

CO-CREATION REPORT ON CLIMATE-SMART COFFEE ADOPTION AND REINVESTMENT

AN IN-DEPTH ANALYSIS OF BARRIERS, INFLUENCING FACTORS, AND PRACTICAL SOLUTIONS

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EXECUTIVE SUMMARY

This report presents an in-depth analysis of the barriers, influencing factors, and practical solutions related to adopting and reinvesting Climate-Smart Coffee (CSC) practices among smallholder coffee farmers in Kayunga District, Uganda. Through a co-creation workshop conducted by the Centre for the Promotion of Imports from Developing Countries (CBI) Uganda Coffee team, stakeholders, including smallholder farmers, agricultural extension officers, local government representatives, and private sector actors, collaborated to explore these challenges and opportunities.

Economic Constraints and Financial Barriers

Farmers are strongly willing to invest in CSC due to recognized long-term benefits such as increased yields, income stability, and improved climate resilience. However, significant economic constraints impede their ability to adopt these practices:

- Farmers face pervasive barriers in accessing financial resources. High interest rates and stringent collateral requirements make formal credit inaccessible to smallholder farmers. As a result, they are often forced to rely on informal lenders who offer loans under unfavorable terms.
- Financial insecurity compels farmers to prioritize immediate economic stability over long-term investments. Pressing household expenses and urgent financial needs lead them to opt for conventional farming methods that provide quicker returns, rather than investing in CSC practices that offer long-term benefits.

Social Structures and Community Influences

Cultural beliefs and community norms significantly influence farmers' decision-making processes:

- Traditional methods such as stumping using axes or uncontrolled agroforestry practices are often favored. This creates resistance to change and hinders the adoption of innovative CSC practices. While some traditional methods may be beneficial, others are applied incorrectly or inefficiently, highlighting the need for farmer sensitization and training to demonstrate proper techniques.
- Predominantly patriarchal structures limit inclusive participation from women and youth. This concentration of authority restricts diverse input and collaborative approaches, stifling innovative thinking and perpetuating adherence to established practices over sustainable alternatives. The lack of shared responsibility within households reduces overall commitment to implementing new practices, as decisions are centralized and alternative perspectives are marginalized.

Information Gaps and Trust Issues

Farmers heavily rely on informal networks for agricultural advice, valuing peer experiences and local community leaders over formal sources:

- While these informal networks are rooted in social trust, they can lead to inconsistent and sometimes conflicting information, causing confusion and indecision among farmers.
- Conflicting messages from various stakeholders—including government agencies, NGOs, and private entities exacerbate uncertainty. For example, differing recommendations on practices like stumping create skepticism and hinder adoption.
- The scarcity of extension services further deepens knowledge gaps, hindering informed decision-making and effective adoption of CSC practices. This reliance on informal networks perpetuates a cycle of limited accurate and comprehensive knowledge transfer.

Motivating Factors and Positive Influences

Despite the challenges, several motivating factors encourage investment in CSC:

- Farmers are confident that favorable market conditions will yield profitable returns on their investments in CSC, aligning long-term practices with potential profitability.
- Training programs provided by NGOs and agricultural initiatives offer essential knowledge, skills, and confidence. These programs empower farmers to overcome initial barriers by demonstrating proper CSC techniques and their benefits.
- Being perceived as progressive and innovative reinforces farmers' commitment to CSC practices. Recognition within the community serves as a powerful motivator and inspires others to adopt CSC practices.
- Tangible results from peers' successes further fuel motivation. Observing improvements in yields and profitability among fellow farmers encourages others to implement CSC practices.

Cognitive and Practical Barriers

Cognitive overload and practical challenges significantly impact farmers' ability to implement CSC practices:

- The mental effort required to learn and apply new, complex CSC techniques such as proper stumping methods or advanced agroforestry practices can be overwhelming.
- Combined with labor shortages and limited access to technical support, farmers often default to familiar, less demanding methods. The shortage of skilled labor and scarce extension services leave farmers without the necessary resources to adopt and maintain CSC practices effectively.
- Due to these challenges, farmers may either not apply the new methods at all or simplify them improperly, such as using machetes instead of pruning saws, which can damage the coffee trees.

Behavioral Insights

The report reveals deep-rooted behavioral and cognitive factors influencing CSC adoption:

- **Present Bias:** Farmers tend to prioritize immediate economic needs over long-term benefits. The pressing demands of household expenses and financial insecurity drive decisions favoring short-term returns from conventional practices over the future advantages of CSC. This behavior highlights the challenge of balancing immediate survival needs with strategic investments for resilience.
- **Risk Aversion and Fear of Perceived Financial Loss:** The uncertainty associated with new practices leads to risk-averse behavior. Farmers prefer familiar methods that guarantee predictable outcomes, exhibiting a status quo bias that hinders experimentation with CSC. The fear of potential financial loss—such as the income gap during the two years following stumping discourages deviation from traditional practices, even when farmers are aware of the long-term benefits.
- **Influence of Social Norms:** Farmers rely heavily on community validation and are influenced by the behaviors of their peers. Positive reinforcement from observing successful CSC adoption within the community encourages others to follow suit. Conversely, resistance to change is reinforced if prevailing norms favor traditional methods.
- **Authority Bias in Household Dynamics:** Patriarchal decision-making structures result in authority bias, where the perspectives of women and youth are undervalued. This limits diverse input and collaborative problem-solving, restricting the household's ability to adopt innovative practices like CSC. The centralization of authority perpetuates existing behaviors and inhibits adaptive strategies.
- **Cognitive Overload and Decision Fatigue:** The complexity of CSC practices and the effort required to learn new techniques contribute to cognitive overload. Combined with inconsistent information and limited technical support, farmers experience decision fatigue, leading them to default to simpler, established methods. This cognitive strain undermines the adoption of more sustainable practices.

- **Lack of Trust in Formal Advisory Services:** A lack of trust in formal advisory services leads farmers to depend on informal networks for guidance. While these networks offer trusted advice, they may lack comprehensive or accurate information necessary for effective CSC implementation. The inconsistency and conflicting messages from formal sources exacerbate skepticism, reinforcing reliance on peer-based knowledge.

1. INTRODUCTION

The Centre for the Promotion of Imports from Developing Countries (CBI) Uganda Coffee Project is a strategic initiative aimed at enhancing the sustainability, resilience, and profitability of Uganda's coffee sector. By promoting the adoption of Climate-Smart Coffee (CSC) practices, the project seeks to address the dual challenges of mitigating climate change impacts and improving agricultural productivity. Through these efforts, smallholder coffee farmers are supported in adapting to climate variability while ensuring their long-term economic viability.

Uganda's coffee production is dominated by smallholder farmers who face substantial barriers to adopting CSC practices. Economic constraints, such as limited access to affordable credit, fluctuating market prices, and resource scarcity, hinder investments in sustainable agricultural innovations. Social dynamics within farming households, particularly patriarchal norms, often marginalize women and youth, limiting their participation in critical farm-level decision-making. Additionally, farmers' reliance on informal networks for advice and support, coupled with limited trust in formal advisory systems, highlights the importance of social capital in influencing adoption behaviors. These intersecting challenges create a complex environment that necessitates targeted, context-specific interventions.

As part of its inception phase, the project conducted a co-creation workshop in Kayunga District. This district was chosen for its significant role in Uganda's coffee production and its representation of smallholder farming systems with diverse socio-economic and behavioral dynamics. The workshop engaged various stakeholders, including farmers, agricultural extension officers, local leaders, and private sector actors, in participatory discussions to explore the structural and behavioral factors influencing CSC adoption.

The following objectives guided the co-creation workshop:

1. Validate assumptions regarding coffee farmers' willingness and ability to adopt and reinvest in CSC practices.
2. Identify social, economic, and behavioral factors impacting farmers' and stakeholders' decisions related to CSC.
3. Develop practical, human-centered solutions collaboratively to address the challenges of adopting CSC practices.

2. METHODOLOGY

The co-creation workshop employed a focus group discussions (FGDs) approach centered around qualitative data collection. This approach facilitated open dialogue, allowing participants to share lived experiences, challenges, and perspectives on adopting CSC practices. FGDs were structured around guiding questions and thematic prompts to elicit in-depth responses and foster discussions revealing individual and collective insights.

