CGIAR SCALING FOR IMPACT

International Water Management Institute

REPORT

Building Scaling Readiness for Inclusive Mechanization in Zambia: Insights from the Training of Trainers and Mechanization Awareness Meetings

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We also recognize the continued support and collaboration of national and regional partners, whose engagement ensures that the solutions developed are responsive to local needs, strengthen innovation systems, and contribute to building more resilient agrifood systems.

About CGIAR Scaling for Impact (S4I) Program

Scaling for Impact (S4I) is a CGIAR program (2025–2030) that tests, refines, and scales innovations in food, land, and water systems. It works to align those innovations with stakeholder needs to achieve transformative impact.

Website: https://www.cgiar.org/cgiar-research-porfolio-2025-2030/scaling-for-impact/

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Front cover photo: a Mechanization Awareness Meeting with farmers in Sinda District, Zambia, organized by CIMMYT. (*photo:* Winnie Kasoma-Pele)
Back cover photo: farmers during a Mechanization Awareness Meeting in Petauke District, Zambia, organized by CIMMYT. (*photo:* Winnie Kasoma-Pele)

Contents

1. Introduction

This report presents findings from the April 2026 Training of Trainers (ToTs) and Mechanization Awareness Meetings conducted under the Scaling for Impact (S4I) Program for Area of Work 2 (AoW2) on Scaling Inclusive Mechanization through Rural Entrepreneurship and Financial Innovation solution track in Zambia.

Creating an inclusive, enabling environment is essential to ensuring that innovations move beyond isolated pilots and achieve sustainable, large-scale impact. In most developing-country contexts, promising innovations often face systemic barriers, including policy incoherence, weak market incentives, limited institutional capacity, and societal constraints, that hinder their adoption and scaling (Arboleda-Muñoz et al., 2026). Recognizing these barriers, the CGIAR Scaling for Impact (S4I) Program adopts a whole-of-CGIAR, transdisciplinary approach that combines research, partnerships, and practical scaling strategies to strengthen the policy, institutional, and market conditions required for innovations to achieve sustainable impac**t.** In doing so, the program seeks to amplify the impact of CGIAR's technological, social, policy-related, and procedural innovations by accelerating their uptake and embedding them within supportive innovation systems. The program is grounded in the recognition that many past failures in scaling innovations stem from limited transdisciplinary collaboration, inadequate planning, poor responsiveness to emerging challenges or opportunities, and constraints within the broader enabling environment. To address these gaps, science must evolve rapidly, generating scalable innovations that are resilient to today's complex challenges and tomorrow's climate.

While the Inclusive Mechanization Solution Track (AoW2) focuses on scaling an inclusive mechanization service-provider (MSP) model through rural entrepreneurship and financial innovation, the Enabling Environment Lab under Area of Work 3 (AoW3) provides the systems perspective needed to understand and address the policy, institutional, market, and social factors that influence whether the innovation can be adopted and sustained at scale. The ToTs and Mechanization Awareness Meetings, therefore, served not only as implementation activities to recruit and prepare potential MSPs, but also as opportunities to identify enabling-environment constraints and opportunities that can inform more inclusive and effective scaling of the innovation. Its primary objective is to address the core challenges that most innovations fail not due to shortcomings in their technical effectiveness, but because the enabling environment is not conducive to their uptake. Key activities under AoW3 aim to identify policy gaps, market failures, institutional weaknesses, and normative constraints that hinder the adoption of innovations, and to provide evidence-based solutions to overcome them.

This includes generating decision-relevant diagnostics, strengthening institutional capacity, and developing pathways for science to influence policy and practice. Importantly, AoW3 also emphasizes inclusivity and systems transformation to ensure that scaling processes are not only efficient but also equitable. By integrating gender equality and social inclusion (GESI) considerations and addressing barriers faced by women, youth, and marginalized groups, AoW3 contributes to a more inclusive development outcome.

