. Standardized proportion:
    - Target proportion = 33% farmers.
    - If observed ≥ 0.33 → score = 1.
    - If observed < 0.33 → score = observed ÷ 0.33.
- In the 3rd co-creation workshop, all the participants were surveyed individually. For this metric we used the responses from farmers, to rate their level of agreement with the following statement: "I am very committed to the activities and success of the LV."

Key Findings:

- Kabare/Biega and Kamonyi had a relatively low standardized participation of farmers in workshops, in terms of attendance. Kabare/Biega consistently also had the lowest scores for self-reported commitment of farmers on the ALL (Figures 6 and 7). As such, these two had the lowest scores for the composite indicator of active farmer involvement in the co-creation process across ALLs (Figure 8)

- Ntui, Uvira, and Kamonyi achieved the highest scores, consistently meeting or exceeding the 33% farmer participation target and receiving strong feedback from farmers on their role in interpreting results and shaping experimental designs.

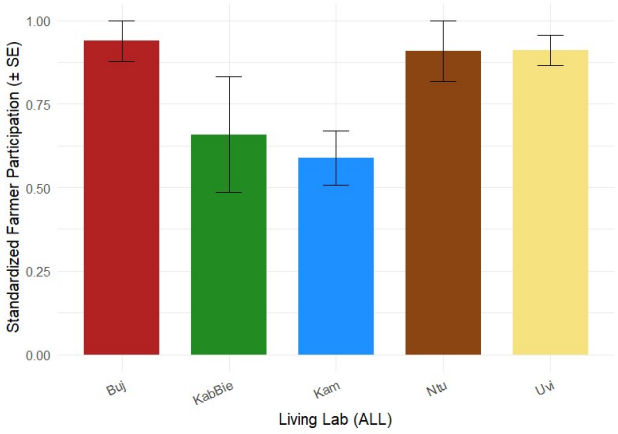

Figure 7. Mean proportion of farmer participation in co-creation workshops across ALLs.

The indicator represents the average share of farmer participants relative to the ideal target of 33% across all three co-creation workshops per Living Lab.

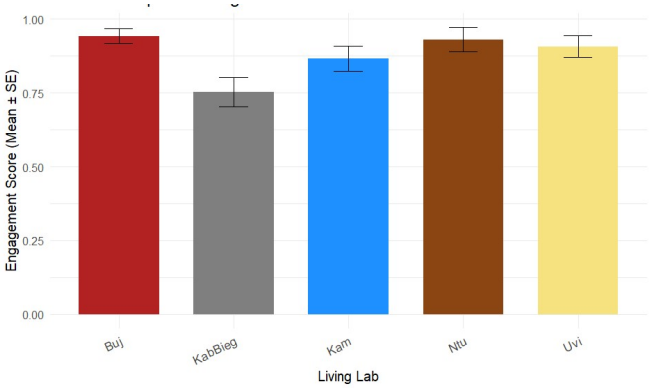

Figure 8. Farmer commitment to ALL activities across ALLs.

Average level of agreement (on a 0–1 scale) with the statement "I am very committed to the activities and success of the Living Lab," based on individual surveys conducted with farmers during the third co-creation workshop. This indicator reflects the perceived engagement and ownership of the process by farmer participants.

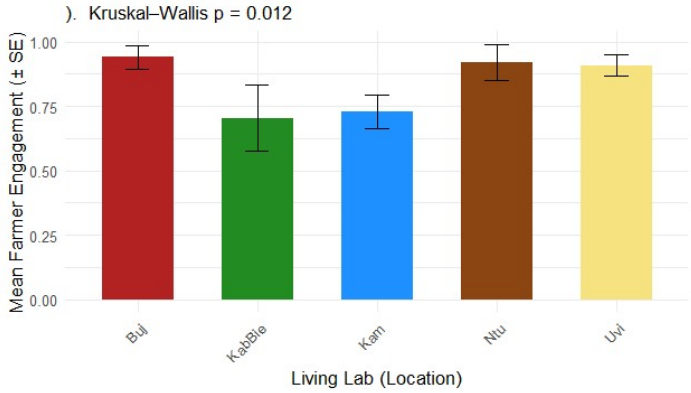

Figure 9. Composite indicator of active farmer involvement in the co-creation process across ALLs.

This figure integrates two metrics: farmers' proportion in workshop attendance (relative to the ideal 33% target), their self-reported commitment to the ALL's success, all standardized on a 0–1 scale. It provides a comparative view of how effectively farmers were engaged across ALLs.

4.2.4 Ownership by ALL Stakeholders

Ownership promotes self-organization, strengthens institutional embedding, and reduces dependency on external support (e.g., facilitation, financial, governance). Ownership is as such, essential for ALL sustainability.

This indicator reflects whether different stakeholder groups perceive themselves as co-owners of the activities, decisions, and processes implemented within the ALL. Ownership implies that actors feel responsible for the outcomes, see the process as legitimate, and are willing to lead or sustain the work beyond the duration of the project.

The metric was based on a survey of task leaders of the project, who were asked: *"Do you believe the Living Lab has taken ownership of this task to the extent it could lead or replicate it in future cycles without your leadership?"*. We collected feedback for 13 tasks from different work packages where tasks were completed and or well advanced in implementation.

Key Findings:

- Ntui stands out with the highest perceived ownership (0.58), followed by Kamonyi (0.46). In these ALLs, task leaders reported relative confidence in the ALL's ability to manage co-creation cycles independently of external support (Figure 10).
- Bujumbura, Uvira, and Kabare/Biega scored similarly, reflecting relatively lower levels of ownership, with stakeholders still reliant on more external support.

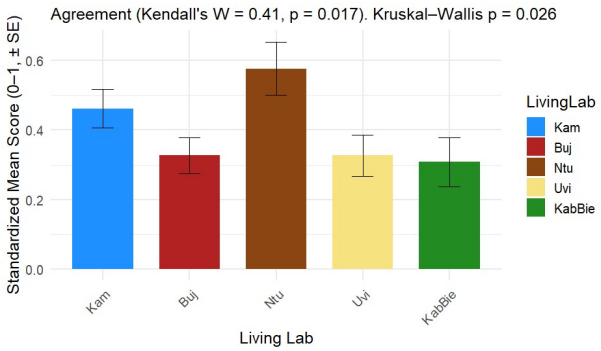

Figure 10. Perceived ownership of tasks

Based on task leaders' agreement with the statement: "Do you believe the Living Lab has taken ownership of this task to the extent it could lead or replicate it in future cycles without your leadership?"

4.2.5 Linkages and Synergies

Establishing synergies with existing initiatives can improve efficiency, reduce duplication of efforts, and enhance the scaling potential of agroecological innovations. Strong linkages also help embed ALL activities within local and national systems, reinforcing institutional sustainability.

This indicator assesses the degree to which each ALL was able to align with, complement, or integrate into other ongoing initiatives, projects, or institutional programs.

Data were collected through the ALL-coordinator survey (Question 6), which asked: *"What is the degree of linkage or synergy between ALL activities and existing initiatives? Please describe any such linkage."*

Responses were reviewed and evaluated based on the depth, breadth, and strategic alignment of reported linkages. Each ALL received a raw score from 0-1, reflecting:

- The number of linkages,
- Their relevance to agroecological innovation and system change,
- Whether linkages were strategic (e.g., policy platforms, national programs) or operational (e.g., shared logistics, data).
- The scoring was conducted by the task 2.1 lead to ensure consistency across ALLs.

Key Results:

- Kamonyi achieved the highest score due to robust and well described linkages with national agroecological programs, local government extension services, and existing innovation platforms.
- Kabare-Biega and Ntui demonstrated good alignment with ongoing development and research initiatives, including shared activities and resources.
- Uvira and Burundi presented limited evidence of synergies.

Table 2. Degree of linkage and synergy with existing initiatives across ALLs.

Scores reflect the extent to which each ALL aligned with or integrated into ongoing programs or projects. Evaluation was based on reported partnerships' strategic importance, relevance to agroecology, and operational depth. Scores range from 0 (no synergy) to 1 (strong synergy).

ALL	Score
Kabare Biega	0.6
Ntui	0.6
Uvira	0.2
Bujumbura	0.2
Kamonyi	0.8

4.2.6 Coordination of the ALL

Coordination refers to the effectiveness with which ALL leads managed the co-creation process. It encompasses leadership, communication, financial oversight, support for task delivery, and inclusiveness in decision-making. These functions form the governance backbone of participatory platforms and are essential for delivering results in a timely, transparent, and accountable manner.

