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The Role Of Agricultural Technology Parks In Outscaling Agricultural Technologies, A Case Of The Slari Agricultural Technology And Innovation Park

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Abstract
Agricultural research technologies play very critical role in enhancing farm productivity and livelihoods of farmers, yet most productive agricultural technologies are still trapped in the shelves, hence, scaling out these innovations remain a persistent challenge. Through support from the West and Central African Council for Agricultural Research (CORAF), the Sierra Leone Agricultural Research Institute (SLARI) established an Agricultural Technology and Innovation Park in Port Loko District that provides a compelling case study of effective out-scaling through integrated strategies. This paper analyses its approach, impact, and lessons for replicating similar models and lays the foundation for impact assessments from 2023–2025.

Key Words; *Agricultural Technology Park, out scaling, Adoption, Climate Smart*

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I. Introduction

Established in 2023, the Sierra Leone Agricultural Technology and Innovation Park (SLARI) has rapidly become a key platform for promoting scalable agricultural technologies in Sierra Leone. The park serves as an agricultural innovation hub for expanding access to production technologies, promoting food security, improving nutrition, and enhancing sustainable agricultural practices. Agricultural innovation parks around the world have demonstrated great potential in integrating research findings with practical, farmer-friendly technologies (Cherunya et al., 2020; Nicolétis et al., 2019). SLARI adheres to this model, providing farmers with opportunities to observe and engage with modern agricultural technologies, fostering knowledge transfer, and enabling their practical application in agricultural practice (Martins et al., 2023).

The park's primary functions include showcasing agricultural innovations, promoting capacity-building programs, and scaling up the application of advanced agricultural technologies. These efforts align with research findings that innovation centers and technology parks can accelerate agricultural transformation by training farmers, particularly targeting key groups such as women and youth (Abraham & Jankowska, 2025; Mangheni et al., 2019). The CORAF/SLARI initiative has demonstrated concrete success stories, implementing technical support measures that are transforming agricultural value chains, increasing productivity, and improving livelihoods in rural Africa (Yami et al., 2022).

SLARI Agricultural Technology and Innovation Park serves as a beacon of hope for local farmers by introducing cutting-edge technologies across key agricultural sectors, including crop production, pest and disease management, irrigation systems, and post-harvest handling techniques designed to improve nutrition outcomes. Globally, similar interventions have resulted in increased demand for high-yield, pest-resistant crop varieties, ensuring stable food production and enhanced resilience to climatic stresses (Pretty et al., 2012; Kabato, 2025). Innovations in water and cropping management at the park have particularly provided solutions to the challenges of drought, which continues to undermine agricultural productivity in Sierra Leone (Collins et al., 2025). The adoption of improved pest management strategies has reduced losses, contributing to more reliable supplies and improved food security (Oerke, 2006).

One of SLARI's core objectives is to facilitate the transfer of knowledge and skills by connecting research findings with practical on-farm applications. As highlighted in the Agricultural Innovation Systems Study (Spendrup & Fernqvist, 2019), bridging the gap between research and practice is crucial to ensuring that farmers directly benefit from scientific advances. To this end, SLARI organizes workshops, field days, and participatory training sessions focusing on best agronomic practices, technology adoption, and sustainable farming methods. These capacity-building programs are tailored to the needs of diverse groups, including smallholder farmers, women, and youth, consistent with evidence that targeted extension services can increase technology adoption among marginalized farmer groups (Mapiye et al., 2019).

SLARI recognizes the vital role played by women and youth in agricultural productivity and has developed dedicated modules to address barriers to their access to technology and resources. In many African countries, women comprise most of the agricultural workforce and often face systemic challenges accessing inputs and training (Doss & Raney, 2011). The park's projects aim to empower women with the knowledge and tools to increase their productivity and income, thereby strengthening their household food security. Similarly, the park prioritizes youth engagement, cultivating the next generation of agricultural innovators and private sector players through entrepreneurship training and exposure to modern agricultural business practices, a key factor in sustaining agricultural development (Abraham, & Jankowska, 2025; Kote et al., 2024).

II. Influence Of The Park On Participating Farmers

The impact of SLARI's technology dissemination and training programs in the park is evident, with participating farmers experiencing significant improvements in agricultural outcomes. Case studies from the community demonstrate significant yield increases (up to 50% for rice, maize, and cassava), improved soil fertility management, enhanced pest and disease control, and the adoption of climate-smart agricultural practices (Lamarpe 2024). Improved post-harvest handling skills are helping to reduce losses and improve the quality of agricultural products, thereby increasing farmers' market value and income (Abonyi, et al., 2024).