Within this integrated framework, the Inclusive Mechanization Solution Track led by CIMMYT in collaboration with IWMI and the Alliance for Bioversity-CIAT aims to scale climate-smart, affordable, and accessible mechanization services for smallholder farmers in Zambia through a market-based, entrepreneurship-driven model. Its primary objective is to build a sustainable ecosystem of Mechanization Service Providers (MSPs), particularly targeting women and youth, who can deliver pay-per-use services to smallholder farmers. Building on a successful MSP model in Zimbabwe, the innovation aims to scale appropriate machinery, tailored financial products (including risk-sharing mechanisms), and capacity building in technical and business skills. This is to support smallholder farmers in reducing labor constraints, increasing agricultural productivity, and improving resilience to climate shocks. At the same time, it aims to stimulate rural enterprise development, enhance market access, and promote inclusive participation in agrifood systems, ensuring that marginalized groups benefit both as service providers and users of mechanization innovations.

The MSP innovation remains a much-needed approach in Zambia, where smallholder farming systems are driven by low levels of agricultural mechanization, limited access to appropriate machinery, mechanization services, maintenance facilities, and technical training (Ministry of Agriculture, 2024; Sims et al., 2014; Mulungu et al., 2025). These constraints are particularly pronounced among women and youth, who face additional barriers including insecure land tenure, lower ownership of productive assets, limited access to finance and extension services, restrictive gender and social norms, and weak participation in mechanization-related networks and enterprises (FAO, 2023; Thesis et al., 2019; Canton, 2021).

Against this background, the MSP innovation in Zambia under the S4I program was designed as a bundled solution to:

- Enable access to low-cost, multi-purpose machinery (e.g., two-wheel tractors, rippers, direct seeders, shellers, and postharvest equipment)
- Provide tailored financial products with risk mitigation
- Provide comprehensive technical and business training.
- Provide comprehensive technical and business training.

This workshop was therefore in response to one of its interventions on inclusive recruitment and training of potential MSPs and partners on mechanization packages. With a strong inclusion component led by IWMI, the goal was not only to promote mechanization technologies but also to build a more inclusive service ecosystem in which extension actors, machinery suppliers, and service providers can support broader farmer access to mechanization.

The long-term scaling ambition of the Inclusive Mechanization Solution Track is to establish a self-sustaining, market-driven ecosystem that enables smallholder farmers to access climate-smart mechanization services through commercially viable and socially inclusive Mechanization Service Providers (MSPs) capable of expanding access well beyond the initial project districts. Rather than directly delivering mechanization services, the project seeks to strengthen the institutions, partnerships, market systems, financing mechanisms, and human capacity required for decentralized expansion.

1.1 Why Training of Trainers Matters for Inclusive Mechanization

In the S4I program, scaling is understood as the deliberate process of expanding, deepening, and institutionalizing the use of proven innovations within food, land, and water systems. For the MSP mechanization model in Zambia, ToT is not only a training activity; it is a core scaling strategy that builds decentralized, durable capacity within existing extension and partner systems. By equipping Technical Services Branch staff, camp officers, CFU, and TLC staff to train others, ToT creates local “nodes” of technical and business expertise that can continue to support mechanization service providers beyond the direct presence of the project team. This cascaded capacity is essential for moving from pilot districts to wider coverage and for sustaining mechanization services after S4I project support ends.

The April 2026 ToTs and Awareness Meetings, therefore, served as an early test of the scaling pathway for inclusive mechanization. They were designed to strengthen extension systems, recruit a pipeline of MSPs, and embed GESI-responsive approaches in partner practices, thereby laying the groundwork for scaling the MSP model from a project intervention to a system-wide service ecosystem

2. Workshop Overview and Approach

The field activities conducted from 20 to 25 April 2026 formed part of the S4I Project's efforts to expand inclusive, climate-smart, and scale-appropriate mechanization in Zambia. The activities combined a Training of Trainers (ToT) session with a 5-series of Mechanization Awareness Meetings (AMs) held in Petauke, Sinda, Mumbwa, Shibuyunji, Kasenengwa, and Katete, within a broader operational footprint. These districts remain the key implementation sites for MSP innovation in Zambia.