Strong coordination ensures clarity of roles, responsiveness to challenges, and balanced participation across stakeholder groups. Without it, even well-designed co-creation frameworks may fail during implementation

Coordination – Leadership

- ❖ Metric 1 for leadership; Risk Management

The ability to navigate uncertainty and adapt to unforeseen issues is essential in multi-actor settings. Effective risk management demonstrates proactive leadership and builds stakeholder trust. This metric assesses the perceived capacity of ALL leadership to identify and manage risks or unexpected challenges during the co-creation process.

Data were collected through a stakeholder group survey during the third co-creation workshop (WS3). Participants reacted to the statement: *"The ALL leadership was effective in identifying and managing risks and unexpected challenges encountered during LVA activities."*

Key Results:

- Kruskal-Wallis tests low statistical significance of the comparison among ALLs for this metric; p=0.127.
- Uvira and Bujumbura received slightly higher ratings than the rest, indicating that stakeholders perceived leadership in these ALLs as proactive and responsive to challenges.
- Kamonyi and Ntui also performed strongly, though with slightly wider confidence intervals.
- Kabare-Biega, while still above 0.70, scored comparatively lower.

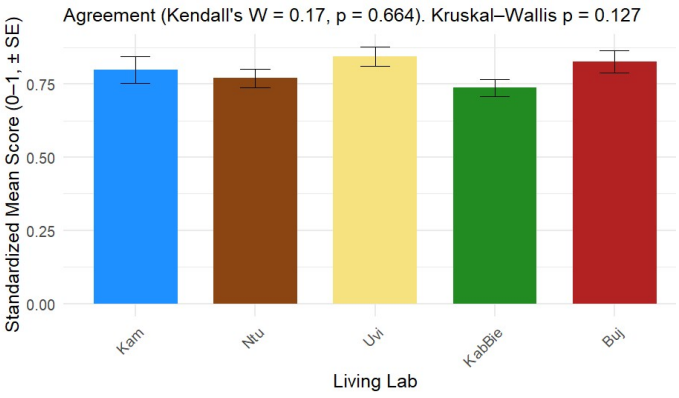

Figure 11. Perceived effectiveness of ALL leadership in risk and challenge management.

Average rating of stakeholder agreement in workshop 3 surveys, with the statement: "ALL leadership was effective in identifying and managing risks and unexpected challenges encountered during LVA activities." Ratings were standardized to a 0–1 scale.

❖ Metric 2 for Leadership: Conflict Management

In multi-actor platforms, conflict is expected due to differing priorities, institutional backgrounds, and power asymmetries. The ability of the coordination team to address tensions constructively is essential for sustaining inclusive engagement and mutual trust. This metric evaluates how effectively each ALL managed and resolved conflicts during the co-creation process.

Data were collected through individual surveys conducted during the third co-creation workshop (WS3). Participants reacted to the statement: *"ALL effectively manages and resolves conflicts among stakeholders or other types of disputes."*

Key Results:

- Uvira recorded the highest score, suggesting that conflict resolution processes were well-facilitated and positively perceived by stakeholders (Figure 12).
- Kamonyi and Ntui also received strong scores, indicating that local coordination teams were generally effective in navigating disputes.
- Kabare-Biega and Bujumbura scored notably lower, potentially reflecting either unresolved tensions or less proactive engagement with emerging conflicts.

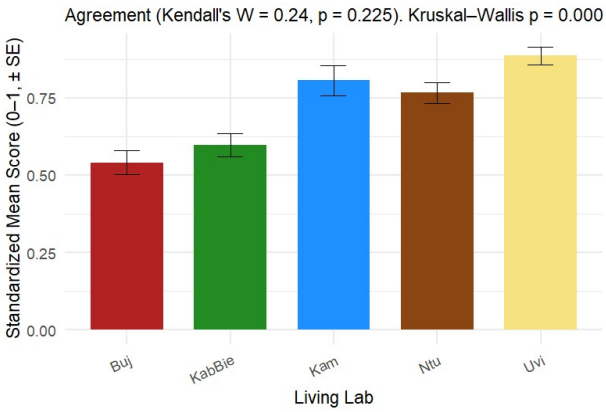

Figure 12. Perceived effectiveness of conflict management by ALL leadership.

Average stakeholder ratings from individual surveys in Workshop 3 in response to: "ALL effectively manages and resolves conflicts among stakeholders or other types of disputes." Scores were standardized to a 0–1 scale.

❖ Metric 3 for Leadership: Engaging Stakeholders

The ability to engage diverse stakeholders and guide them toward a shared vision and common objectives is a key governance function in co-creation processes. It reflects both strategic facilitation and the inclusiveness of decision-making. This metric evaluates how effectively ALL coordination teams mobilized stakeholders and fostered collective direction.

Data were collected through individual surveys conducted during the third co-creation workshop (WS3). Participants responded to the statement: *"ALL engaged stakeholders and put in place mechanisms for them to reach a shared vision and common objectives."*

Key Results:

- Uvira received the highest score (Figure 13). Bujumbura and Ntui also scored highly, suggesting well-structured engagement mechanisms and a strong sense of shared purpose.
- Kamonyi and Kabare-Biega performed slightly lower, though still well above 0.80, indicating consistent but slightly more variable perceptions across stakeholders.

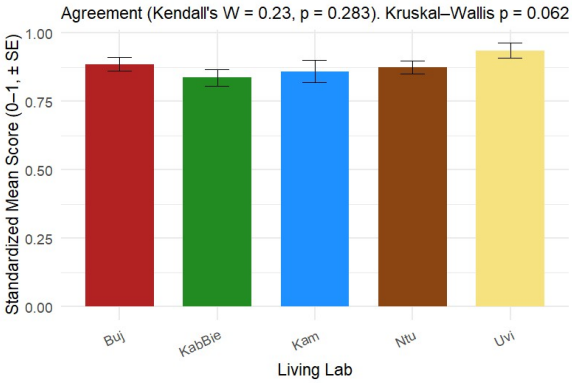

Figure 13. Effectiveness of stakeholder engagement by ALL coordination teams.

Average rating of stakeholder agreement in Workshop 3 surveys, based on the statement: "ALL engaged stakeholders and put in place mechanisms for them to reach a shared vision and common objectives." Ratings were standardized to a 0–1 scale.

❖ Metric 4 for Leadership: Feedback Integration

In participatory innovation processes, the ability to collect, process, and integrate feedback is central to adaptive governance. It ensures that diverse stakeholder voices inform the evolution of co-creation activities, increasing legitimacy and responsiveness. This metric evaluates how effectively the ALL-coordination teams captured and acted upon stakeholder feedback.

Data were collected through individual surveys conducted during the third co-creation workshop (WS3). Participants responded to the statement: "*ALL effectively gathered feedback from stakeholders, processed it, and integrated it into the project*."

Key Results:

- Uvira emerged with the highest score, suggesting that feedback loops were active and integrated into planning (Figure 14). Bujumbura also performed well.
- Ntui, Kabare-Biega and Kamnyi, while slightly lower, still showed solid results, indicating functioning, but perhaps weaker feedback integration mechanisms.

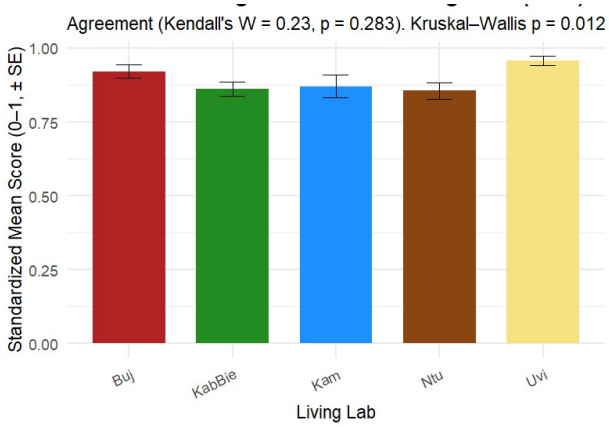

Figure 14. Stakeholder perceptions of feedback integration in ALL coordination.

Average rating of stakeholder agreement during Workshop 3 surveys with the statement: "ALL effectively gathered feedback from stakeholders, processed it, and integrated it into the project." Responses were standardized to a 0–1 scale.

❖ Leadership Composite Score

To assess the leadership capacity of the ALL-coordination teams, we constructed a composite indicator based on four governance metrics: (1) risk management, (2) conflict management, (3) stakeholder engagement, and (4) feedback integration.

Key findings:

- Uvira emerged with the highest leadership score, reflecting strong performance across all four sub-metrics. Kamonyi and Ntui also performed consistently well, with scores above 0.83.
- Bujumbura and Kabare-Biega, while slightly lower, still demonstrated solid leadership (Figure 15).