Beyond the benefits at the individual farm level, the park's impact extends to the transformation of Sierra Leone's agricultural value chain by promoting technology adoption across production, processing, and marketing. This integrated approach aligns with the literature on value chain development, which emphasizes the importance of integrated innovation for achieving sustainability, efficiency, and competitiveness (Kaplinsky & Morris, 2000). Partnerships forged between farmers, processors (such as African Seeds SL. and Seed Technology International), and other stakeholders strengthen market linkages and foster a more resilient agricultural economy.

Representative success stories, such as those of smallholder farmers Mariatu Kamara and Hassan Kabia, who significantly increased their yields through the training program, and Mohamed Conteh, a young entrepreneur who produces organic fertilizers, demonstrate SLARI’s transformative impact on livelihoods and sustainable agricultural practices. These cases resonate with the growing emphasis on inclusive agricultural innovation models that promote equity, sustainability, and economic empowerment (Diao et al., 2023).

In summary, the Sierra Leone Agricultural Technology Innovation Park serves as a prime example of how localized innovation hubs can boost agricultural productivity, promote sustainable development, and improve food security in Sierra Leone. Its multifaceted initiatives in technology dissemination, capacity building, and value chain integration offer a replicable model for other sub-Saharan African countries facing similar agricultural challenges.

III. The Agricultural Technology Park Establishment Approach

The concept of Agricultural Technology and Innovation Park (ATP) establishment is a regional program coordinated by CORAF. It is being implemented in nine countries in West and Central African countries with funding from Kansas state university and the World Bank through their Innovation, Research, Extension and Advisory Coordination Hub (IREACH) and Food Systems Resilient programme (FSRP). In Sierra Leone, the Sierra Leone Agricultural Research Institute (SLARI) is leading the implementation. The park has made significant impacts on local communities since its establishment in 2023 through the introduction of gender friendly, nutrition sensitive and climate smart agricultural technologies. Serving as a hub for agricultural innovations, the park has enhanced access to agricultural technologies and thus, food security and nutrition, facilitated knowledge transfer, and encouraged the adoption of advanced agricultural technologies. Through targeted training programs for farmers and private sector players, including women and youth, the park has empowered individuals to improve their agricultural practices and productivity. The success stories of local farmers within the few times of implementation illustrate the tangible benefits of the park's initiatives, which reinforce its role in transforming agricultural value chains in Sierra Leone. As the park continues to grow and expand its reach, it holds the potential to drive further advancements in the agricultural sector, contributing to the sustainable agricultural development and prosperity of local communities in Sierra Leone.
Out scaling Strategies

IV. Multi-Stakeholder Engagement

The park collaborates with:
Farmer organizations
Private sector, youth entrepreneurs and NGO partners for technology out scaling

Government agencies
Media outlets like AYV and radio democracy Sierra Leone for awareness campaigns

V. Effective Dissemination Methods

Method		Number of times	Attendance(persons)	Mean respondents satisfactory rating (1-5)
FIELD DAYS		10	2010	4
EXPOSURE VISITS		30	928	5
TRAINING AND MINI KITS		15	1235	5
MEDIA COVERAGE	Radio	10	Nationwide	5
	Television	10	Nationwide	4

Table 1: Comparative effectiveness of dissemination approached

VI. Technologies Demonstrated In The Park

During implementation, the A, T & I Park management team decided to show case technologies during the on and off season for farmers and other stakeholders to see crop performance and the level of tolerance to heat/drought of some of these technologies. We planted farmers demanded crop varieties and demonstrated some Climate smart agricultural practices