Participants were drawn from the Ministry of Agriculture, including the Technical Service Branch (TSB) and camp officers, as well as representatives from Total Land Care (TLC) and the Conservation Farming Unit (CFU). Its objective was to empower TSB, extension staff, CFU, and TLC staff to train colleagues and service providers in technical and business development aspects within project districts. Awareness meetings were subsequently held in Sinda, Petauke, Mumbwa, and Shibuyunji. These awareness meetings were intended to recruit some of the 500 service providers (SPs) targeted under the S4I project in Zambia, as shown in Figure 1.

Inclusive scaling of this innovation was a key facet, and participants were reminded of its potential to improve skills and capacity, access finance, and increase income and agricultural productivity through access to machinery.

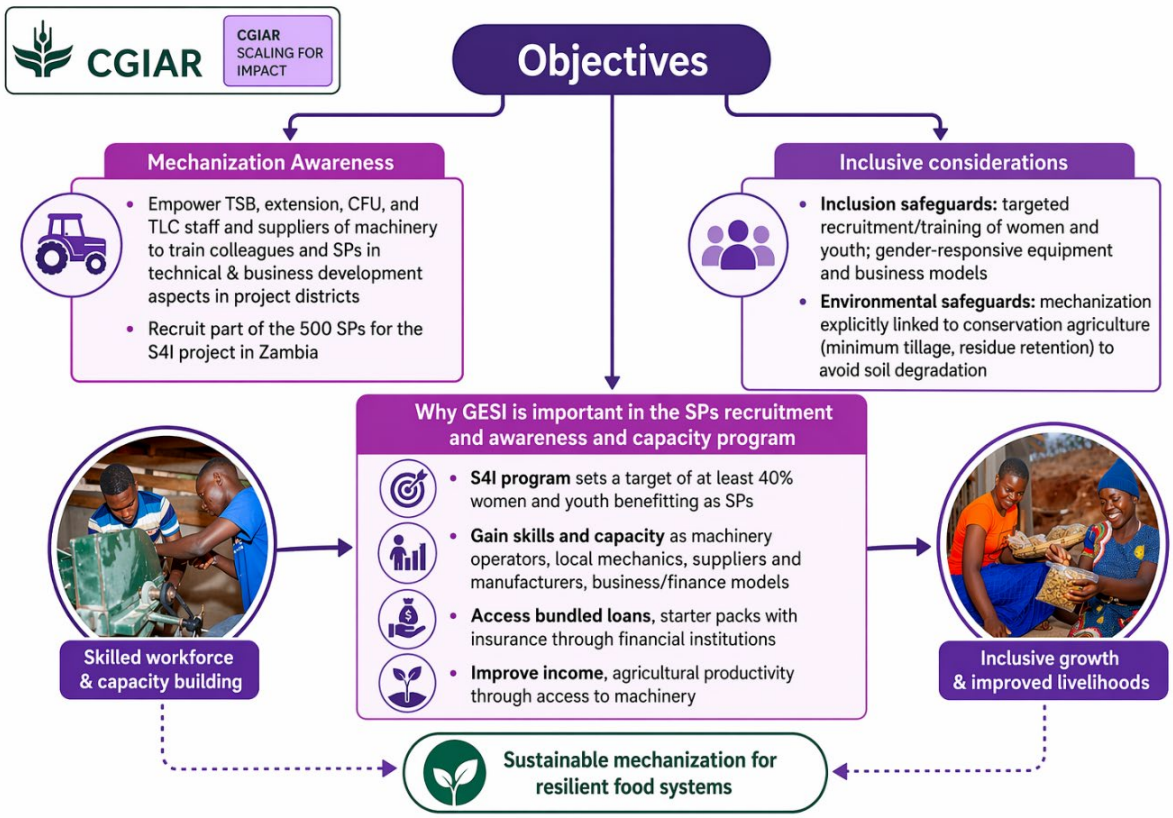

Figure 1. Showing key field objectives and its relevance to Gender Equity and Social Inclusion and inclusive mechanization
Source: Authors' creation