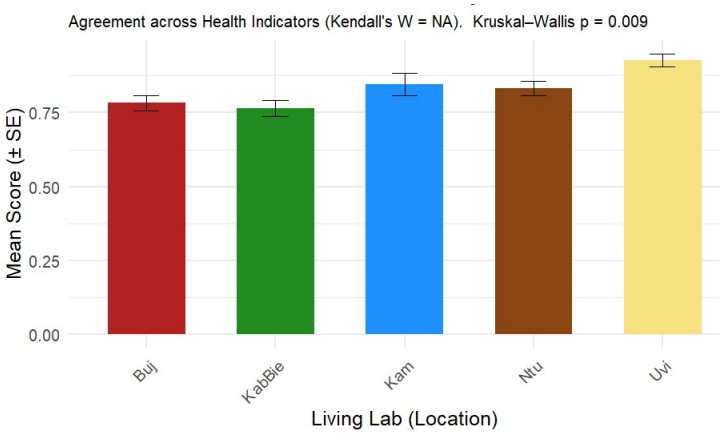

Figure 15. Composite leadership scores across ALLs.

Aggregated score based on four governance metrics: risk management, conflict management, stakeholder engagement, and feedback integration. Each score is derived from stakeholder perceptions in Workshop 3 and standardized to a 0–1 scale. The composite represents the average of all four sub-metrics with propagated standard errors.

Coordination – Partners and Stakeholders Communication

Effective communication between ALL coordination and stakeholders ensures clarity of roles, alignment of actions, and meaningful exchange of knowledge. This metric evaluates the ability of the ALL-coordination team to organize, inform, and engage stakeholders around tasks-level and platform-wide activities.

Two complementary data sources were used.

- Survey to tasks leads; respondents rated the effectiveness of coordination in organizing and communicating activities with stakeholders for each task.
- Stakeholder Survey (WS3); respondents evaluated whether the ALL "enabled all stakeholders to stay informed and promoted the sharing of expertise and knowledge."

Key Results:

- Ntui recorded the highest communication score (0.86), reflecting strong information flows (Figure 16). Uvira followed with a high score (0.81).
- Bujumbura and Kamonyi received mid-range scores (0.76 and 0.75), indicating generally effective communication with some variability.
- Kabare-Biega scored lowest (0.72), suggesting less consistency in communication practices across stakeholders and tasks activities.

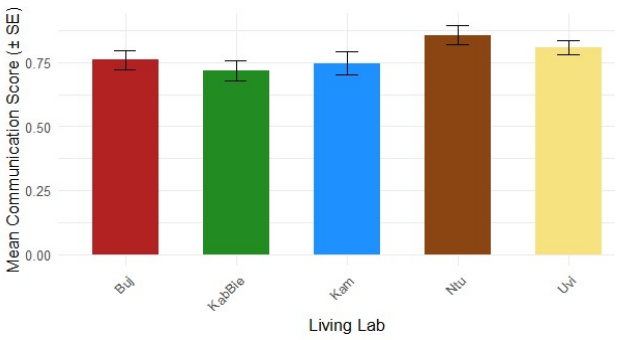

Figure 16. Composite communication scores

Average of two metrics evaluating communication effectiveness: task-level coordination (Task Leads Survey) and stakeholder engagement in information flow and knowledge sharing (WS3 Stakeholder Survey). Scores were standardized to a 0–1 scale and combined using propagated standard errors to assess performance across ALLs.

Coordination – Financial Oversight

Timely and transparent management of financial resources is a key function of effective coordination. It ensures that planned activities are adequately funded and executed as expected, while reinforcing accountability among partners. This metric assesses how well coordination teams mobilized and managed financial resources across ALL activities.

This metric integrates data from two sources:

- Task Leads Survey. Focused on whether coordination teams organized financing effectively, in alignment with the grant agreement (timely disbursement and collaboration).
- Stakeholder Survey (WS3) – Focused on whether resources were mobilized efficiently and in time for implementing ALL activities.

Key Results:

- Kamonyi, Uvira, and Ntui showed relatively strong financial coordination (scores ~0.70), suggesting reliable and timely resource mobilization Figure 17).
- Kabare-Biega (0.56) and Bujumbura (0.52) received relatively low scores, reflecting perceptions of delayed disbursement or difficulties in financial coordination.

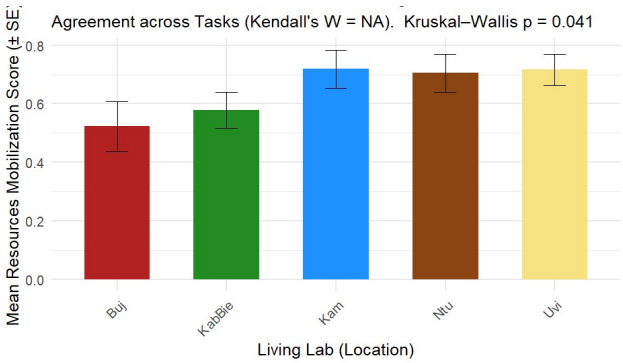

Figure 17. Financial oversight and resource mobilization.

Composite score from task leads and WS3 stakeholder surveys on timely and efficient coordination of financial resources.

Coordination – Coordination of Task Activities

Beyond planning and funding, coordination teams must ensure that day-to-day activities are synchronized, and directed toward deliverables. This metric captures the perceived effectiveness of the ALL-coordination teams in facilitating timely and high-quality delivery of task outcomes.

This metric was derived from the task leads' surveys, where respondents answered the question: *"To what extent did the Living Lab coordination facilitate the achievement of this task's deliverables on time and quality?"*

Key results:

- Ntui achieved the highest score (0.8), indicating that coordination strongly supported the execution of deliverables of the different tasks (Figure 18).
- Kamonyi and Uvira scored in the mid to low scores, suggesting reasonably effective but potentially uneven support across tasks.
- Bujumbura and Kabare-Biega received lower scores, pointing to possible challenges in task synchronization or support for tasks implementation.

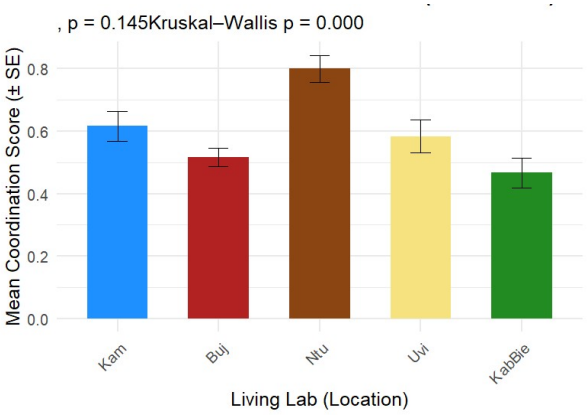

Figure 18. Effectiveness of coordination in delivering task outcomes.

This figure presents the average ratings from task leads on the question: "To what extent did the Living Lab coordination facilitate the achievement of this task's deliverables on time and quality?" Ratings were standardized to a 0–1 scale, and reflect perceptions of operational alignment, execution support, and synchronization across activities for each ALL.

Coordination – Power balance

Ensuring equitable influence over decisions is critical for meaningful co-creation. When all stakeholder groups have equal opportunity to shape priorities, practices, and decisions, the process becomes more democratic, inclusive, and responsive. This metric captures the extent to which diverse actors felt they could influence key decisions across the co-creation cycle.

This composite indicator was constructed from two data sources:

- Stakeholder Group Survey (WS3). Assessed perceived influence of stakeholder groups across four key decisions: problem definition, practice selection, experimental design, and interpretation of results.
- Individual Stakeholder Survey (WS3). Respondents evaluated whether the ALL *"Ensured that all stakeholders had an equal opportunity to influence decisions and access resources."*

Key results:

- Uvira scored highest (0.96), reflecting strong perceptions of fairness and equal influence in decision-making (Figure 19). Bujumbura also performed relatively strong.
- Kamobyi, Kabare-Biega and Ntui received slightly lower, but still high scores.

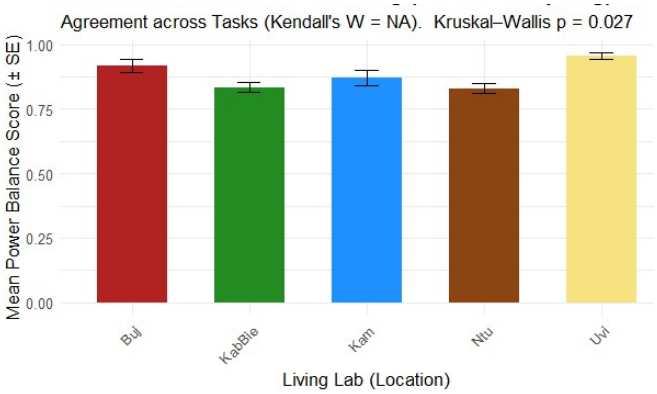

Figure 19. Perceived balance of power among stakeholder groups.
Composite score based on WS3 survey data assessing equal opportunity to influence decisions and access resources across four decision-making stages. Scores were standardized to a 0–1 scale.