No	Type of Technology	Name of Technology	Special Attributes	Climate Smart Technologies (*Yes/No*)	Nutrition Sensitive (*Yes/No*)	Gender Sensitive (*Yes/No*)
Improved crop variety/ animal breed						
1.1.1	Cowpea	SLIPEA 2	1.Seed colour is white 2. Reaction to trips is moderate 3.Reaction to pod borers is moderate 4.Yield is 1.5t/Ha 5.Maturity is between 70-80 days Growth pattern is semi erect	No	Yes	Yes
1.1.2	Cowpea	SLIPEA 5	1.Matures between 70-75 days 2.Yields 1.1-1.8t/Ha 3.Seed colour is white 4.Seed shape is kidney like	No	Yes	Yes
	Groundnut	SLINUT 2	1.Rosett virus resistant 2.drought tolerant	yes	Yes	Yes
1.1.3	Soya bean	SLIBEAN 2	1.Contain high level of protein 2.High fiber content	yes	Yes	Yes
1.1.4	Orange flesh sweet potato	SLIPOT 5	Contains Pro vitamin A 2.Moderately resistant to weevils 3.Resistant to stem rot 4. Yields 25t/Ha	No	Yes	Yes
1.1.5	Orange flesh sweet potato	Chipka	Contains Pro vitamin A 2.Yields 30-35 t/Ha 3. Plant growth is erect 4. Greenish stem with pale green leaves 5. Slightly susceptible to stem rot 6. Resistant to weevils 7. Flesh colour is orange	No	Yes	Yes
1.1.6	Orange flesh sweet potato	Kaphulira	Contains Pro vitamin A 2.Yields 30-35 t/Ha 3. Plant growth is runner type 4. Leaf colour is dark green with purple stem 5. Slightly susceptible to stem rot 6. Resistant to weevils 7. Flesh colour is orange	No	Yes	Yes
1.1.7	Orange flesh sweet potato	MK1	Rich in PVA 2.Leaves are dark green 3. Vine colour is pale purple 4. Resistant to stem rot 5. Moderately resistant to weevils 6. Tuber or flesh colour is slightly orange 7. Yields are high under good management.	No	Yes	Yes
1.1.8	Orange flesh sweet potato	MK2	Rich in PVA 2.Leaves are dark green	No	Yes	Yes

			3. Vine colour is pale purple 4. Resistant to stem rot 5.Moderately resistant to weevils 6. Tuber or flesh colour is slightly orange 7. Yields are high under good management.			
1.1.9	Orange flesh sweet potato	Haja thor	Highly rich in PVA 2.Fleshcolour is highly orange 3. Have serrated leaves with dark green colour. 3. Yields are higher with good management	No	Yes	Yes
1.2.0	Cassava	SLICASS 1	1. High dry matter content (40%) 2.Yields 30-35t/Ha 3.Red petiole 4. Resistant to ACMD & CBB 5. Fairly tolerant CGM & CM	yes	Yes	Yes
1.2.1	Cassava	SLICASS 4	1.Bitter and none mealy 2.Yields 30-35t/Ha 3.Has dry matter of 30% 4. Resistant to ACMD &CBB 5. Fairly tolerant to CGM &CM	yes	Yes	Yes
1.2.2	Cassava	SLICASS 6	1.Yields 30-40t/Ha 2.Red petioles 3.Dry matter content is 30% 4.Resistant to ACMD & CBB 5Fairly tolerant to CGM &CM	yes	Yes	Yes
1.2.3	Cassava	SLICASS 7	1.Root dry matter is 30% 2.Yields 33.4t/Ha 3.Sweet+ 4.Resistant to ACMD &CBB 5. Fairly tolerant to CGM & CM	yes	Yes	Yes
1.2.4	Cassava	SLICASS 8	1.Root dry matter is 36% 2.yield 35-40t/Ha 3.Sweet 4.Resistant to ACMD &CBB 5.Fairly resistant to CGM & CM	yes	Yes	Yes
1.2.5	Cassava	SLICASS10	1.Root dry matter content is 26-35% 2.Slightly bitter 3. Flesh colour is orange 4.Resistant to ACMD &CBB 5.Fairly resistant to CGM & CM 6. Yield is 35-40t/Ha	Yes	Yes	Yes
1.2.6	Cassava	SLICASS11	1.Root dry matter content is 25-35% 2. Flesh colour is yellow 3. It is slightly bitter 4. Yield is 35-40t/Ha 5. Resistant to ACMD &CBB 6. Fairly tolerant to CGM &CM	Yes	Yes	Yes
1.2.7	Cassava	SLICASS12	1.Root dry matter is 25-35% 2. Flesh colour is white 3. Sweet 4. Resistant to ACMD &CBB 5.Fairly tolerant to CGM &CM 6. YIELDS 30-35t/Ha	Yes	Yes	Yes
1.2.8	Maize	PVA SYN 3	1.Contains PVA 2.High protein 3.yields -5.5 t/ha 4. Carotine fortified 5. Resistant to maize streak virus	yes	yes	yes
1.2.9	Maize	PVA SYN9	1.Contains PVA 2.High vegetative performance making it important for fodder for small Ruminant. 3. Yields 4-5.5 t/Ha 4. Drought tolerant	Yes	Yes	Yes
1.3.0	Maize	DT STR SYN 14	1.Contains PVA 2.Yields 5.5-6 t/Ha 2. Resistant streak virus 3. Strigger resistant 4. Drought tolerant	Yes	Yes	Yes