Each FGD session was moderated by facilitators with expertise in agricultural practices and behavioral analysis, ensuring focused and productive discussions while allowing participants flexibility to express thoughts freely. A facilitation guide captured direct responses and nuanced insights into participants' attitudes, beliefs, and social norms influencing CSC-related decision-making.

Data collection involved audio recordings and detailed note-taking to ensure accuracy and completeness. FGD transcripts were systematically analyzed using thematic analysis, identifying key patterns and categorizing data into primary themes and sub-themes. This method provided an in-depth

understanding of the root causes, perceived benefits, and barriers associated with CSC adoption and reinvestment.

Criteria for Stakeholder Inclusion

The co-creation workshop in Kayunga District brought together 25 participants carefully selected to represent a diverse cross-section of stakeholders integral to Uganda's coffee sector. The selection process was guided by clear criteria to ensure the inclusion of perspectives and expertise critical to understanding and addressing the challenges of CSC adoption. The stakeholder groups were chosen based on the following considerations:

- **Smallholder Coffee Farmers:** Priority was given to farmers actively engaged in coffee production, particularly those grappling with the socio-economic and behavioral barriers targeted by the project.
- **Agricultural Extension Officers:** These participants were chosen for their frontline role in disseminating technical knowledge and supporting farmers. Their inclusion was critical to understanding the gaps in extension services and identifying opportunities to improve knowledge transfer and adoption support.
- **Local Government Representatives:** Officials from local government bodies were included to provide insights into the policy and governance landscape.
- **Private Sector Stakeholders:** Representatives from the coffee supply chain, including commercial farmers, and processors, were included to align workshop discussions with broader economic and market realities.

3. FINDINGS

The findings from the co-creation workshop are presented below, based on insights shared by different stakeholders, including farmers, agricultural extension officers, and community leaders. This section outlines what participants reported during focus group discussions and workshops.

3.1 COFFEE FARMERS' WILLINGNESS TO INVEST IN CLIMATE-SMART COFFEE

Focus group discussions revealed that coffee farmers were willing to invest in CSC, driven by their awareness of long-term benefits such as increased yields, enhanced income stability, and improved resilience to climate change. However, this willingness varied across participants, reflecting a spectrum of financial and situational realities rather than a uniform perspective.

Farmers frequently expressed a future-oriented mindset, emphasizing their commitment to reinvesting in their farms when circumstances allowed. A more accurate range of reinvestment emerged from the discussions, with farmers estimating they reinvest between 30% and 60% of their earnings, depending on seasonal income and household demands. This range better captures the realities most participants face, contrasting with the higher estimates provided by a few outliers. For example, while one farmer claimed, "I reinvest as much as I can—sometimes up to 70%," this sentiment did not represent the broader group and must be contextualized as an exception.

The willingness to invest was strongly tied to farmers' aspirations for sustainable farming and long-term economic security. Additionally, community recognition emerged as a powerful motivator. Participants shared that being seen as progressive and innovative within their communities enhanced their confidence and commitment to CSC practices. One farmer observed, "When my neighbors see what I have achieved, they ask for advice, and it feels good to lead by example." This sense of

validation reinforced the adoption of CSC practices, as farmers sought to inspire and influence others in their communities.

Beyond individual benefits, farmers also associated CSC adoption with collective progress. Many participants emphasized a sense of shared responsibility, expressing pride in contributing to their communities' development through sustainable farming. This community-centric perspective underscored the potential ripple effects of CSC adoption, where individual actions could positively influence neighbors and extended social networks.

Despite this evident willingness, participants acknowledged that social and economic constraints often limited the extent of their investments. Financial constraints, such as limited access to credit and volatile coffee prices, were recurrent challenges. Farmers described the constant balancing act between long-term goals and immediate household needs, which often resulted in inconsistent implementation of CSC practices.

3.2 BARRIERS TO ABILITY TO INVEST IN CSC

Despite their willingness to invest in CSC, participants described multiple barriers hindering their ability to adopt and sustain these practices. These obstacles, encompassing economic, structural, and operational challenges, impact farmers' capacity for long-term CSC investments.

Limited Access to Financial Resources: Farmers consistently highlighted the lack of financial resources as a primary barrier. Operating on tight profit margins, they struggle to allocate funds for the tools, inputs, and labor required for CSC practices. Essential items such as pruning secateurs remain out of reach for many, forcing farmers to use suboptimal tools like machetes, which damage crops and reduce productivity. This economic strain was summed up by one farmer: "Without money, we can only dream of what we could do on our farms." The inability to invest in critical inputs perpetuates low yields and undermines their long-term resilience.

Access to Credit: Farmers reported significant challenges securing credit from financial institutions due to high-interest rates and stringent collateral requirements. Participants described a system favoring wealthier clients over small-scale farmers, with one stating, "Banks [*such as Centenary and Stanbic Banks*] are for people with big pockets. We farmers are left to rely on money lenders who don't care about coffee." This reliance on informal lenders often involves unfavorable terms and a lack of structured support for agricultural development investments. Limited access to affordable, farmer-friendly credit discourages many from pursuing financial solutions that could facilitate CSC adoption.

Fragmented Landholdings: Land fragmentation was identified as a significant structural challenge to the adoption of Climate-Smart Coffee (CSC) practices. Farmers managing small, scattered plots reported difficulty in scaling up labor-intensive practices like terracing and mulching, which require cohesive and well-coordinated efforts. Fragmentation adds logistical complexity and increases costs, making comprehensive CSC implementation harder to achieve.

Additionally, practices like **stumping**, which involve rejuvenating coffee trees by cutting them down to encourage new growth, were perceived as impractical for farmers with small landholdings. One farmer remarked, "Stumping is for people with many trees, not for those with just a few. Investing in a stumping saw for something I'll use only once isn't justifiable." This sentiment highlights the economic and logistical barriers to adopting practices that are essential for long-term farm productivity but appear unfeasible on fragmented or limited plots.

As another participant explained, “Managing multiple small plots makes it difficult to implement CSC fully,” underscoring how land distribution issues exacerbate the challenges of adopting these practices.

Limited Extension Services: The scarcity of agricultural extension services was identified as a significant barrier. Participants emphasized the critical role of extension officers in providing timely, expert advice and support. However, limited extension officer availability in many areas means farmers struggle to access this essential resource. One farmer noted the delays in accessing extension services, leading to a knowledge gap hindering effective CSC adoption and maintenance. Infrequent interactions with extension officers leave farmers relying on outdated or second-hand information, limiting informed decision-making.

Labor Shortages: Labor shortages emerged as a critical operational barrier to adopting labor-intensive Climate-Smart Coffee (CSC) practices. Farmers consistently highlighted the challenge of finding skilled workers for pruning, terracing, and irrigation management—practices essential for improving coffee productivity and resilience.

Labor shortages hinder the adoption of CSC practices, driven by high costs, lack of skilled workers, and youth disinterest in agricultural labor.

The high cost of hiring skilled labor, particularly during peak farming periods, poses a significant challenge. Farmers noted that labor costs often rise sharply during these periods, making it difficult to allocate resources toward long-term practices like CSC. One farmer explained, “During the harvest season, everyone needs workers. Prices go up, and we have to prioritize immediate needs over things like pruning.” This financial constraint forces many farmers to rely on unskilled labor or household members, such as women and youth, who may lack the expertise to execute these practices effectively.

Youth disinterest in agricultural labor was another notable issue. Many farmers observed that younger community members are reluctant to engage in physically demanding farm work due to its perceived low income potential. “The youth want quick money,” one participant remarked, highlighting the disconnect between farming activities and younger generations' economic aspirations. This sentiment points to a broader need to reposition coffee farming as an attractive livelihood option, potentially through youth-focused incentives, training programs, and exposure to successful farming models.

Additionally, farmers emphasized the lack of affordable mechanization as a compounding factor. Basic tools and mechanized services, such as tractors for land preparation, remain out of reach for many smallholders, further limiting their capacity to address labor shortages effectively. In some cases, this gap leads to delays or incomplete implementation of critical practices, undermining farm productivity and resilience.