Summary of Coordination Performance

Coordination was assessed through a composite index integrating six sub-indicators: leadership, partner–stakeholder communication, financial oversight, activity coordination, stakeholder engagement, and power balance.

- Uvira achieved the highest composite coordination score (0.67), followed by Ntui (0.64) and Kamonyi (0.61). These ALLs consistently demonstrated strong performance across most coordination functions, with notable strengths in leadership, communication, and inclusive decision-making.
- Kabare-Biega (0.52) and Bujumbura (0.55) scored lower, particularly in operational and financial aspects, although they showed strengths in power balance and stakeholder engagement.

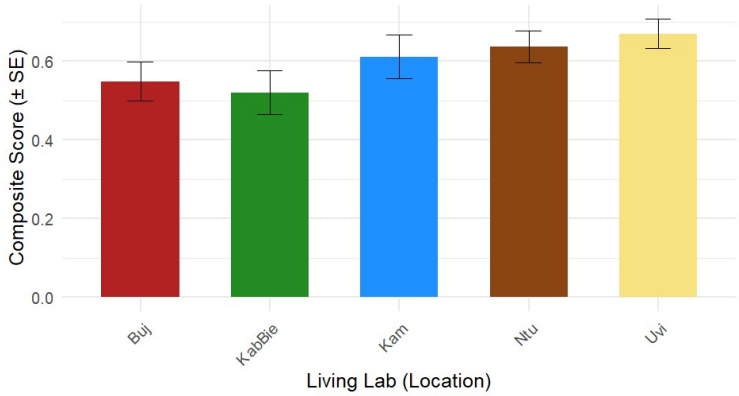

Figure 20. Composite coordination score across ALLs.
Aggregated indicator combining six dimensions of coordination quality: leadership, communication, financial oversight, activity coordination, stakeholder engagement, and power balance.

4.2.7 Overall Structural Functionality and Coordination

We assessed the institutional structure and coordination quality of each ALL using six equally weighted indicators. These indicators evaluate how well each ALL was organized, inclusive, and capable of facilitating participatory processes, focusing on the configuration and functioning of co-creation platforms, rather than their outcomes. While not direct measures of effectiveness, they offer insight into the enabling conditions that may shape an ALL's ability to deliver results in later phases.

- Ntui emerged as the top performer (0.63; Table 3, Figure 23), with particularly strong scores in coordination, farmer participation, stakeholder ownership, and linkages with other projects or initiatives, suggesting a well-structured and effectively coordinated platform (Figure 21).
- Kamonyi (0.58) and Uvira (0.58) followed closely. Kamonyi scored well across most indicators, but underperformed in two critical areas: farmer participation and stakeholder ownership. Uvira stood out across most indicators but showed lower scores for ownership and external linkages.
- Kabare-Biega (0.49) and Bujumbura (0.47) ranked lowest. Kabare-Biega scored relatively high on linkages but showed consistently low scores across the remaining indicators. Bujumbura achieved the highest score for farmer participation but performed poorly across all other dimensions, indicating limited institutional depth despite strong grassroots engagement.

While each ALL showed particular strengths, these patterns reveal structural gaps that could influence future effectiveness.

These results must be interpreted with caution. Most indicators rely on self-reported data from stakeholders and coordination teams. While these perspectives offer valuable insights into participatory dynamics, they are susceptible to bias, whether intentional or due to limited visibility into broader coordination structures. Therefore, while the composite scores are helpful for comparing coordination capacity across ALLs, they should not be viewed as absolute evaluations of institutional performance. Their reliability depends on the quality and context of stakeholder perceptions.

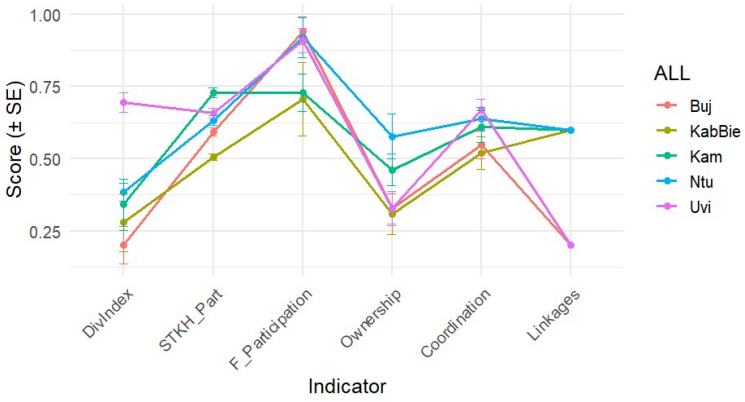

Figure 21. Comparison of ALLs across indicators of structural functionality and coordination. Composite scores across six indicators. Scores reflect normalized averages based on self-reported data from coordination teams and stakeholders, standardized to a 0–1 scale.

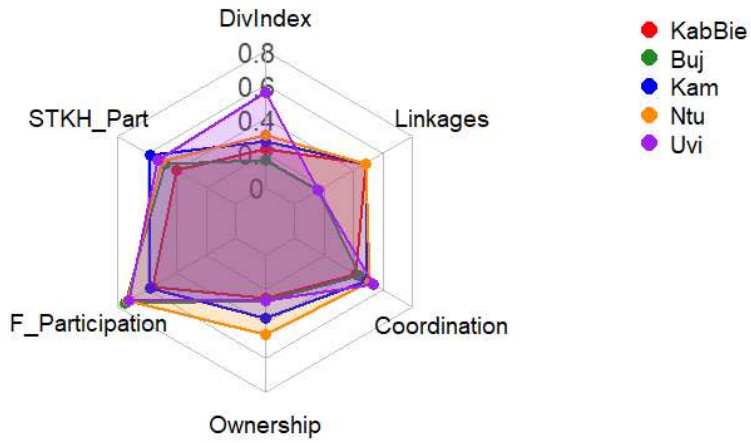

Figure 22. Comparison of ALLs across indicators of structural functionality and coordination (spider chart format). Composite scores across six indicators. Scores reflect normalized averages based on self-reported data from coordination teams and stakeholders, standardized to a 0–1 scale.

Table 3. Average and composite standard error of the 6 indicators to evaluate the structural functionality and coordination

ALL	Overall_Mean	N_Indicators	SE_Overall
Buj	0.468	6	0.11662050
KabBie	0.486	6	0.06765214
Kam	0.578	6	0.06232900
Ntu	0.625	6	0.07024060
Uvi	0.576	6	0.10707601

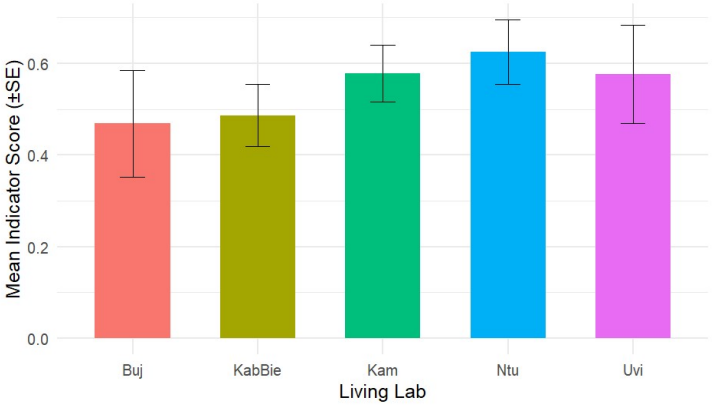

Figure 23. Composite scores of structural functionality and coordination indicators by ALL. Mean composite scores across all seven indicators Values reflect standardized averages (0–1 scale) from stakeholder and coordination team data.

4.3. Achievement of Expected Outcomes

This section evaluates the extent to which the co-creation process achieved its intended outcomes across the five ALLs. It shifts the focus from structural functionality (assessed in previous section) to the co-creation outputs. Specifically, it examines whether the co-creation efforts produced relevant, scientifically robust, and actionable information and/ or AEPs, and whether they delivered tangible and intangible benefits to stakeholders. The evaluation again relies on stakeholder surveys, triangulated across multiple indicators, to assess the success of the co-creation cycle in meeting its goals. Four outcome indicators were analyzed:

- **Creation of adapted AEPs.** Were locally tailored agroecological practices successfully co-designed through the participatory process?
- **Relevance of selected challenges and practices.** Were the results from the experimental phase considered valuable and practical by farmers and stakeholders?
- **Usefulness and adoptability of experimental results.** Were the results from the experimental phase considered valuable and practical by farmers and stakeholders?
- **Scientific rigor of the experimentation.** Was the experimental work methodologically robust and analytically sound?

An integrated index summarizing performance across all outcome dimensions was calculated. Together, these provide a multidimensional picture of the results achieved by the ALLs.