2.1.Objectives of the Workshop

The workshop's objectives were as follows:

- Build the capacity of frontline extension and partner staff to cascade technical and business-oriented training on mechanization service provision.
- Introduce farmers and prospective service providers to the S4I mechanization model and the equipment bundle being promoted under the project.
- Recruit and motivate a pipeline of service providers who can support local access to mechanization services in target districts.
- Promote inclusive participation by deliberately targeting women, youth, and persons with disabilities in recruitment, training, and service-provider development.
- Increase awareness of financing pathways, including bundled loans, insurance, group guarantees, and alternative collateral arrangements needed to make equipment acquisition more accessible.
- Strengthen understanding of mechanization as both a productivity intervention and a rural business opportunity that can generate income, reduce drudgery, and improve livelihoods.

2.2. Approach Used During the Field Activities

The approach used in the field was built around inclusive recruitment, practical awareness creation, and a bundled mechanization service-provider model. Rather than promoting machinery as a stand-alone asset, the CIMMYT team presented mechanization as part of an integrated ecosystem combining equipment, finance, skills, insurance, after-sales support, service delivery, and partnerships.

A central element of the approach was the mechanization starter pack, which included equipment such as the basin digger, maize sheller, peanut sheller, peanut butter machine, and multi-crop or peanut grinder, all intended to support local service provision while remaining manageable for the smallholder context.

To build a more inclusive service ecosystem as led by IWMI under this solution track, inclusion was embedded as a deliberate design principle (Figure 2). GESI-sensitive recruitment criteria that prioritized functional literacy over formal education, community trustworthiness, willingness to provide year-round service, and flexible arrangements for commitment fees and collateral were proposed. Participation by women, youth, and persons with disabilities was encouraged. Women's groups and youth associations were recommended in the selection process, and apprenticeship pathways, equal pay, safety training, and protective gear for operators and employees were promoted. Environmental safeguards were also built into the approach by explicitly linking mechanization to conservation agriculture principles, including minimum tillage and residue retention, to avoid soil degradation while improving the timeliness and efficiency of field operations.

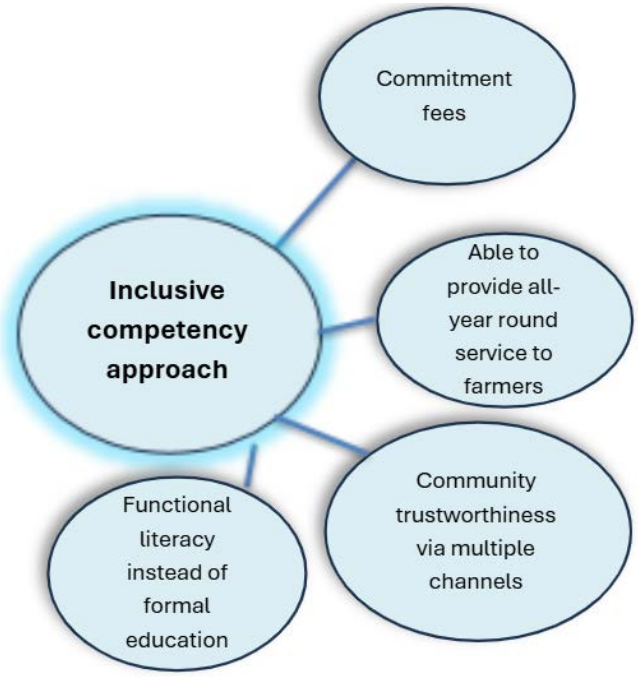

Figure 2. Gender Equity and Social Inclusion sensitive recruitment criteria for Mechanization Service Providers
Source: Authors' creation

During the awareness meeting, participants went through the inclusion tenets for consideration. This was done by discussing entry points (such as working with farmer cooperatives for product packaging, mechanization repairers, and machinery suppliers) for scaling the MSP model, as well as the gender action plans for inclusive business development. These mainstreaming tools were designed to support partners and service providers in understanding the benefits and impact of greater inclusivity, as shown in Figure 3.