Finally, farmers underscored the importance of improving labor conditions to attract and retain workers. Suggestions included providing timely wages, enhancing worker safety, and fostering a sense of pride in agricultural work.

3.3 MOTIVATING FACTORS FOR INVESTMENT IN CSC

Despite facing numerous challenges, participants identified several motivating factors encouraging investment in CSC. These motivations stemmed from economic expectations and social incentives reinforcing their commitment to sustainable practices.

Expectations of Favorable Market Conditions: Anticipation of stable or improving coffee market prices was a key motivator for farmers to invest in CSC practices. Farmers expressed confidence that favorable market conditions would make investments in fertilizers, labor, and other inputs

worthwhile, as they expected higher returns. As one farmer stated, “If I hear that the price of coffee is good, I’ll use my savings to buy fertilizers and hire workers,” underscoring how market expectations directly influence resource allocation decisions. This perspective reflects a profit-driven economic mindset where farmers prioritize individual financial gain over broader ethical or community-focused considerations. Their willingness to invest hinges on the assurance that market conditions will support profitability. Rather than adopting CSC practices for communal or environmental benefits alone, farmers are motivated by the potential for personal economic advancement tied to favorable price dynamics. By anchoring their decisions on expected market stability, farmers demonstrate a calculated approach to risk and investment. This highlights the importance of aligning CSC promotion efforts with market-based incentives that reinforce the profitability of sustainable practices.

Support from Training Programs: Participants highlighted the critical role of training programs provided by NGOs, government initiatives, and agricultural organizations in facilitating the adoption of CSC practices. These programs equip farmers with the technical knowledge and practical skills to implement CSC effectively. Farmers cited examples of training on pruning techniques, fertilizer application, and irrigation systems, which empowered them to overcome initial barriers to adoption. One participant noted how a program by TechnoServe provided hands-on guidance that significantly improved their crop management and yields.

Beyond technical knowledge, these programs serve as motivational drivers by demonstrating tangible benefits. Farmers who applied techniques learned through training reported improved productivity and income, reinforcing their confidence in CSC practices. For example, participants described how workshops showcasing successful CSC adoption within their community boosted their willingness to invest in similar practices, creating a ripple effect of adoption.

Community and Social Validation: Community and social validation emerged as powerful motivators for farmers to adopt CSC practices. Participants emphasized the pride and recognition they felt from being viewed as progressive and innovative within their communities. This social acknowledgment encouraged continued investment in CSC practices and inspired feelings of accomplishment. Farmers frequently mentioned the ripple effect of their efforts, where visible success motivated neighbors and peers to adopt similar practices.

For instance, one farmer observed that seeing neighbors achieve better yields after adopting improved methods inspired others to try similar practices. Sharing knowledge and providing advice to others further reinforced individual commitment, as one farmer explained how being sought after for farming advice pushed them to maintain high standards and continue improving. Social recognition also acted as informal validation, strengthening confidence in the benefits of CSC and fostering a sense of responsibility to lead by example.

Tangible Results and Observational Learning: Witnessing tangible improvements in yields and income after adopting CSC practices emerged as a significant motivator for continued investment. Farmers who experienced firsthand benefits, such as healthier crops or increased profitability, expressed a stronger commitment to maintaining and scaling up these practices. Observing successful outcomes among peers further reinforced this motivation, highlighting the role of observational learning, where positive results validate the perceived benefits of CSC.

One farmer shared how observing a neighbor’s success with pruning and fertilization encouraged them to adopt similar methods, leading to noticeable improvements in their own yields. Another farmer noted that seeing healthier coffee plants on a peer’s farm strengthened their belief in the long-term viability of CSC, prompting them to allocate more resources toward sustainable practices.

3.4 SOCIAL STRUCTURES AND COMMUNITY INFLUENCES

Focus group discussions emphasized the significant influence of social norms, cultural beliefs, and household dynamics on farmers' decisions regarding CSC adoption. These social and structural factors can either facilitate or hinder farmers' willingness and ability to integrate new practices.

Community Norms and Cultural Beliefs: Participants highlighted that established community norms and cultural beliefs often reinforce traditional farming methods, leading to reluctance in adopting new practices like CSC. The emphasis on short-term gains and familiarity with long-standing methods contributes to this resistance. One farmer's observation about prioritizing "quick short-term earnings" reflects a prevalent mindset that can hinder the acceptance of innovative, long-term strategies. While providing stability, cultural beliefs and societal norms can also limit openness to change and experimentation.

Household Decision-Making: Discussions revealed that household decision-making dynamics, often influenced by patriarchal structures, play a crucial role in shaping farm-related decisions. In many families, men hold primary decision-making power, sometimes restricting the participation of women and younger members in key farming choices. This structure affects how investments and changes, including CSC adoption, are approached within households. The lack of inclusivity and transparency in decision-making processes can limit the diverse perspectives needed for adopting and sustaining CSC practices.

Level of Education: Education was identified as a significant factor influencing farmers' ability to adopt CSC practices. Participants frequently highlighted that higher levels of formal education, such as secondary or tertiary schooling, correlated with better understanding and implementation of complex agronomic practices. Farmers with advanced education demonstrated a greater capacity to analyze long-term benefits, assess risks, and make informed decisions about adopting sustainable techniques.

Practical education programs were recognized as essential for bridging knowledge gaps among farmers with limited formal schooling. Suggestions included hands-on learning approaches, such as the use of demonstration plots, farmer-to-farmer training, and agricultural shows where practical methods could be observed and tested. One participant shared their experience with demonstration farms, explaining how they enabled farmers to "see for themselves what works best," thereby building trust in CSC practices.

Another notable insight was the importance of tailoring educational content to the needs and literacy levels of different demographics. For instance, while some participants advocated for detailed technical manuals, others emphasized simplifying visual materials and community-led discussions to ensure inclusivity. Farmers without formal education expressed the value of oral training sessions conducted by trusted local figures or extension workers, which helped them adopt practices such as mulching, pruning, and intercropping effectively.

Youth Engagement: Youth engagement was identified as a critical factor for ensuring the sustainability and modernization of coffee farming systems. Participants emphasized the importance of the early involvement of younger generations in practical farming activities and decision-making processes. This approach was seen as essential for addressing labor shortages, fostering innovation, and ensuring the resilience of the coffee value chain.

Farmers proposed specific roles for youth within the coffee sector, including managing tree nurseries, providing pruning services, and serving as village agents to disseminate technical knowledge. For instance, participants highlighted the potential of Village Agent Models (VAMs), where youth could deliver tailored advice, oversee demonstration plots, and bridge gaps in knowledge transfer. These

roles align with the younger generation's preference for modern and innovative farming practices, offering them viable and rewarding livelihood opportunities.

Incentivizing youth engagement was recognized as a priority. Participants suggested initiatives such as competitions rewarding high-performing youth farmers with tools or other resources, mentorship programs pairing young farmers with experienced practitioners, and showcasing success stories of successful youth-led farms. One farmer remarked, "Youth love to learn through interaction and practical exposure, so events like field days and peer exchanges are very effective."

Participants also highlighted systemic barriers that need to be addressed, such as limited land ownership and access to financing for young farmers. Expanding opportunities for youth beyond traditional production roles—such as value addition, irrigation management, and soil conservation—was seen as crucial for attracting and retaining their interest. Demonstrating the long-term profitability of coffee farming through community-driven success stories was also suggested as a way to counteract perceptions of farming as low-income work.

3.5 INFORMATION FLOW AND KNOWLEDGE GAPS

FGDs revealed that issues related to information flow and access to knowledge significantly impacted farmers' decisions to adopt CSC. Participants highlighted several key challenges in this area.

Conflicting Information: Farmers identified the challenge of conflicting and inconsistent information from various stakeholders as a critical barrier to adopting CSC practices. These inconsistencies stem from divergent priorities and agendas among NGOs, government agencies, and private sector entities. For instance, some stakeholders promote specific agronomic practices, while others focus on different priorities, leaving farmers uncertain about the best course of action.

A farmer noted that messages about the benefits and risks of stumping—a crucial practice in CSC—varied significantly between stakeholders. Some encouraged it for rejuvenating productivity, while others highlighted short-term yield reductions, creating confusion and hesitation. This discrepancy highlights the need for unified messaging to foster confidence in CSC practices.