4.3.1 Co-creation of locally adapted AEPs

Locally adapted AEPs are essential for ensuring that innovations are relevant, effective, and sustainable across diverse contexts. This indicator evaluates the extent to which stakeholders and scientific evaluators perceived the project as successful in co-creating such locally adapted AEPs.

Two data sources were used to build this indicator:

- Individual stakeholder surveys (WS3): Participants were asked, *"Do you think the project was successful in creating agricultural practices adapted to your region?"*
- Scientific evaluator surveys: Conducted during the final co-creation session, scientists were asked to rate the "Relevance of experimental objectives" and whether they clearly responded to key challenges identified in Step 1 of the process.

Key Findings:

- Bujumbura emerged with the highest overall score (0.84), reflecting alignment between stakeholder perceptions and scientific evaluation. Kamonyi, Ntui and Uvirea followed very closely.
- Kabare-Biega received the lowest score (0.68), with alignment on the lowest scores between stakeholder perceptions and scientific evaluation.

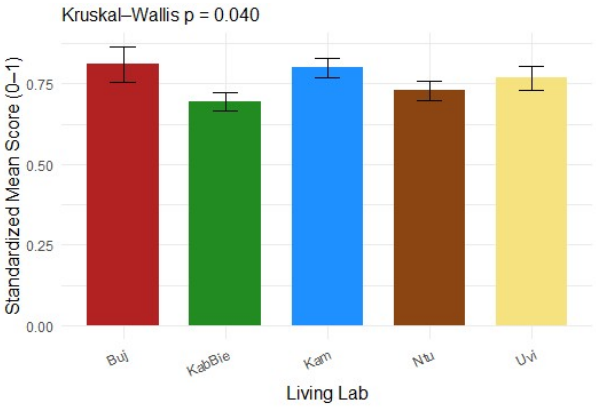

Figure 24. Stakeholder perception of the relevance of co-created practices.
Average rating from individual WS3 survey responses to: "Pensez-vous que le projet a réussi à créer des pratiques agricoles adaptées à votre région ?" Scores were standardized to a 0–1 scale.

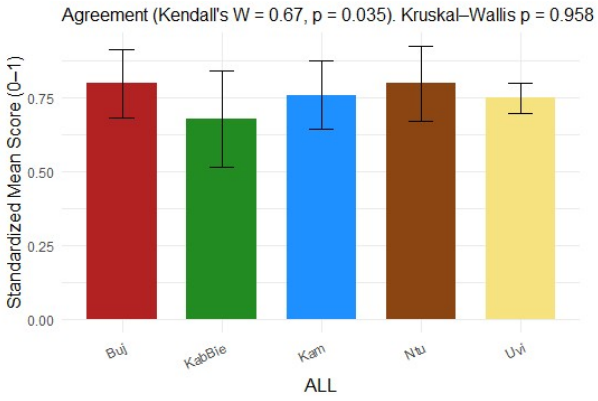

Figure 25. Scientific assessment of the relevance of experimental objectives. Mean rating from scientific evaluators on whether experiments addressed locally identified challenges. Ratings were standardized to a 0–1 scale.

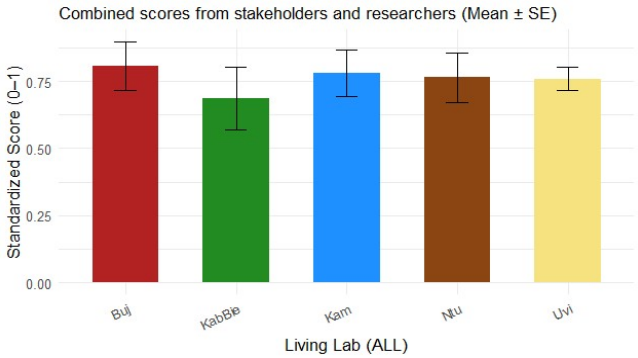

Figure 26. Composite indicator of relevance of co-created AEPs. Average of stakeholder and scientific scores for each ALL, representing perceived success in tailoring practices to local needs.

4.3.2 Relevance of Focus Challenges and AEPs Evaluated

Relevance of the challenges addressed and practices tested genuinely should reflect the priorities and realities of end users, in this case, farmers. This indicator assesses whether those co-created focal areas were perceived as meaningful and useful.

Two complementary sources were used to build this indicator:

- Survey to scientists during the co-creation session presentations: Evaluators rated the “Relevance and actionability of results,” judging how well outputs met farmers' needs and whether they provided value sufficient to sustain farmer engagement.
- Stakeholder group surveys from WS3, filtered for farmers, cooperatives, and farmer associations. Relevant items included satisfaction with the selected challenges and a sense of ownership over practice selection.

Key Findings:

- Bujumbura achieved the highest composite score composite (0.84; figure 29), reflecting strong alignment between scientific assessments and farmer perceptions regarding relevance.
- For the other 4 ALLS, the ranking diverged between scientific assessments and farmer perceptions regarding relevance.
- Kamonyi (0.74) also scored relatively high, suggesting that farmers and scientists found the challenges and practices well-targeted.
- Kabare-Biega (0.70) and Ntui (0.71) received moderate ratings across both sources.
- Uvira showed the lowest score (0.68), mainly due to more reserved scientific assessments, despite moderate scores by farmers' feedback.

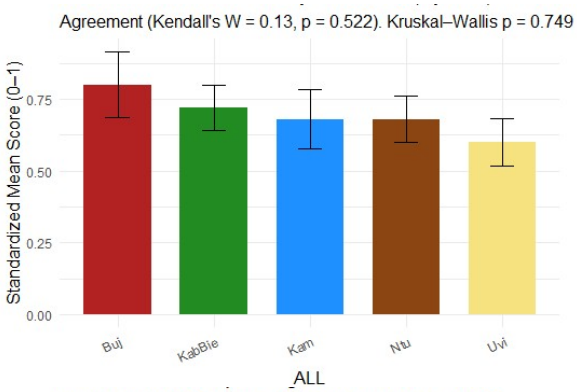

Figure 27. Scientific evaluation of the relevance of results.
Average score based on experts' assessment of whether trial outputs met farmers' needs and sustained engagement.

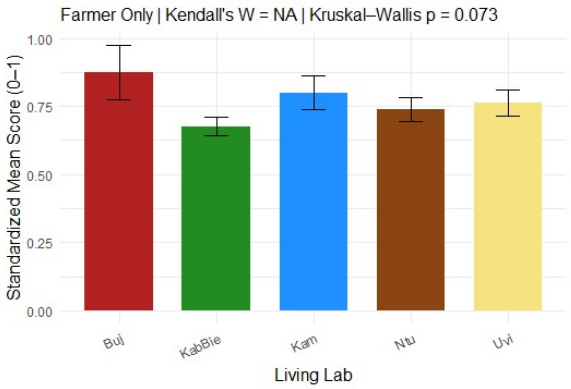

Figure 28. Farmer assessment of challenge relevance and practice ownership.
Results from stakeholder group surveys (WS3), including satisfaction with challenge selection and ownership of practice decisions. Scores standardized to a 0–1 scale.

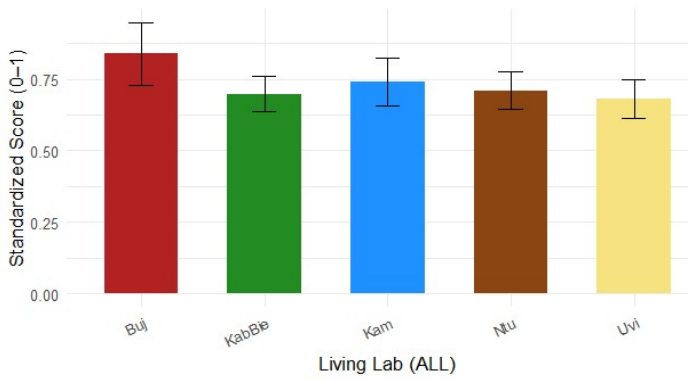

Figure 29. Composite of scientific evaluation and farmer assessment of challenge relevance and practice ownership.

4.3.3 Tangible Results from Experimental Cycle

This indicator assesses whether the first co-creation cycle generated meaningful results that farmers and other stakeholders found useful and likely to be adopted in their farms. These tangible outcomes help build credibility, and support ongoing engagement.

This composite indicator integrates perceptions from two sources:

- Stakeholder group survey (WS3): Assessed whether the results of the first experimental cycle were perceived as tangible and useful for stakeholders. In this workshop the groups rated the perceived likelihood that farmers would adopt each of the AEPs evaluated.
- Survey to scientists: Evaluated the relevance and actionability of experimental results presented during ALL reporting sessions.