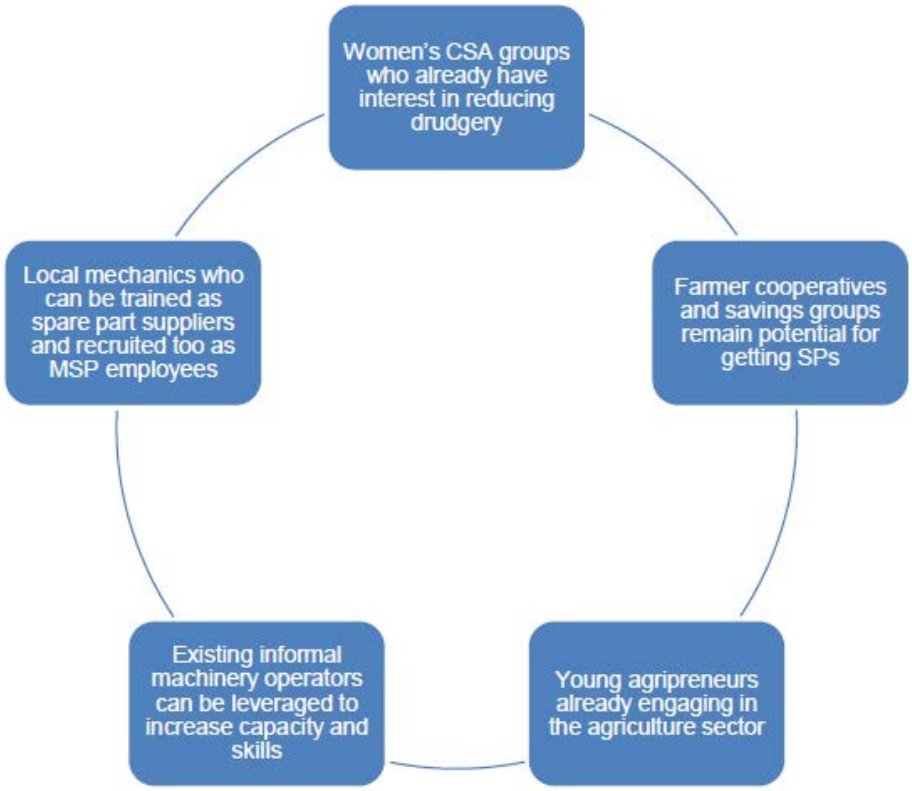

Figure 3. Diagram showing Gender Equity and Social Inclusion entry points for inclusive scaling of Mechanization Service Provider model in Zambia
Source: Authors' creation

From a scaling perspective, the approach was designed to strengthen multiple components of the innovation ecosystem simultaneously. Awareness meetings generated demand among potential service providers, while the ToT increased local institutional capacity to support adoption. The recruitment process tested inclusive selection criteria, and discussions around finance, partnerships, and after-sales support generated evidence on the complementary conditions required for successful scaling. Together, these activities provided an opportunity to validate assumptions underpinning the proposed scaling pathway before wider expansion.

The field activities were designed to support the project's scaling pathway (Figure 4) by strengthening decentralized extension capacity to recruit and mentor MSPs, who in turn expand access through affordable mechanization services for smallholder farmers. By embedding technical knowledge within existing extension systems and linking MSP development with financing, machinery suppliers, and institutional partnerships, the intervention establishes the enabling conditions for sustainable scaling beyond direct project implementation.