Moreover, participants expressed frustration over receiving incomplete or unclear advice. For example, while one organization emphasized planting shade trees to enhance farm resilience, it did not provide adequate guidance on selecting appropriate species or managing shading levels. Such gaps exacerbate farmers' skepticism and deter informed decision-making.

Dependence on Informal Networks: Farmers indicated a strong reliance on informal networks such as peers, local community leaders, and sometimes family members for agricultural advice and information. This preference was primarily driven by the high level of trust and relatability associated with these sources. For example, farmers frequently mentioned neighbors' successes or local leaders' advice as pivotal in shaping their practices. Specific examples from the transcripts identified trusted sources such as church leaders, community meetings, and agricultural shows, emphasizing the localized and socially rooted nature of information flow.

This reliance, while beneficial for immediate and relatable guidance, posed challenges. Farmers often received practical information but lacked depth or scientific rigor, limiting their access to innovative or up-to-date practices. For instance, participants trusted advice from agro-dealers and local influencers more than extension officers or formal advisory systems, underscoring a gap in the perceived credibility of formal institutions.

The heavy dependence on informal networks reinforces the status quo, where traditional practices are perpetuated, and innovative solutions like CSC practices face slower adoption. However, integrating

respected community figures into formal advisory systems could bridge the gap, providing trust and technical accuracy. This dual approach would enhance farmers' access to reliable information while retaining the community trust that informal networks provide.

Limited Extension Support: Farmers consistently highlighted the important role of agricultural extension services in adopting and maintaining CSC practices. However, the widespread shortage of extension officers has created significant barriers. Participants explained that the lack of timely, accessible guidance left them ill-equipped to implement new techniques effectively.

One farmer shared, “Without regular visits and follow-ups, we don’t know if what we’re doing is correct,” emphasizing the reliance on practical, expert-led support to navigate the complexities of CSC. Additionally, the limited availability of extension officers often resulted in delays in responding to pressing issues like pest infestations or crop management challenges. This delay led to reliance on informal networks for advice, which sometimes lacked the technical accuracy needed for CSC implementation.

Farmers also mentioned instances where extension officers were inaccessible due to limited coverage and stretched resources. The coverage of extension services in Kayunga was described as “sporadic and unreliable,” forcing farmers to rely on outdated practices or experimental methods. This gap has perpetuated knowledge and implementation challenges, as farmers often felt isolated in their efforts to adopt and sustain CSC practices. Participants highlighted that a single extension officer often serves a vast area, making personalized support impossible. Farmers expressed that while some extension officers provided generic advice, they often lacked specialized expertise in CSC, further diminishing their effectiveness.

4. ANALYSIS

4.1 THEMATIC ANALYSIS

ECONOMIC CONSTRAINTS AND FINANCIAL BARRIERS

This analysis highlights that economic constraints are pivotal in limiting farmers' capacity to adopt and sustain CSC practices. Financial limitations create a restrictive environment where farmers struggle to invest substantially in long-term, resilience-building practices. The cycle of constrained finances and limited access to affordable credit creates a reinforcing pattern of low reinvestment and minimal productivity. This economic fragility is compounded by unpredictable income, often tied to fluctuating coffee prices and other market conditions, exacerbating farmers' risk aversion.

In such situations, farmers prioritize immediate financial needs, such as household expenses, school fees, and daily farm maintenance. This short-term focus, driven by the necessity to ensure basic survival, prevents strategic investments that could yield long-term benefits. For example, adopting CSC practices may require significant upfront costs but promise sustainable gains. The pressure to maintain financial stability leads farmers to opt for practices that guarantee quicker, albeit smaller, returns over more innovative and potentially rewarding approaches.

Overview: Economic constraints, such as financial limitations, lack of affordable credit, and unpredictable income from fluctuating coffee prices and market conditions, create a cycle of low reinvestment and minimal productivity. This leads farmers to focus on immediate financial needs rather than long-term investments in CSC practices. The risk aversion driven by perceived financial loss, compounded by reliance on informal lending sources and unfavorable terms, prevents farmers from investing in practices that could enhance farm resilience and sustainability, slowing progress toward CSC.

The lack of access to affordable and flexible credit further reinforces this economic prioritization. High-interest rates, stringent collateral requirements, and the general reluctance of traditional financial institutions to extend favorable credit terms to smallholder farmers intensify the challenge. Farmers' reliance on informal lending sources, which often come with unfavorable terms, discourages investment in anything perceived as uncertain or long-term, such as CSC practices. This dynamic reinforces a cycle where economic vulnerability limits opportunities for growth and adaptation.

The perceived risk of financial loss further influences the reluctance to invest in CSC. The fear of investing in new practices that may not provide immediate returns or may fail due to factors beyond the farmer's control, such as erratic weather patterns or price drops and changes in demand, solidifies a risk-averse mindset. This cautious spending approach, driven by the need to avoid potential financial setbacks, means that even farmers aware of the benefits of CSC may hesitate to allocate resources to it.

The cumulative effect of these economic constraints is a persistent short-term outlook that hampers the adoption of practices capable of enhancing farm resilience and sustainability. The focus on immediate financial security over strategic, long-term investments restricts farmers' ability to break the cycle of low productivity and reinvestment, thereby slowing overall progress toward sustainable farming practices.

Systemic Implications: These economic constraints contribute to a broader systemic loop where limited financial resources result in low productivity, which, in turn, reinforces economic instability. This feedback loop (also known as the poverty trap) keeps farmers locked in a state of financial fragility, deterring them from making investments that could otherwise improve their resilience and productivity. Addressing these constraints requires a shift that balances immediate financial support with access to credit facilities and incentives that lower the perceived risks of long-term investment in CSC. Without breaking this cycle, the potential for farmers to adopt and sustain CSC practices remains limited, stifling both economic and agricultural development.

INFORMATION GAPS AND TRUST ISSUES

Analysis reveals that farmers' reliance on informal networks for information is a double-edged sword, acting as both an enabler and a barrier to adopting CSC practices. Peer networks, characterized by shared experiences and social trust, are an essential channel for disseminating knowledge and practical advice. Farmers often turn to these networks for immediate and relatable guidance, reinforcing community bonds and fostering collective learning. However, while these networks provide a foundation of trust, they also present limitations that hinder the broader adoption of innovative, scientifically-backed practices.

Over-reliance on peer networks can restrict exposure to more comprehensive, expert knowledge. Farmers may receive practical and contextually relevant information, but it is not always accurate or up-to-date.

Consequently, when new climate-smart practices (CSC incorporates additional climate-smart practices into an existing set of Good Agricultural Practices - GAPs) are introduced, the information circulating within

Overview: Farmers' reliance on informal peer networks for information, while fostering trust and community learning, limits their exposure to more comprehensive, expert knowledge necessary for adopting CSC. The inconsistency and conflicting messages from various sources, including formal advisory services, undermine trust in these institutions, leading farmers to prioritize familiar, community-based advice over scientifically-backed practices. This trust gap, combined with inconsistent messaging, creates a feedback loop that hinders the adoption of innovative agricultural practices, perpetuating outdated methods and limiting the diffusion of sustainable, science-based solutions.

informal networks may lack the depth or clarity needed for effective implementation. The trust in these networks often outweighs trust in formal sources, making farmers skeptical of or slow to adopt advice from extension services or technical experts. This trust gap can contribute to the slower adoption of new practices and hinder the effective implementation of climate-smart agriculture.

Conflicting and inconsistent information further complicates farmers' decision-making. Farmers frequently report receiving mixed messages from stakeholders, including government agencies, NGOs, and private entities. This inconsistency can cause confusion and indecision as farmers struggle to discern reliable advice amidst competing narratives. The resulting ambiguity undermines confidence in formal advisory bodies and extension services, which should provide authoritative guidance. A lack of coherence in messaging erodes trust in these formal institutions, leading farmers to default to the familiar and trusted information shared within their communities. This inconsistency weakens trust in formal sources and may lead farmers to ignore or dismiss valuable information, further hindering the adoption of climate-smart practices.