1.3.1	Maize	PVA SYN13	1.Contains PVA 2.drought tolerant 3. Yields 5-5.3 4.	Yes	Yes	Yes
1.3.2	Maize	SAMAZ 52				
1.3.3	Rice	Nerica 3	1.Yields 4-5 t/Ha 2.Days to 50% heading 70-75 days 3.Maturity 95-100 days 5. Resistant to leaf blast 5. Resistant to logging	yes	Yes	Yes
1.3.4	Rice	Nerica 4	1.Yields 4-5 t/Ha 2.Day to 50% heading 70-75 days 3.Maturity period 95-100 days 4. Resistant leaf blast and insect pests 5. High tillering ability	Yes	Yes	Yes
1.3.5	Rice	Rok 34	1.Yields 4t/Ha 2.High tillering ability 3.Resistant to rice blast 4. Can be used in both low land and upland ecology	Yes	Yes	Yes
1.3.6	Sorghum	SORK P1	1.Short duration of 97 days 2.attains a height of 120 3. yields 2 -3t/Ha 4. Has a stay green trait 5. Stalks are bigger and makes it withstand logging	Yes	Yes	Yes
1.3.7	Yam	SLIYAM 1	1.Green and broad leaves 2. Stem tendrils /limber	Yes	Yes	Yes
1.3.8	Citrus	Orange	1.Yields30 t/Ha 2. First flowering starts 5years plant. 3.Resistabt to pests and diseases 4. Easily adapts to changing climate	yes	yes	yes
1.3.9	Cocoa	Cocoa	1.Yields 300-400t/Ha 2. Resistant pest but susceptible black pod disease 3. Adapts to changing climate 4. First flower occurs 3 years after planting		Yes	Yes
1.3.10	Coffee	Coffee	1.6t/Ha yield 2. Resistant to pest and diseases 3. proven adaptation to climate change 4. First flowering occur 3 years after cultivation	Yes	Yes	Yes
1.3.11	Guava	Guava	1.First flower starts 2 years after planting	Yes	Yes	Yes
1.3.12	Dwarf Coconut	Coco nut	1.Yield 24,500t/Ha 2.Adapts to climate change 3.Resistant to pest and diseases 4.First flowering starts 3 years after plant	Yes	Yes	Yes
1.3.13	Cashew	Cashew	1.Polyclonal material 2.first flowering occurs 2 years after planting 3.can yield			
1.3.14	Trees	Gliricidia sepium tree seedlings	Nitrogen fixing plant	Yes		Yes
1.3.15	Oil palm	Oil palm	1.Yields 158t/Ha of clean oil 2.Resistant to pests and diseases if properly managed 3. Proven adaptation to changing climate 4. First flower production occurs 3 years after planting			
2.0	Cropping Systems/Agronomic practices					
2.1	Intercropping	Cassava & groundnut intercrop	1.improves soil condition 2.Ground nut straw is added to cassava hill 3. growth level increased	Yes	yes	yes

			4 No weeds for cassava			
2.2	Intercropping	Cassava Cowpea intercrop	1.improves soil condition 2.SLIPEA straw is added to cassava hill 3. growth level increased 4 No weeds for cassava	Yes	Yes	Yes
2.3	Intercropping	Cassava soybean intercrop	1.improves soil condition 2.SLIBEAN straw is added to cassava hill 3. growth level increased 4 No weeds for cassava	Yes	Yes	Yes
3.0 EQUIPMENT						
3.1	Equipment	Blender	1.Food mixer 2. Used in kitchen to prepare beverages	No	No	Yes
3.2	Equipment	Grinder	1.Used to grind dried cassava into powder 2. Can be used in garie processing Made of metals 3. Has a motorized engine. 4. It is used for multipurpose	No	No	Yes
3.3	Equipment	Mixer	1.A Kitchen equipment 2.Used mostly by women 3. Used in bakeries	No	No	Yes
3.4	Equipment	Baking trays	Made of metal pan for baking purpose	No	No	Yes
3.5	Equipment	Frying trays	1,Used in frying processes	No	No	Yes
3.6	Equipment	Afi-gas	1.Source of energy for cooking purpose	No	No	Yes
3.7	Equipment	Measuring scale	1. An instrument used in taking measurements	No	No	Yes
3.8	Mechanization (equipment and machinery)					
3.9	Equipment	Cassava grater	1.A metal machine 2. Has a motorized engine 3. Reduces drudgery in cassava processing	No	No	Yes
3.10	Equipment	Hydraulic press	1.Built of heavy metal 2. Possesses a jerk used to press	No	No	Yes
3.11	Equipment	Garie patching tray	A flat metal plate with curved edges for patching garie	No	No	Yes
3.12	Equipment	Rice thresher	A motorized machine use to thresh rice and separate from the straws	No	No	Yes
3.13	Equipment	Rice miller	A metallic equipment with a motorized engine attached to it for milling rice	No	No	Yes
3.14	Equipment	Tiller machines	1. Motorised machine used to till the soil.	No	No	Yes
4.0	Agriculture Information and Technology (AIT)					
4.1	Visibility	Posters	Broad piece of cloth with writing to show purpose of the occasion	No	No	yes
4.2	Visibility	Brochures	A document carrying information about the park	No	No	Yes
	Visibility	Fliers	Single page document carrying information about the Park	No	No	yes
	Visibility	Video documentary	A short film showing an important event	No	No	yes