Figure 4. Scaling pathway for inclusive mechanization technology for equitable gains
Source: Authors' creation

Discussions on inclusive recruitment of machinery operators and employees focused on the following key points:

- Ensure transparent job postings in community centers, churches, markets, other groups
- During live practical demonstration days, source potential operators
- Focus on getting at least 40% representation for women/youth/persons with disability
- Create an apprenticeship model with mechanics to learn troubleshooting and maintenance
- Those employed, provide equal pay; safety training; protective gears (different sizes)

3. Key Discussions of the Field Workshop Training

Participants were reminded that the intervention aims to provide more tailored, inclusive training on financial literacy and knowledge sharing. Regarding financial literacy, the team indicated that entrepreneurship and business management training targeting women and youth will be prioritized, as well as the facilitation of peer-learning networks for women and youth MSP operators (for knowledge sharing). These inclusive trainings will be grounded in the gender-responsive business canvas model developed in the Agribusiness toolkit for scalable growth

Participants found the ToT presentation clear and easy to understand, particularly the MSP model and the delivery of mechanization services. Participants also expressed strong appreciation for the workshop's focus on women, youth, and persons with disabilities, as well as for the emphasis on flexible training schedules, group guarantees, and alternative collateral arrangements as practical measures for inclusion.

Participants testing the basin digger. (*photo:* Winnie Kasoma-Pele)

The discussions helped clarify key operational issues. Participants requested greater clarity on financing arrangements, suggesting that access to affordable financing remains a critical systems constraint affecting readiness for scaling. This finding reinforces the need for partnerships with financial institutions that can offer financing products aligned with the cash-flow realities of emerging MSP enterprises. The team provided additional explanations during the sessions. A practical suggestion that emerged from the exchange was to share the 30 percent commitment fee among cooperatives or savings groups, making entry into the model more realistic for women and youth who may not be able to mobilize the required resources individually.

The sessions also generated interest in the different mechanization equipment. Farmers tested the basin digger, maize sheller, groundnut sheller, and peanut butter-making machine, and reported that the equipment was easy to use, fast, and generally user-friendly. Participants noted that the machines were not too heavy, which reinforced the message that mechanization can be accessible even to individuals who are not physically strong.

From a systems perspective, the field activities confirmed that scaling mechanization in Zambia depends on much more than the technical performance of machinery. Discussions identified interacting constraints across the financial, institutional, market, policy, and social systems. These include limited access to affordable finance, weak coordination between machinery suppliers and financial institutions, inadequate after-sales support, insufficient enterprise incubation for emerging MSPs, and persistent barriers affecting women, youth, and persons with disabilities. These findings reinforce the S4I premise that successful scaling requires strengthening the broader innovation ecosystem rather than focusing solely on technology dissemination.

Another important outcome was a greater appreciation of mechanization as a livelihood opportunity. During an awareness meeting, an existing service provider shared testimony that mechanization had reduced time spent on farm operations, lowered labor costs, and generated additional income by hiring out equipment and offering transport services to other farmers. According to the testimony, these benefits translated into improved food security and household welfare, including the ability to pay school fees and purchase a motorbike.


Participants testing the maize and groundnut shellers *(photo:* Winnie Kasoma-Pele)

3.1 Issues Raised for Consideration

Several discussion points emerged with issues for clarity and support. The first issue was affordability, especially for women. While some male participants indicated they could afford the machines, women openly stated that the equipment was beyond their individual means, confirming broader evidence from the Zambian context that financial barriers continue to limit equitable access to mechanization.

A second issue was the need for more flexible ownership and financing arrangements. In response to women's concerns, the meetings explored the option of group purchase through savings groups or cooperatives so that members could jointly own equipment, use it on their own farms, and hire it out as a business. This point resonates with further discussions that women in Zambia are more likely to prefer group ownership models and that financial products based only on individual collateral are likely to exclude them.

A third issue raised was on inclusion targeting. Participants asked whether there was a specific target for persons with disabilities, and it was clarified that they are included within the overall 40 percent target for women, youth, and persons with disabilities under the program. This showed both interest in inclusive targeting and the need for continued communication about how program inclusion targets are defined and operationalized.
A fourth issue was the need for post-training support. Participants recommended ongoing follow-up, mentorship, and technical assistance to ensure that recruited or trained MSPs do not remain with information only but can transition to sustained practice and business operations. This concern aligns with the inclusive scaling of smallholder agricultural mechanization scoping review, which shows that training alone is insufficient without finance, service networks, after-sales support, and institutional partnerships.