The gap between formal and informal information sources underscores the critical role of consistent and reliable communication in enabling farmers to adopt innovative practices. Informal channels, which may lack the rigor and expertise necessary for advancing sustainable practices like CSC, fill the void when formal sources fail to maintain consistent and clear messaging. This gap highlights a fundamental challenge in agricultural development: bridging the trust divide between expert advisory services and farmers who rely heavily on peer validation and experience-based learning.

Systemic Implications: Reliance on informal networks and inconsistent information from formal sources creates a feedback loop that reinforces the status quo. When farmers do not trust or cannot access reliable expert advice, they are more likely to perpetuate familiar practices, even if they are less effective in the long term. This cycle perpetuates reliance on anecdotal evidence and potentially outdated methods, limiting the diffusion of innovative, science-based approaches like CSC.

SOCIAL NORMS AND COMMUNITY INFLUENCE

Overview: Social validation and community recognition are powerful motivators for adopting CSC practices. Farmers who successfully implement CSC gain respect and social proof, encouraging others to follow suit. However, deeply

Analysis highlights that social validation within farming communities is a powerful motivator for those who engage in CSC. Farmers who successfully adopt and implement CSC practices often gain recognition and respect from their peers, reinforcing their commitment. This community recognition creates a form of social proof that can promote the adoption of new behaviors, as farmers seek to align with those perceived as progressive and successful.

However, entrenched cultural beliefs and norms pose significant challenges to shifting from traditional methods to more sustainable, long-term practices. These norms often prioritize tried-and-true methods that offer immediate or short-term gains, aligning with the community's established ways of working. This collective mindset creates a self-reinforcing cycle where deviation from traditional practices is met with skepticism or resistance. Farmers may fear social judgment or economic loss, discouraging them from adopting innovative approaches that deviate from the norm, even if they promise greater benefits over time.

Hesitation to adopt climate-smart coffee (CSC) practices can often be linked to the influence of community conformity, where farmers prefer to adhere to established norms that have historically ensured stability, even at the cost of future gains. In many cases, this conformity acts as both a barrier

to innovation and a mechanism that perpetuates current, traditional practices. The perception that familiar, conventional methods are reliable and safe leads to a reluctance to experiment with or adopt new practices, especially when the broader community may view them as risky or unnecessary.

This dynamic is clearly illustrated in the discussions, where some farmers continue to use suboptimal tools such as machetes for stumping, despite knowing that proper tools like pruning saws would be more effective. In this case, the barrier to adopting climate-smart practices is a combination of knowledge gaps (e.g., not fully understanding the correct method for stumping) and economic constraints (e.g., the inability to afford the necessary tools). Furthermore, a lack of availability of these tools in the local market can further hinder the adoption of more efficient practices. While the knowledge of the correct method may exist, financial limitations restrict the farmers' ability to implement the best practices, resulting in the continued use of outdated methods.

However, there are also cases where the community's resistance to adopting new practices is not due to lack of knowledge or resources, but rather deeply rooted cultural beliefs and social norms. For example, farmers may resist practices like intercropping or other forms of agroforestry, not because they don't know how to implement them, but because such methods are viewed as incompatible with the traditional, monoculture coffee farming systems that have been practiced for generations. These cultural attitudes make innovation seem unnecessary or risky, despite potential long-term benefits. In such situations, the challenge is not about providing additional information or tools, but rather about addressing deeper cultural perceptions that view new practices as threatening to established ways of life.

Systemic Implications: The impact of social norms creates a reinforcing feedback loop that can either accelerate or impede the adoption of CSC practices. When community leaders or influential farmers advocate for and visibly benefit from CSC, it creates a ripple effect where others in the community are more likely to follow suit. However, if the majority view CSC as unnecessary or too risky, adoption rates remain low, and traditional practices dominate.

LABOR SHORTAGES AND KNOWLEDGE TRANSFER

The scarcity of skilled agricultural labor is a significant barrier to implementing CSC practices effectively. While these techniques don't necessarily require highly specialized skills, they do demand proper training and exposure for effective execution. The reliance on untrained labor affects both the quality and consistency of practices. The challenge lies not only in the availability of expertise but in the lack of training and resources, which limits farmers' ability to implement more advanced agricultural techniques. This issue is compounded by financial constraints, where farmers struggle to afford skilled labor or appropriate tools, such as pruning saws for stumping or equipment for irrigation. Moreover, the disconnect between traditional practices and more innovative techniques further exacerbates the labor shortage, as the community tends to favor familiar methods over new, sustainable ones.

Limited technical support exacerbated this challenge by leaving farmers without the guidance needed to bridge the gap between existing knowledge and the effective application of CSC. While extension officers and agricultural experts play a crucial role in transferring knowledge and supporting farmers, participants noted that these services were not readily available or accessible. This gap in technical support left farmers feeling isolated in their efforts to adopt new practices, leading to inconsistent implementation and lower rates of successful CSC adoption.

The combination of labor shortages and limited technical assistance impacts the speed and efficacy of knowledge transfer within farming communities. While the shortage of skilled labor affects the implementation of high-intensity land adjustment tasks such as trenching or pitting, the greater

challenge often lies in the lack of unskilled labor for these tasks. In the absence of expert advice, farmers increasingly rely on peer-to-peer learning, which, though valuable, may not provide the depth or accuracy required for effective CSC implementation. This reliance can delay adoption, as farmers often wait for successful outcomes among peers before attempting new practices themselves. Consequently, the combination of labor constraints and limited access to expert guidance slows the adoption of climate-smart practices.

Systemic Implications: The shortage of skilled labor and limited technical support creates a reinforcing cycle that perpetuates low adoption rates for CSC. Farmers who struggle to implement these practices due to labor shortages may experience suboptimal outcomes, reinforcing a perception that CSC is not worth the effort or risk. This perception, in turn, discourages further investment in training or hiring skilled labor, perpetuating the cycle.

HOUSEHOLD AND GENDER DYNAMICS

Analysis of household dynamics reveals that patriarchal structures, concentrating decision-making power in male heads of households, significantly impact the adoption of CSC practices. These structures often limit input from other family members, particularly women and youth, who could contribute valuable perspectives and innovative approaches. This concentration of power stifles collaborative decision-making and reduces the collective commitment necessary for successful CSC implementation.

Excluding women and younger family members from decision-making not only limits the variety of ideas but also restricts the household's ability to adopt adaptive strategies that account for different viewpoints. Women and youth often bring unique insights and a willingness to experiment with new practices that could improve farm resilience. However, traditional gender roles that marginalize their voices mean these perspectives are rarely considered, resulting in a lack of diversity in problem-solving and strategic planning.

This limited participation can also affect the motivation and engagement of household members. When decisions are centralized, the broader family may not feel ownership over the farm's operations or outcomes. This lack of shared responsibility can reduce overall commitment to implementing new practices, as members are less likely to invest their time, effort, or innovative ideas into initiatives where they have little say. Consequently, the adoption of CSC practices may be perceived as solely the responsibility of the decision-maker, limiting widespread support and effort within the household.

Systemic Implications: The patriarchal structure of decision-making within households creates a reinforcing loop that perpetuates traditional practices. This cycle can be described as a decision-diversity barrier, where the exclusion of women and youth results in a narrower range of ideas and solutions. This barrier prevents households from fully exploring adaptive strategies that could be more effective in addressing challenges related to CSC adoption.

The lack of diverse input also hampers the household's ability to respond dynamically to changing conditions, such as climate variability or market shifts. Without broader participation, strategies may remain rigid and less adaptable, making households more vulnerable to challenges that require innovative and flexible solutions.

4.2 BEHAVIORAL TRIGGERS AND OBSERVATIONS

ECONOMIC PRIORITIZATION AND SHORT-TERM FOCUS

Farmers' decision-making often prioritizes immediate economic stability due to financial limitations. This focus on short-term gains over long-term benefits reflects the challenge of balancing daily survival needs with the potential advantages of strategic, future-oriented investments. Immediate financial pressures, such as household expenses, school fees, and basic living costs, often outweigh considerations for long-term investments like CSC, which may not yield immediate returns but promise resilience and profitability over time. This short-term prioritization leads farmers to choose conventional farming methods that provide predictable, albeit limited, returns. The need to ensure current financial stability results in decision-making patterns that forego innovative practices that could enhance long-term productivity and environmental sustainability. Consequently, despite awareness of CSC's potential benefits, the urgent need to meet immediate financial obligations creates a barrier to change.