VII. Partnerships And Collaborations

The Sierra Leone Agricultural Research Institute Technology and Innovation Park in collaboration with CORAF staff engaged representatives of the Food and Agriculture Organization (FAO), World Food Programme (WFP), Sierra Leone Chamber of Agribusiness Development (SLECAD), Solidaridad SL, AAD, MADAM, Seed Tech. International, Africa Seed Company and UNIDO to significant meetings. The primary agenda revolved around discussing potential partnership establishment in supporting the park's objectives, showcasing innovative agricultural technologies, and exploring potential collaborations to boost the agricultural sector in Sierra Leone.

The meetings concluded on a promising note, with representatives of potential partners pledging to build fruitful partnership with SLARI. This collaboration aims to sustainably bring more diverse range of technologies and approaches to the SLARI Technology and Innovation Park, benefiting local farmers and advancing Sierra Leone's agricultural landscape. On the 13th September, 2024, MOUs were signed with the partners.

Park Management

Management Operations

The management operations of SLARI's Technology and Innovation Park are critical to its success and impact on local farming communities. These operations are designed to ensure the smooth functioning of the park, facilitate effective decision-making, and address key issues promptly.

On these bases, regular meetings are a cornerstone of the park's management operations. The management team, consisting of key personnel from SLARI and other stakeholders, convenes bi-weekly to discuss on-going project activities, review progress, and strategize for upcoming initiatives. Additionally, monthly meetings are held with representatives from local farmer groups, government agencies, and development partners to ensure a broad-based approach to addressing challenges and leveraging opportunities.

The management team focuses on several key issues to ensure the park's objectives are met:

Technology Adoption: Encouraging local farmers to adopt new agricultural technologies remains a primary concern. Strategies are developed to address barriers such as cost, accessibility, and lack of awareness. Hence, strategically positioning the park on a motorized highway there by, creating easy access.

Training and Capacity Building: Continuous improvement of training programs for farmers and the private sector players, especially targeting women and youth, is essential. The management team regularly evaluates the effectiveness of these programs and makes necessary adjustments.

Resource Allocation: Ensuring that resources, including financial, technical, and human resources, are effectively allocated to various projects activities and initiatives within the park as dictated in the work plan developed.

Stakeholder Engagement: Maintaining strong relationships with stakeholders, including local communities, private sector, NGOs, government bodies, and international partners, to support the park's activities and expansion.

During meetings, specific action points are identified and assigned to relevant team members, by maintaining a structured approach to management operations, the SLARI Technology and Innovation Park ensures continuous improvement and sustainable development, thereby significantly contributing to the agricultural advancement and prosperity of local farmers

VIII. Conclusion

The SLARI Agricultural Technology and Innovation Park in Sierra Leone stands as a transformative model for advancing agricultural productivity, food security, and sustainable development. By serving as a central hub for the demonstration and dissemination of climate-smart, nutrition-sensitive, and gender-inclusive technologies, the park has effectively bridged the gap between research and practical application for local farmers. Its integrated approach-combining multi-stakeholder engagement, tailored training programs for women and youth, and a robust system for showcasing and scaling out innovations-has led to measurable improvements in crop yields, resource management, and farmer incomes.

Success stories from the park, such as increased yields and the growth of agribusinesses, highlight the tangible benefits of these interventions for individuals and communities. The park's emphasis on knowledge transfer and value chain development has not only empowered farmers but also strengthened market linkages and enhanced the competitiveness of Sierra Leone's agricultural sector.

As the park continues to expand its reach, it offers a replicable blueprint for similar initiatives across West and Central Africa. Its achievements underscore the critical role of coordinated research, stakeholder collaboration, and inclusive capacity building in driving sustainable agricultural transformation and improving livelihoods. The SLARI Agricultural Technology and Innovation Park thus represents a beacon of hope and a catalyst for ongoing progress in Sierra Leone's agricultural landscape.

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