4. Workshop Highlights and Outcomes

One major highlight of the field engagement was the practical demonstration of equipment, which helped shift the discussion from abstract concepts to hands-on experience. Farmers were able to test the machines directly, and this appears to have strengthened confidence in the technologies being promoted.

Another highlight was the positive reception of the inclusive recruitment approach. The emphasis on women, youth, and persons with disabilities, together with flexible training schedules and alternative collateral options, was well received by participants and gave the meetings a strong social inclusion dimension rather than a purely technical focus.

The workshop also produced a clear shift in mindset among participants. Discussions encouraged farmers to view mechanization not only as support for their own production but also as a business model through which groups or individuals can recover investment costs and generate income by serving other farmers. The excitement shown by women after the suggestion of group ownership indicates that the meetings succeeded in opening practical pathways for participation that had not initially seemed possible to them.

In operational terms, the activities contributed to awareness-raising, service-provider identification, and the strengthening of local partner capacity to support recruitment and follow-up in project districts. They also surfaced critical field-level issues, especially affordability and the need for structured post-training support, which should inform subsequent implementation.

4.1 Scaling Readiness Assessment

The field activities generated encouraging evidence that the MSP innovation demonstrates early scaling readiness across several dimensions. First, there was strong stakeholder demand for mechanization services, particularly among women and youth. Second, extension institutions demonstrated willingness to integrate the training within existing advisory systems. Third, participants positively received the bundled innovation combining machinery, finance, business development, and technical support.

However, several constraints remain before large-scale expansion can occur. These include limited access to affordable finance, insufficient after-sales support, limited business incubation for new MSPs, and the need to institutionalize GESI-responsive recruitment and monitoring within partner organizations. Addressing these constraints will improve the innovation's readiness for sustainable scaling.

5. Conclusion and Recommendations

The April 2026 ToTs and Mechanization Awareness Meetings in Zambia provided an important platform for linking context, technology, inclusion, and business development under the S4I program. Grounded in a Zambian context where mechanization demand exists but access remains unequal, the activities helped to show where partner capacity would be needed, increase farmer awareness, validate the relevance of the proposed equipment, and identify practical barriers that must be addressed to enable inclusive scaling.

Overall, the April 2026 Training of Trainers and Mechanization Awareness Meetings demonstrated that the inclusive MSP model is technically feasible, institutionally supported, and well aligned with Zambia's mechanization agenda. The activities also generated valuable evidence on the enabling conditions required for scaling, including decentralized capacity development, inclusive financing, strategic partnerships, and post-training enterprise support. While the innovation shows encouraging signs of scaling readiness, addressing the identified system bottlenecks will be essential to achieving sustainable and inclusive expansion.

The field evidence suggests that the innovation approach is technically relevant and socially promising, particularly because it recognizes the specific constraints faced by women, youth, and persons with disabilities. At the same time, affordability, financing mechanisms, and post-training follow-up remain decisive areas for the intervention. Addressing them is essential to translating the awareness generated during the meetings into viable, inclusive mechanization service businesses.

The following emerged as key recommendations that can strengthen the innovations' impact and outcomes in Zambia:

- Develop a structured MSP incubation model combining mentorship, business coaching, enterprise management, and after-sales technical support to improve enterprise survival during the early scaling phase.
- Pilot blended financing models involving commercial banks, microfinance institutions, equipment suppliers, and savings groups to identify financially sustainable approaches suitable for women- and youth-led mechanization enterprises.
- Formalize long-term partnerships among extension agencies, machinery suppliers, financial institutions, mechanics, farmer organizations, and private sector actors to strengthen the enabling environment required for sustained scaling.
- Institutionalize GESI-responsive recruitment criteria, monitoring indicators, and extension protocols within Ministry and partner systems to ensure inclusive scaling beyond the project lifecycle.
- Develop a structured national Training of Trainers model embedded within Ministry of Agriculture extension systems and partner organizations to enable continuous expansion of MSP recruitment and technical support beyond project-supported districts.
- Continue documenting implementation lessons, validating assumptions, and monitoring adoption outcomes to refine the scaling pathway and inform expansion into new districts.

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