Observations:

- **Risk Management and Aversion:** Farmers exhibit risk-averse behavior, particularly when future returns are uncertain or delayed. The possibility of short-term financial loss discourages investment in practices that do not guarantee immediate payoffs.
- **Present-Focused Decision-Making:** The emphasis on securing short-term gains discourages allocating resources toward practices perceived as long-term projects. This mindset prevents investments that might strengthen farms' future sustainability and productivity.
- **Reinforced Financial Constraints:** The cyclical nature of prioritizing short-term returns over long-term strategies perpetuates a loop of low reinvestment and limited income growth, reinforcing economic constraints over time.

Systemic Implications: The emphasis on short-term financial stability significantly impacts the adoption of CSC practices. It creates an environment where sustainable agricultural investments are secondary to immediate economic needs. To shift this perspective, strategies that align CSC benefits with tangible, short-term incentives may be necessary. Creating mechanisms that mitigate the financial risks associated with CSC adoption—such as subsidies, grants, or guaranteed market access—could help balance the trade-offs between short-term financial needs and long-term agricultural gains.

COMMUNITY-DRIVEN DECISIONS

The influence of social norms and peer behavior emerged as a significant driver in farmers' decision-making. Farmers demonstrated a strong reliance on community validation and social proof, where observing the actions and outcomes of their peers shaped their choices. This reliance often motivated farmers to adopt practices seen as successful within their social circles, reinforcing behaviors that conformed to accepted norms.

The positive side of this dynamic is that farmers who witnessed peers achieving benefits from CSC were more likely to adopt similar practices. Community validation provided assurance and reduced the perceived risk of trying new methods. Farmers tended to value the experiences of those within their immediate networks over external advice, making peer influence a powerful tool for fostering change when aligned with progressive practices.

However, this same reliance could also constrain innovation. Farmers were less inclined to deviate from established practices when community norms favored traditional farming methods or short-term gains. If most of their peers were risk-averse or resistant to change, it created a reinforcing cycle that discouraged experimentation and slowed the adoption of more sustainable, long-term solutions like CSC.

Observations:

- **Herd Behavior:** The influence of community-driven decision-making plays a significant role in shaping the adoption of CSC practices. A key observation from the discussions was the prominence of herd behavior, where farmers tend to mirror the actions of their peers to align with perceived safe or accepted practices. This behavior is especially evident in communities where traditional farming methods dominate, and farmers follow the collective trend rather than experimenting with innovative practices independently. For instance, one farmer shared that seeing a neighbor improve yields after adopting new methods reassured them, making them more inclined to try similar techniques. This illustrates how social validation within the community can motivate farmers to try new practices, reinforcing the influence of peer behavior in promoting CSC adoption.
- **Conformity to Norms:** Conformity to norms also emerged as a barrier to innovation. Social pressure to conform within the community often discouraged farmers from adopting practices outside the traditional methods, even when they recognized the potential benefits of CSC. For example, farmers who attempted new practices sometimes faced skepticism or resistance from others in the community. As one farmer expressed, "If it fails, everyone will talk about it," highlighting how the fear of social judgment can deter experimentation and reinforce adherence to traditional practices. The deeply ingrained focus on short-term gains over long-term sustainability creates a cycle where innovation is stifled, and farmers hesitate to adopt climate-smart practices, despite their potential advantages.
- **Influence of Success Stories:** On the other hand, the influence of success stories played a key role in motivating farmers to adopt CSC practices. Positive examples from peers who successfully implemented CSC techniques acted as tangible evidence that new methods could yield better results and increased profitability. For example, one participant shared that seeing their neighbors achieve better outcomes with new techniques helped them believe that adopting similar practices could be beneficial. This reflects the power of observational learning, where visible success within the community serves as a trigger for behavioral change. The observed improvements in farm productivity instilled confidence in others, creating a ripple effect of CSC adoption driven by peer influence.

Systemic Implications: Reliance on community-driven decisions has broad implications for scaling CSC adoption. While peer influence can promote positive change, it also highlights the need for strategies that shift collective attitudes and introduce trusted local champions of innovation. When peer leaders or respected figures demonstrate the benefits of CSC, it can create a ripple effect that encourages wider acceptance. However, without these examples, farmers may adhere to risk-averse behaviors, prioritizing established methods.

COGNITIVE AND PRACTICAL BARRIERS

Farmers' experiences with labor shortages and limited access to technical support have highlighted critical cognitive and practical barriers that affect their ability to adopt CSC practices. The mental burden of managing daily farming operations and the complexity of learning and implementing new methods often lead to cognitive overload. This overwhelming feeling of being stretched too thin

discourages farmers from pursuing new, labor-intensive practices, which are seen as complex and requiring additional effort. As a result, farmers tend to prefer simpler, familiar routines that involve less risk and effort, even if those methods are less efficient or sustainable in the long term.

When facing cognitive overload, farmers are more inclined to revert to established practices they feel comfortable with, even though these may not be the most productive or environmentally sustainable in the long term. This preference for familiar methods creates a cycle of minimal change, reinforcing the status quo and slowing the adoption of more innovative practices. The lack of technical support exacerbates this issue, as farmers often lack the structured guidance to navigate the transition to new practices. With insufficient access to extension services or expert support, farmers feel overwhelmed and unsupported in adopting more complex climate-smart techniques.

Observations:

- **Cognitive Load:** The effort required to understand and integrate complex CSC practices was often perceived as excessive, leading to decision fatigue. Farmers tended to prioritize daily tasks over learning new techniques, missing opportunities for innovation.
- **Default to Familiarity:** Faced with practical and mental barriers, farmers were inclined to choose established, less demanding practices manageable with existing knowledge and resources. This default to familiarity sustained traditional methods and slowed CSC adoption.
- **Gaps in Support:** Limited access to extension services and expert support left farmers with insufficient resources to tackle cognitive and practical challenges effectively. This gap meant farmers often lacked the necessary reassurance or technical assistance that could have alleviated cognitive stress and encouraged change.

Systemic Implications: The cycle of cognitive overload and practical constraints has systemic implications for CSC adoption. Without addressing these barriers through targeted interventions that provide accessible training and reduce implementation complexity, farmers will likely continue adhering to familiar practices. Simplified training programs and information, consistent technical support, and practical demonstrations that break down complex techniques into manageable steps can be essential in overcoming cognitive barriers and promoting sustainable change.

AUTHORITY AND HOUSEHOLD DYNAMICS

Household decision-making dynamics played a crucial role in shaping farm-related choices. Findings indicated that decision-making was often centralized around male heads of households, reinforcing authority biases and limiting collaborative approaches. This structure frequently excluded the perspectives of women and youth, whose contributions could have introduced new ideas and diversified approaches to farm management.

Concentrating decision-making power in a single authority figure restricted innovative thinking and dampened shared responsibility and commitment to new practices like CSC. The lack of inclusivity in decision-making meant the potential for holistic, adaptive solutions was reduced, as alternative viewpoints were not considered or valued.

Observations:

- **Authority Bias:** Decisions were typically influenced by the authority of the male household head, minimizing input from other family members. This bias reinforced existing power structures and discouraged collaborative discussions that might have led to more varied and creative solutions.
- **Exclusion of Voices:** Women and youth, who might offer different perspectives or be more open to adopting innovative practices, were often excluded from critical decisions. This

exclusion limited the range of ideas and reduced the household's adaptability to changing circumstances.

- **Hindered Innovation:** Reliance on a single decision-maker created an environment resistant to change. The absence of diverse input stifled the potential for innovative thinking and collaborative problem-solving, leading to continued adherence to established methods.

Systemic Implications: Authority and household dynamics that favor centralized decision-making contribute to a cycle where traditional practices are maintained, and new, potentially beneficial practices like CSC face resistance. Interventions aimed at fostering inclusive decision-making within households could encourage a broader sense of ownership and collaboration, paving the way for more innovative and resilient strategies. Programs emphasizing shared decision-making and the active involvement of all household members, including women and youth, can help shift entrenched norms and promote a more adaptable, forward-thinking approach to farm management.