Key Findings:

- Bujumbura and Uvira recorded the highest scores (0.91 and 0.87, respectively; figure 32), suggesting strong stakeholder consensus on the usefulness and adoption potential of the experimental results. Both were perceived as delivering concrete outcomes with high farmer relevance.
- Kabare-Biega and Kamonyi reported moderate scores (0.78 and 0.74), indicating generally positive but slightly more cautious assessments, particularly from scientists and task teams.
- Ntui scored lowest (0.68), reflecting greater uncertainty regarding the immediate utility or scalability of trial outcomes, despite some favorable perceptions among farmer groups.

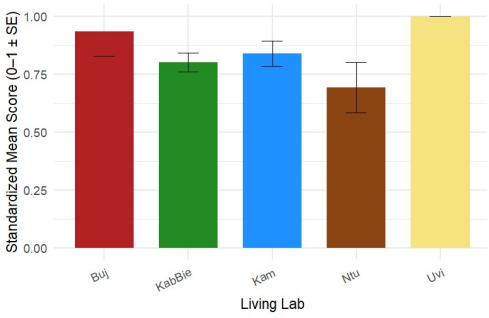

Figure 30. Stakeholder assessment of the usefulness and adoptability of experimental results.
Group-level ratings from WS3 on whether trial outcomes were tangible and likely to be adopted, complemented by farmer perspectives on specific AEPs.

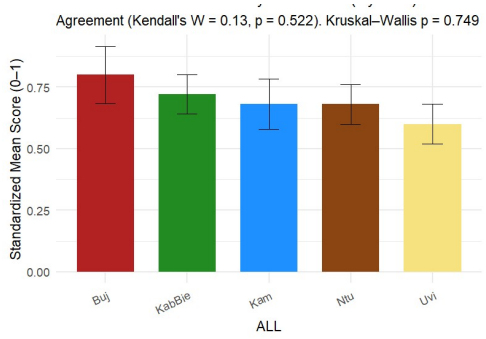

Figure 31. Scientific assessment of experimental output relevance.
Experts rated the actionability and utility of the trial results as presented during ALL reporting sessions. Scores were standardized to a 0–1 scale.

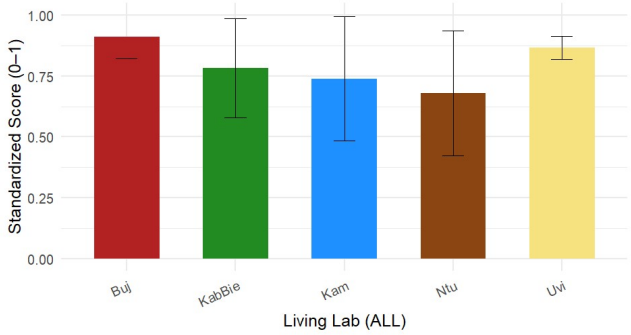

Figure 32. Composite score of perceived usefulness and adoption potential.
Combined average of stakeholder and scientific assessments of trial outcomes across ALLs, with standard errors.

4.3.4 Scientific Rigor of the Experimental Phase of Co-creation

Scientific rigor is essential to ensure that agroecological experiments are not only contextually relevant but also methodologically sound. This indicator evaluates the perceived quality of experimental design, data collection, and analysis.

This indicator is derived from a structured survey conducted among scientists who attended ALL presentations of the first co-creation cycle. The composite score reflects three dimensions:

- Experimental design rigor: Whether the design appropriately tested hypotheses and produced reliable results.
- Quality of experimental setup: Clarity and consistency of measurements, procedures, and follow-ups across sites.
- Quality of data and analysis: Systematic data collection and sound analytical approaches aligned with project objectives.

Key Findings:

- Ntui stands out with the highest overall score (0.80), suggesting strong confidence among scientists in both the experimental setup and the analytical quality. It showed consistently high marks across all three components.
- The rest of the ALLS were below, and very close to each other on the composite score. There was variability among the three indicators in terms of the ranking of each ALL.

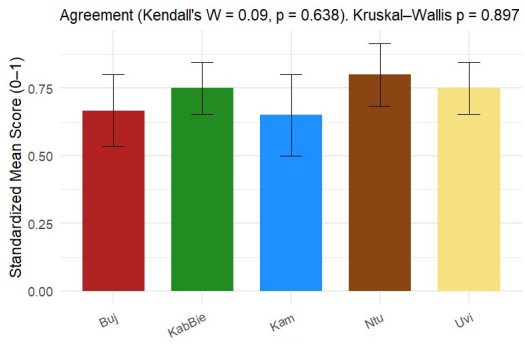

Figure 33. Rigor of experimental design. Average scientist ratings of how well the experimental designs tested hypotheses and produced reliable results, standardized to a 0–1 scale.

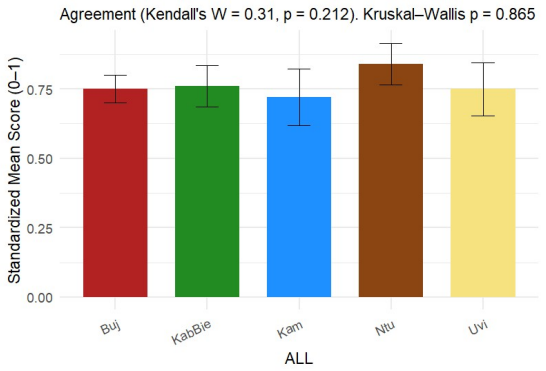

Figure 34. Consistency of experimental setup. Average scientist ratings of measurement clarity, procedural consistency, and follow-up quality across sites, standardized to a 0–1 scale.

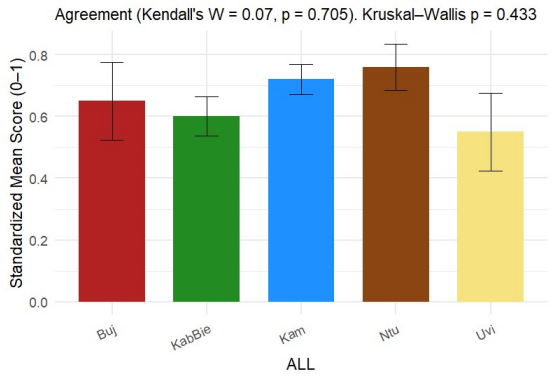

Figure 35. Quality of data and analysis.
Average scientist ratings of data collection robustness and analytical soundness, standardized to a 0–1 scale.

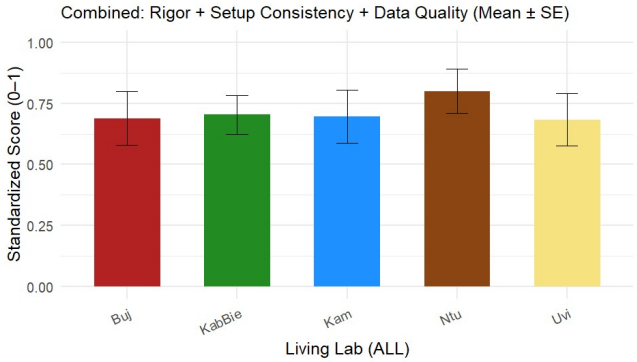

Figure 36. Composite scientific-robustness index.
Aggregated average of Figures 33–35 for each ALL, with standard errors shown.

4.3.5 Overall Achievement of Expected Outcomes

This section synthesizes the performance of the ALLs across four key indicators to evaluate how effectively the co-creation process delivered its intended results. Unlike Section 4.2, which examined structural functionality, this dimension focuses on the tangible and intangible outcomes of the co-creation cycle. Specifically, it assesses whether the co-created agroecological practices (AEPs) were contextually adapted, relevant to local challenges, scientifically robust, actionable, and beneficial to stakeholders.

- Bujumbura achieved the highest composite outcome score (0.81), reflecting consistently strong results across most indicators. Its only relatively weaker dimension was scientific robustness.
- Kamonyi (0.74), Uvira (0.75), and Ntui (0.74) followed with nearly the same composite scores, each showing a balanced profile with strengths and weaknesses in different areas. Kamonyi performed well in AEP relevance but was slightly weaker in their actionability and the scientific robustness of field evaluations. Uvira stood out for actionable results but scored relatively lower for the other indicators. Ntui, on the other

hand, achieved the highest score for scientific robustness, but its experimental results were perceived as less actionable.

- Kabare-Biega had the lowest composite score (0.72), with modest to low ratings across three indicators and only modest to high performance in scientific rigor.

These findings indicate that all six ALLs delivered meaningful results through the co-creation process, although the depth and breadth of outcomes varied. As with the structural indicators, these outcome scores are based on stakeholder and scientific perceptions. While they offer valuable comparative insights, they should not be interpreted as absolute measures of impact or adoption. Importantly, the assessment of outcome achievement is particularly challenging at this early stage in the project, just 1½ to 2 years into the co-creation process. At this point, many results are still maturing, and much of the feedback is necessarily subjective and provisional. As such, outcome scores may be even more sensitive to perception biases and less reliable than those related to structural functionality. Future analyses should combine these results with longitudinal adoption data to evaluate sustainability and scaling potential.