5. BEHAVIORAL INSIGHTS

The findings from the co-creation workshops reveal deep-rooted behavioral and cognitive factors that significantly impact the adoption and reinvestment in CSC. This section explores these insights, focusing on the psychological and social dynamics at play.

5.1 ECONOMIC PRIORITIZATION AND SHORT-TERM FOCUS

A key behavioral insight from the workshop discussions is farmers' tendency to prioritize immediate economic stability over long-term investments, which indicates present bias. In this cognitive tendency, immediate rewards are valued more than future benefits, even when the future benefits are larger. This bias is especially pronounced among coffee farmers who often operate under tight financial constraints, where managing household expenses, such as school fees and daily living costs, takes precedence over long-term sustainability.

Farmers revealed that they often default to conventional farming methods that yield quicker, though smaller, returns instead of investing in CSC practices. While CSC offers greater resilience and profitability over time, it requires initial investment and patience—qualities that seem uncertain when immediate financial pressures loom large. This decision-making pattern is driven by the need to meet immediate financial demands, making short-term stability a more urgent consideration than future benefits. As one farmer noted, "We stick to what works for now because we need to be sure we can provide for our families," reflecting how short-term financial pressures shape the focus on conventional methods.

This emphasis on immediate returns results in a cycle of low reinvestment and continued reliance on practices that do not address long-term sustainability. Despite recognizing the potential of CSC, the fear of financial instability and the inability to access immediate returns discourage farmers from shifting toward more sustainable practices, reinforcing the status quo.

5.2 THE CYCLE OF ECONOMIC CONSTRAINTS AND DECISION-MAKING

The behavior observed is further reinforced by the cycle of economic constraints. Limited financial resources and access to affordable credit push farmers into a pattern where low investment leads to minimal productivity, which then perpetuates economic fragility. This cycle can be difficult to break, as farmers feel compelled to prioritize strategies that minimize immediate financial risk, even at the cost of future gains.

Farmers in the workshops expressed a common concern: “Investing in new methods is hard when you are unsure if you’ll have enough for next month.” This highlights how the need for financial security dictates their decisions. Even when the benefits of CSC are understood, the uncertainty surrounding its implementation and potential delays in seeing results contribute to a reluctance to commit resources. This behavior aligns with the broader economic reality where farmers weigh the perceived risks of change against guaranteed returns from familiar practices, albeit lower. To shift behavior toward long-term planning, interventions need to address both the cognitive and practical aspects of decision-making with solutions such as flexible loan programs specifically tailored for smallholder farmers that offer favorable terms and lower collateral requirements. Additionally, demonstrating quick wins through pilot programs or phased CSC adoption strategies can showcase tangible short-term benefits, helping to bridge the gap between immediate needs and future gains.

5.3 COGNITIVE AND PRACTICAL BARRIERS

Farmers' ability to implement CSC practices is significantly impacted by cognitive and practical challenges, including labor shortages and limited technical support. The mental effort required to learn and apply new CSC techniques amidst the ongoing demands of daily farming creates cognitive overload. This strain leads to decision fatigue, where the sheer mental and physical demands of trying to adopt new practices cause farmers to default to familiar, simpler methods that require less cognitive and practical investment.

The absence of consistent technical support compounds this issue. Farmers are often left to navigate new techniques without sufficient guidance, making the transition to CSC feel daunting and complex. The workshops revealed that the limited reach of extension services left many farmers feeling isolated in their efforts to adopt innovative practices. One farmer remarked, "Without someone to show us how to do it step-by-step, it's easier to just keep doing what we know." This sentiment illustrates how the combination of cognitive burden and lack of support creates a cycle of inertia where innovation is stifled, and established practices persist. To address these barriers, strategies that reduce cognitive load should be prioritized. Phased training programs and information that break down CSC practices into manageable steps can make the learning process less overwhelming. Simplified, practical instructions and demonstration plots that show CSC methods in action can provide farmers with clearer, more digestible ways to implement changes. The presence of consistent support from extension officers or community-based technical advisors can also provide reassurance and reduce the mental burden associated with adopting new practices.

5.4 SOCIAL NORMS AND COMMUNITY INFLUENCE

The influence of social norms emerged as a significant factor in farmers' decision-making processes. Social norms acted as both enablers and barriers, depending on the prevailing attitudes within the community. The workshop highlighted that farmers often looked to their peers for validation and guidance—a reliance on social proof where observing the successful actions of others reinforced their own willingness to try similar practices. One participant shared, “When I saw my neighbor getting better yields after trying new methods, I thought maybe it’s worth trying too.” This shows how positive peer examples can motivate adoption.

Conversely, the workshops also revealed how entrenched cultural beliefs that favor traditional methods create resistance to change. These beliefs, often passed down through generations, can make farmers hesitant to experiment with new approaches for fear of social judgment or failure. This reluctance was noted in comments such as, “Trying something new is risky. If it fails, everyone will talk about it.” This fear of social judgment can discourage farmers from deviating from established practices, even if they are aware of the potential benefits of CSC. Strategies that leverage respected community members or early adopters as champions of CSC can help shift these social norms. When trusted figures endorse new practices and demonstrate their benefits, it can create a ripple effect that fosters a more supportive environment for innovation. Additionally, community-based programs that celebrate and share stories of CSC success can build momentum and reduce the stigma around trying new methods. Creating platforms where farmers can discuss and learn from each other's experiences can also reinforce a collective willingness to adapt and adopt new practices.

5.5 AUTHORITY AND HOUSEHOLD DYNAMICS

Patriarchal structures that centralize decision-making within male heads of households significantly affect how farm-related choices are made. This hierarchical arrangement limits the involvement of women and youth, whose input could introduce valuable perspectives and innovative approaches. Such an authority-driven system often results in authority bias, where decisions are influenced by the established leader, reducing the likelihood of collaboration and exploration of diverse ideas.

This dynamic was apparent in workshop discussions, where participants noted that male-dominated decision-making stifled adaptive and creative strategies. One participant shared, “The man decides how to use the earnings, and the rest of the family may not know or participate in important decisions.” This comment underscores the restrictive nature of such structures, where inclusive, collaborative input is minimized, reinforcing existing practices rather than fostering new ones. The status quo bias prevalent in patriarchal systems discourages the adoption of new methods, as changing established practices can be perceived as risky or unnecessary. This results in households adhering to conventional techniques, even when these are less effective for long-term sustainability. Encouraging inclusive decision-making within households can lead to a more diverse range of ideas and strengthen the commitment to CSC practices. Programs that promote shared responsibility and active participation from women and youth can create an environment where collaborative problem-solving thrives. Training initiatives focused on household decision-making processes and the benefits of cooperative strategies can help break down traditional barriers and introduce more adaptive farming approaches.

5.6 INFORMATION GAPS AND TRUST ISSUES

The discussions revealed that farmers' reliance on informal networks for guidance plays a dual role in their decision-making process. On the one hand, peer networks, built on social trust, allow farmers to share practical, experience-based knowledge that is often immediately relevant. On the other hand, this reliance limits their exposure to more comprehensive, expert-led information, which restricts their understanding of scientifically validated CSC practices. As a result, farmers may lack the necessary technical depth to fully implement CSC techniques, relying instead on methods that are more familiar but less sustainable in the long term.

A critical issue that emerged from the discussions is the conflicting advice provided by various stakeholders, such as NGOs, government agencies, and private sector actors. This inconsistency creates confusion and uncertainty, leading to hesitation in adopting new practices. For instance, one farmer expressed, "Many stakeholders convey mixed messages, each with their own agenda, making it hard to know what's true." This contradictory information further exacerbates cognitive dissonance, where farmers struggle to reconcile differing sources of advice and default to familiar, trusted sources, even if those sources offer outdated or incomplete guidance. This reliance on familiarity and reliability over novelty or uncertainty is a key example of cognitive bias, where farmers favor the known over potentially more beneficial but less familiar alternatives.

Another critical aspect is the erosion of trust in formal advisory services. The lack of consistency in messaging, combined with the perceived inaccessibility and irrelevance of formal support systems, has undermined farmers' confidence in technical extension services. Without trust in these services, farmers turn increasingly to peers and local community leaders, reinforcing a cycle where informal networks become the primary source of agricultural guidance. This reliance perpetuates the trust gap and limits the transfer of accurate, up-to-date knowledge, making it difficult to adopt climate-smart practices effectively.