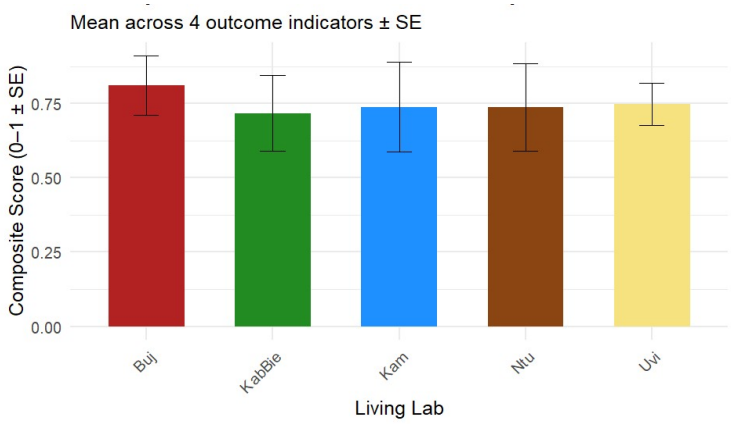

Figure 37. Composite score for Achievement of Expected Outcomes
Aggregated average of Figures 33–35 for each ALL, with standard errors shown.

Table 4. Outcome Composite Indicator Scores by ALL, displaying the composite values for each Agroecological Living Lab (ALL) across four outcome indicators.

ALL	Composite score	SE
Buj	0.810	0.099
KabBie	0.717	0.127
Kam	0.738	0.151
Ntu	0.738	0.146
Uvi	0.747	0.070

Table 5. Outcome Indicator Scores by ALL, displaying the values for each Agroecological Living Lab (ALL) for each four outcome indicators.

ALL	Adapted AEP	Relevance of AEP	Actionable Results	Sci Robustness
Buj	0.805	0.837	0.911	0.6889
KabBie	0.687	0.698	0.7821	0.703
Kam	0.780	0.740	0.739	0.696
Ntu	0.764	0.710	0.679	0.800
Uvi	0.759	0.6810	0.866	0.683

4.4. Summary of Insights

The evaluation of the CANALLS co-creation framework across the five ALLs reveals a nuanced picture of how participatory innovation platforms function in diverse contexts. By assessing two key dimensions (i.e., structural functionality and coordination, and achievement of expected outcomes) the evaluation highlights both the enabling conditions and the early results of co-creation efforts.

Structural Functionality and Coordination scores were more distinct across ALLs, with Ntui, Kamonyi, and Uvira consistently demonstrating higher levels of inclusivity and coordination capacity as compared to Bubumbura and Kabare/Biega. These assessments benefited from relatively mature implementation and stronger data availability, leading to relatively reliable composite indicators.

In contrast, the Achievement of Expected Outcomes dimension showed narrower score differentials and an unexpected lack of alignment with the structural functionality and coordination dimension. For instance, Bujumbura, which had lower functionality and coordination scores, emerged as the top performer in terms of co-creation outcomes. Conversely, structurally strong ALLs like Ntui and Kamonyi did not rank high in outcome delivery. This unexpected divergence suggests that strong institutional design and governance, while necessary, may not immediately translate into visible results, especially at this early stage in the co-creation cycle.

The disparity also underscores the different nature of the data underlying each dimension. While structural indicators were often grounded in coordinated surveys and cross-validation, outcome indicators were based primarily on stakeholder and scientific perceptions of relevance and utility. Given that experimental trials are still ongoing (only one season completed) at the time of assessment, the outcome evaluations are particularly sensitive to perception biases and should be treated as provisional. We suggest that while the structural findings are relatively robust, outcome scores should be interpreted with caution and revisited as more objective

evidence (e.g., adoption rates, productivity gains and other performance indicators resulting from WP3) becomes available.

Despite these limitations, the evaluation framework has proven valuable in facilitating cross-ALL comparison and in identifying key strengths and weaknesses. It provided a baseline for performance monitoring and a practical mechanism for surfacing early implementation issues. Importantly, it revealed that even high-performing ALLs in one dimension may face challenges in another, pointing to specific areas where targeted support or follow-up is needed.

Going forward, the evaluation approach should be enhanced by:

- Validate scores for each dimension with stakeholders and collect feedback from them.
- Repeating stakeholder surveys at regular intervals to track evolution and monitor improvements (e.g., yearly)
- Complementing perception-based data with more objective indicators of adoption, learning, and impact.
- Using the current findings to inform tailored reinforcement strategies for each ALL, focusing particularly on their weaker dimensions.

Ultimately, this evaluation underscores the value of a structured, multidimensional approach to co-creation monitoring and evaluation, which can guide internal reflection and supports adaptation/ improvement.

5. Challenges in the Co-creation Process

The co-creation process within the CANALLS framework involves two core components: co-creation workshops and the field experiments. Each component plays a critical role in shaping agroecological innovations and facilitating stakeholder collaboration. This section synthesizes the key outputs and challenges encountered in these activities.

5.1. Co-Creation Workshops

Outputs from the Workshops Co-creation workshops were central to identifying local challenges, defining agroecological practices to evaluate, and building consensus among stakeholders. Table 5 summarizes key outputs from each ALL, including the main crop focus, challenges identified in Step 1, and combinations of practices selected in Step 2 of the co-creation process.

Table 6: Outputs from the co-creation workshops.

ALL	Crop	Main Challenges (Main output of Step 1)	Combinations of AEP to Evaluate (Main output of Step 2)
NTU	Cocoa	Pests Low soil fertility Shade management	Biopesticides Foliar fertilizers Improved shade management
KAM	Cassava	Soil erosion Low soil fertility	Anti-erosion practices Combination of org. and inorg. fertilizers Intercrops
BUJ	Maize- bean intercrop	Pests Low soil fertility	Biopesticides Combination of org. fertilizers
BIE	Coffee	Low soil fertility Old variety Pests	Biopesticides Anti-erosion practices Organic fertilizers Cover crops
KAB	Coffee	Pests Gral. poor crop management Aging of coffee trees	
UVI	Rice and cassava	Pests Low soil fertility Drought	Biopesticides Combination of org. and inorganic fertilizers

Challenges

- Workshops were resource-intensive and placed a heavy burden on ALL coordinators, who often played multiple roles (i.e., facilitators, researchers, and logistical leads) hindering sustained facilitation quality.
- Farmer participation was present but not always representative or influential. "Farmer representatives" did not always reflect the diversity of farming contexts, and their influence on decisions was limited. Despite an initial plan to scale workshop activities to a broader farmer base (Section 3.5), this was not implemented due to resource constraints.

Table 7: Costs per workshop in each ALL (3 workshops) USD

ALL	Workshop			Full year of field experiments
	1	2	3	
Kabare	2745	2963	6000	27200
Biega	1948	1365		

Buj				
Kam		1265		
Ntu	2909	2067	3115	30023
Uvi	2945	2293	2500	11149

5.2. Field Experiments

Design and Scope: Field experiments were designed to test the AEPs selected during co-creation workshops, with trial setups tailored to each agroecological zone. Designs, treatments, and replication schemes varied by ALL (see Table 8).

Table 8: Design and Scope of Field Experiments. Lists number of experiments, treatments, replications/farmers, design type, and estimated cost per ALL.

ALL	N Eperiments	Factors	Experimental Design	N of treatments	N of replications/ N of Farmers
Uvira	1	Pesticide (2 levels) Fertilization (4 levels)	Split plot	8	2 sites, 10 farmers per site = 20 reps
Kamonyi	2	Exp 1; Intercrop (2 levels), Erosion control (2 levels), Org. fertilizers (2 levels)	Stepwise	4	2 Sites, 3 reps per site = 6 reps
		Exp 2: Crop design (intercrops; 4 levels)	RCBD	4	2 sites, 10 reps per site = 20 reps
Kabare Biega	1	Tillage (2 levels) Biopesticides (2 levels) Erosion control (2 levels) Compost use (2 levels)	Stepwise	4	2 sites, 5 farmers per site = 10 reps
Bujumbura	1	Sanitized urine (4 levels) Biopesticides (2 levels)	Split plot	8	2 sites, 3 farms per site = 6 reps
Ntui	2	Exp 1: Biopesticides (2 levels)	CRD	2	3 farms = 3 reps
		Exp 2: Foliar Fertilizer (2 levels)	RCBD	2	3 sites (forest transition and savannah. 4 farms with 3 blocks in the farm + 8 farms with a block in the farm = 20 reps

Key Findings: Trial outcomes were heterogeneous across ALLs. While some sites (e.g., Uvira, Bujumbura) produced actionable insights, others faced technical or coordination setbacks that attenuated scientific value, and more data analysis and or replication of trials is needed to gain confidence on recommendations (table 9).