The systemic implications of these information gaps are significant. Inconsistent messaging from formal sources and the dominance of informal networks contribute to a fragmented approach to agricultural development.

6. CONCLUSION

This report validates the assumption that coffee farmers in Kayunga are willing and able to adopt CSC practices. Still, their ability to scale these practices depends on overcoming various barriers. These barriers, identified throughout the discussions, include economic constraints, cognitive overload, social norms, and information gaps, which limit farmers' capacity to embrace and sustain CSC practices fully. Addressing these challenges is essential to fostering farmers' willingness and ability to adopt sustainable farming practices at scale.

Farmers are willing to adopt CSC practices, recognizing their long-term benefits, such as increased resilience to climate change and greater profitability. However, their ability to fully implement these practices is constrained by economic pressures prioritizing short-term financial stability over long-term investments. The immediate need to meet household expenses, such as school fees and daily living costs, leads farmers to favor conventional farming methods that provide quicker, albeit smaller, returns. This present bias makes it difficult for farmers to invest in practices that require initial outlay and patience, even though they recognize the future benefits of CSC.

Social dynamics and peer influence also play a significant role in shaping farmers' adoption of new practices. While peer networks offer valuable support and guidance, they can also limit farmers'

exposure to expert-led knowledge and scientifically validated techniques. The trust gap between informal networks and formal advisory bodies further exacerbates the challenge, with farmers often opting for familiar but potentially outdated information over newer, more effective CSC methods. This reliance on informal sources highlights the importance of building trust in formal advisory services through consistent messaging and collaboration with trusted community leaders.

Cognitive barriers, including information overload and the complexity of learning new practices, also discourage farmers from adopting more labor-intensive CSC techniques. The overwhelming mental burden of managing daily operations and limited technical support leads farmers to revert to established methods that are easier to implement but less effective in the long term. Addressing these barriers requires simplified training, practical demonstrations, and more accessible expert guidance to alleviate cognitive stress and support farmers in adopting new techniques.

Despite these barriers, there is strong evidence that farmers are willing to embrace change when they can see the benefits of new practices, particularly through success stories from their peers. Visible improvements in farm productivity serve as powerful motivators, and when these success stories are shared within communities, they encourage broader adoption of CSC practices. Therefore, harnessing the power of social proof by disseminating local success stories is critical to driving wider adoption of CSC.

In conclusion, while the willingness of farmers in Kayunga to adopt CSC practices is evident, their ability to scale these practices is contingent upon addressing the multifaceted barriers they face. Economic incentives, such as subsidies or access to credit, inclusive decision-making within households, enhanced technical support, and trust-building efforts, are key to empowering farmers to overcome these challenges. By aligning the needs of farmers with the long-term goals of sustainable agriculture, the path to scaling CSC practices can be significantly accelerated. The success of CSC adoption in Kayunga lies in the ability of all stakeholders, including government, NGOs, private sector actors, and the farmers themselves, to collaborate and create an enabling environment that supports immediate and future agricultural sustainability.

7. CO-CREATION

6.1 MESSAGING FRAMEWORK

The co-creation workshops led to developing a messaging framework tailored to address specific barriers and motivators identified during the Kayunga FDGs. This framework was collaboratively crafted, engaging the group to reflect the perspectives and real-life experiences of those directly involved in or affected by CSC practices.

Objectives of the Messaging Framework

The messaging framework aims to enhance the adoption and sustainable implementation of CSC practices among Kayunga coffee farmers by crafting targeted, contextually relevant messages. These messages were designed to:

- Overcome identified behavioral and socio-economic barriers to CSC adoption.
- Utilize motivational triggers that align with farmers' values, social norms, and economic aspirations.
- Integrate behavioral science principles to create compelling and relatable communications.
- Establish a shared understanding and social proof that supports a community-wide shift toward CSC practices.

Insights from Co-Creation

Co-creation sessions highlighted the need to tailor messages that resonate across different demographic segments—men, women, and youth—each with distinct motivators, challenges, and roles in coffee. The messaging framework drew on key insights from behavioral economics and social behavior change theories to ensure alignment with real-world farmer behaviors and attitudes.

- **Men: Economic Empowerment and Prestige-** Men expressed that financial stability and social status were powerful motivators for adopting CSC practices. They valued seeing tangible benefits and sought recognition for their efforts. This reflects a desire for economic advancement and a need to fulfill traditional roles as providers and leaders within their communities.
- **Women: Household Stability and Resilience-** Women emphasized household security, financial stability, and their roles in managing family well-being. They were influenced by outcomes that benefited their families and communities, underscoring their focus on collective well-being and long-term stability.
- **Youth: Modern Farming and Immediate Rewards-** Youth participants sought modern, innovative approaches to farming and were motivated by short-term achievements and financial gains. They showed an inclination toward using technology and valued learning new skills. This reflects a desire for progress, a receptiveness to new technologies, and a need for tangible, immediate outcomes to maintain motivation.

Channels and Modes of Communication

To ensure maximum reach and engagement, co-creation workshops identified these effective channels for disseminating messages:

- **Radio Shows and Talk Programs:** Engaging farmers and community members by featuring successful stories and expert advice on widely listened-to radio stations, capitalizing on the accessibility and popularity of this medium.

- **Social Media and Digital Platforms:** Utilizing platforms like TikTok and WhatsApp to share short videos, success stories, and interactive content targeted at youth, leveraging their familiarity and engagement with digital media.
- **Community Events and Farmer Field Days:** Providing hands-on demonstrations and real-time showcases of CSC benefits, allowing farmers to experience the practical advantages firsthand.
- **Printed Educational Materials:** Posters, pamphlets, and simplified guidebooks, translated to local languages, distributed at community centers and local events to reach women and older demographics with limited access to digital channels or prefer traditional communication methods.
- **Cultural and Educational Dramas:** Creating dramas and songs that embed CSC messages, tapping into local traditions and oral storytelling to reinforce learning and appeal to cultural preferences.

Table 1: Co-created Message matrix

Audience	Core Message Theme	Key Motivators and Behavioral Drivers	Behavioral Science Principle	Proposed Communication Channels	Message Example/Slogan
Men	Economic Empowerment and Prestige	Recognition within the community, financial success, long-term investment benefits	Prospect Theory (emphasis on potential gains), Social Proof (peer validation)	Radio programs, farmer field days, community meetings	"Emwanyi maama waffe – Coffee secures our legacy and future."
Women	Household Stability and Resilience	Family security, enhanced income for household needs, community support	Loss Aversion (fear of losing stability), Social Norms (family well-being focus)	Printed educational materials, community dramas, local council meetings	"Emwanyi ddembe lyaffe – Coffee is our path to prosperity and peace."
Youth	Modern Farming and Immediate Rewards	Access to new technology, modern farming skills, quick wins, employment opportunities	Present Bias (focus on immediate rewards), Innovation Motivation	Social media (TikTok, WhatsApp), youth-centric events, digital animations	"Emwanyi sente – My coffee, my prosperity."
General Farmers	Tangible Success Stories	Real-life examples of success, learning from peers, visible results	Social Proof (seeing others succeed), Cognitive Dissonance Reduction (aligning behavior with observed success)	Radio talk shows, farmer exchange visits, agricultural exhibitions	"Zaabu mwany ndabirile – Coffee, our unseen gold."
Community Leaders	Community Development and Leadership	Position as a community influencer, fostering collective economic growth	Authority Bias (respect for community leaders), Social Responsibility	Community meetings, radio interviews, training workshops	"Emwanyi esomesa omwana nga tenakungurwa – Coffee educates our children even before it's harvested."

Audience	Core Message Theme	Key Motivators and Behavioral Drivers	Behavioral Science Principle	Proposed Communication Channels	Message Example/Slogan
Extension Officers and Experts	Trust and Expert Validation	Sharing expert knowledge, supporting farmers through challenges	Availability Heuristic (access to trusted information), Reciprocity (support breeds loyalty)	Demonstration farms, interactive workshops, direct farmer visits	"Practice CSC and see your yields thrive – support is here to guide you."