Table 9: Key Findings from Experimental Trials. Highlights main results from field experiments, whether the practices are ready for scaling, and proposed next steps per ALL.

ALL	Key Findings	Ready for Scaling?	Next Steps
Uvira	Organic + inorganic fertilizers increased yield; biopesticides promising but need more data.	Yes (fertilizers); No, more data needed for biopesticides	Replicate trials; conduct economic & soil analysis; record more variables.
Kab-Biega	Yield improved when combining AEPs; erosion control effects need longer term; cover crops need better management.	Partially	Continue trials; refine cover crop management; assess impacts on coffee profit, quality, and soil.
Kamonyi	Anti-erosion AEPs supported by gov't; other results still under analysis.	Not yet	Complete analysis; maintain stepwise plots; expand intercrop trials.
Bujumbura	Urine increased maize yield (no dilution effect); neem leaves comparable to pesticides.	Yes (urine); Possibly (neem).	Retest same AEPs; assess risks (e.g., urine contaminants); conduct profitability analysis.
Ntui	Foliar fertilizer ineffective; biopesticides similar to chemicals; no yield gains from cocoa trials.	partially on what *not* to use foliar fertilizers; Biopesticides promising but more trials needed.	Repeat biopesticide trials; add more criteria (profit, health); include female farmers.

Challenges

- **Coordination and Oversight Gaps:** Multiple organisations and staff with divergent perspectives made coordination challenging. In many cases, harmonising technical approaches and responsibilities proved difficult, sometimes resulting in oversight of key design decisions or inefficient resource use.
- **Need for Dedicated Scientific Leadership:** A recurring issue was the absence of a single researcher overseeing the complete experimental cycle. Without dedicated

leadership, several ALLs experienced inconsistent data quality. Assigning a lead researcher per ALL (whether or not they are also the ALL coordinator) would significantly enhance consistency, responsiveness, and credibility of findings.

- **Balancing Scientific Rigor with Farmer Relevance:** The design of the first-year trials was intentionally focused on generating actionable information for farmers. While this increased the trials' practical utility and stakeholder engagement, it limited their novelty and scientific value, making them less suitable for academic publication or broader research contributions. Striking a more deliberate balance between participatory relevance and methodological rigor is essential for long-term sustainability and credibility.

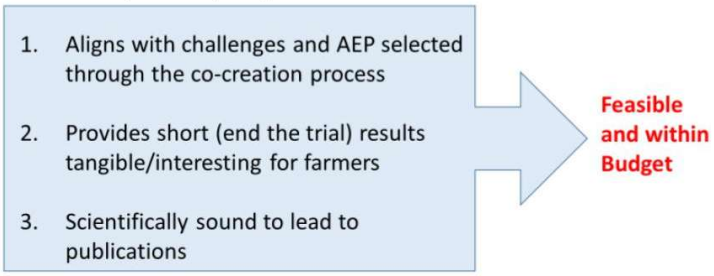

Figure 38. Rational for experimental phase design in the CANALLS ALLs for the 1st co-creation cycle.

- **Risks of Misinterpretation and Bias:** Even valid on-farm methods can yield variable or ambiguous results due to inconsistent implementation or uncontrolled variables. While trained scientists can contextualise this, other stakeholders may misinterpret findings. In a few cases, input-supplier interests may have shaped interpretations. To protect platform integrity, researchers must maintain authority over result validation and communication, even within inclusive governance.

6. Key Enhancements to the Initial Framework

The foundational four-phase structure outlined in D2.1 remains valid. However, implementation across the six ALLs revealed critical areas where targeted adjustments can enhance effectiveness, stakeholder engagement, and scientific robustness. These enhancements are grouped below by operational domain.

6.1. Workshops

Workshops remain central to the co-creation methodology. To improve their inclusivity, efficiency, and cost-effectiveness:

- Assign a dedicated local facilitator trained in participatory methods, distinct from the ALL coordinator, to ensure consistent quality in planning and delivery.
- Differentiate between high-cost and field-based workshops. Field workshops should be simplified (e.g., flipcharts, mobile projectors) to reduce costs while maintaining participatory quality.
- Clarify cost-sharing expectations upfront, especially in inception meetings. Local NGOs, private actors, and government entities should be encouraged to co-invest in workshops, fostering ownership and continuity.
- Extend workshop outreach by ensuring outcomes and materials are shared with a broader population of farmers (not only participants).
- Anticipate and mitigate constraints to scaling. For example, in cases where wider farmer engagement is unfeasible, alternative strategies (e.g., digital summaries) could be considered.
- Explore the integration of AI tools to support workshop planning, feedback synthesis, and even facilitation. While not tested under CANALLS, emerging tools offer potential to streamline preparatory work and expand participation.

6.2. Field Experimentation

To increase the scientific rigor and decision-usefulness of participatory trials:

- Assign a lead researcher per ALL who is responsible for overseeing experimental design, quality control, and data interpretation. This role should be distinct from general coordination responsibilities.
- Ensure minimum replication at each trial site (minimum number of farmers or blocks) to enable meaningful statistical analysis.
- Develop and apply basic plot quality control protocols, including exclusion criteria for poorly implemented trials or failed plots.
- Strengthen training for all actors involved in experiments, especially on interpreting results with scientific reasoning, to avoid misinterpretations or biased extrapolation.
- Address risks of biased interpretation, particularly from stakeholders with vested interests (e.g., input suppliers). Researchers must retain the lead in validating and communicating findings clearly and responsibly.
- Explore the use of artificial intelligence (AI) tools to support participatory monitoring, evaluation, and learning (MEL) processes. AI applications such as automated data analysis, mobile-based feedback capture, or pattern recognition in trial results can reduce the cost of experimentation, streamline data interpretation, and enhance farmer engagement and ownership. These tools could also help triangulate local knowledge with scientific findings in real time.

Together, these enhancements will improve the scientific robustness of co-created agroecological experiments while preserving their participatory and context-sensitive nature.

6.3. Other Cross-cutting Improvements

- Promote sustainability from the outset by embedding ALLs in existing institutions and aligning with national agroecological policies or funding frameworks.
- Early design of monitoring, evaluation and learning (MEL) tools to better assess the functionality and outcomes of co-creation process, indicators and data collection tools should be defined during the inception phase. While CANALLS relied on stakeholder surveys, these were vulnerable to social desirability and confirmation bias. Future efforts should consider:
    - Independent field observations or triangulated assessments by researchers from different ALLs.
    - Short, standardized self-assessments complemented by cross-evaluation.
    - Low-bias, cost-effective tools (e.g., mobile-based annual surveys, simple observational checklists).
    - Integrating evaluation protocols into ongoing activities, avoiding the need for separate, resource-intensive evaluations.
    - Integrate this MEL at the project-wide level, not as a siloed activity within a task, so that indicators are embedded across multiple tasks and co-owned by different actors.
    - Institutionalize annual reviews of structural functionality and outcome achievements to support adaptive management, aligned with the project timeline and resource cycles.

These refinements aim to preserve the participatory ethos of the original CANALLS framework while strengthening its credibility, replicability, and long-term impact across varied agroecological and institutional contexts.

7. Annexes: Supporting Material and Evidence

Annex 1:

```
            Df Sum Sq Mean Sq F value  Pr(>F)
ALL          4 0.4279 0.10696    7.41 0.00484 **
Residuals   10 0.1443 0.01443
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

ALL	Workshop #	Academic institution	Farmer org./coop.	Government institution	NGO	Research institution	Value chain actors	Civil society	Total_WS_Participants
Bie	1	1	2	1	6	6	5	0	**21**
Bie	2	1	2	1	5	7	4	2	**22**
Buj	1	2	7	3	1	13	0	0	**26**
Buj	2	0	20	3	3	9	0	0	**35**
Buj	3	0	13	3	1	15	2	0	**34**
Kab	1	5	5	0	1	4	4	0	**19**
Kab	2	3	4	0	1	5	6	0	**19**
KabBie	3	1	19	0	0	5	0	0	**25**
Kam	1	1	3	3	3	8	3	0	**21**
Kam	2	1	7	3	6	8	4	1	**30**
Kam	3	0	6	3	4	11	5	0	**29**
Ntu	1	2	12	8	10	14	4	0	**50**
Ntu	2	1	13	1	3	9	2	0	**29**
Ntu	3	1	15	4	2	8	4	2	**36**
Uvi	1	3	7	1	5	6	1	2	**25**
Uvi	2	2	7	3	4	5	2	1	**24**
Uvi	3	3	13	8	4	2	6	1	**37**