



Seeds4Liberia Project

Rice Seed Value Chains in Liberia: Mapping and SWOT Analysis

Africa Rice Center and Central Agricultural Research Institute

September 2025



ACKNOWLEDGEMENTS

The Seeds4Liberia project is funded by the European Union (EU). We thank the staff of the Central Agricultural Research Institute (CARI) for facilitating the focus group discussions and all the rice seed value chain actors that participated in the discussions.

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Citation

Africa Rice Center and Central Agricultural Research Institute. 2025. Rice Seed Value Chains in Liberia: Mapping and SWOT Analysis. Africa Rice Center (AfricaRice), Bouake, Côte d'Ivoire.



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Acronyms

AfricaRice	:	Africa Rice Center
CARI	:	Central Agricultural Research Institute
EU	:	European Union
FGDs	:	Focus Group Discussions
SARA	:	Savanna Agricultural Research Institute
Seeds4Liberia	:	Seeds4Liberia project
SWOT	:	Strengths, Weaknesses, Opportunities, and Threats
USDA	:	United States Department of Agriculture



SUMMARY

The rice seed value chain in Liberia is important to the country's agricultural sector and food security. This study conducted focus group discussions with formal and informal rice seed value chain actors to map the value chain and perform a SWOT analysis. The discussions, held in Suakoko, Liberia, aimed to identify key actors, analyze strengths, weaknesses, opportunities, and threats, and assess actors' perceptions of biofortified rice.

The formal value chain includes early-generation (breeder/pre-basic and foundation/basic) seed producers, certified seed producers, agro-input dealers, NGOs, seed importers, and service providers. The informal value chain is characterized by community-based seed enterprises, which sell uncertified seed in local open-air markets, service providers such as credit and extension service providers, and 95% of rice farmers in Liberia. These farmers also use seed from their previous season's harvest and exchange seed among themselves, either freely or through borrowing.

The SWOT analysis revealed that both value chains face challenges, such as inadequate infrastructure, limited access to finance, and climate change threats. However, opportunities exist in the growing market demand for rice seed, technology adoption, and support from international organizations. The study also found a lack of awareness about biofortified rice among the participants, highlighting the need for education and awareness campaigns. Based on these findings, policy recommendations were made to strengthen the rice seed value chains, including capacity building, improving access to quality seed, strengthening local cooperatives, enhancing market linkages, and promoting research and development. This study emphasizes the importance of addressing challenges and leveraging opportunities to develop a more resilient and sustainable rice seed sector in Liberia, ultimately contributing to improved food security and economic growth.

Keywords: Rice seed value chains, SWOT analysis, focus group discussions, biofortified rice, food security, Liberia.

1. INTRODUCTION

Rice is the cornerstone of food security and economic stability in Liberia, where it is a primary staple food for the majority of the population (World Bank, 2021). Rice is consumed in various forms and is a key component of daily meals. During the last three years (2020-2023), annual rice consumption per capita in Liberia was 96, 104, and 108 kg, respectively (USDA, 2024). Both production and harvested area have fluctuated over the decades, with notable dips and recovery (Figure 1).

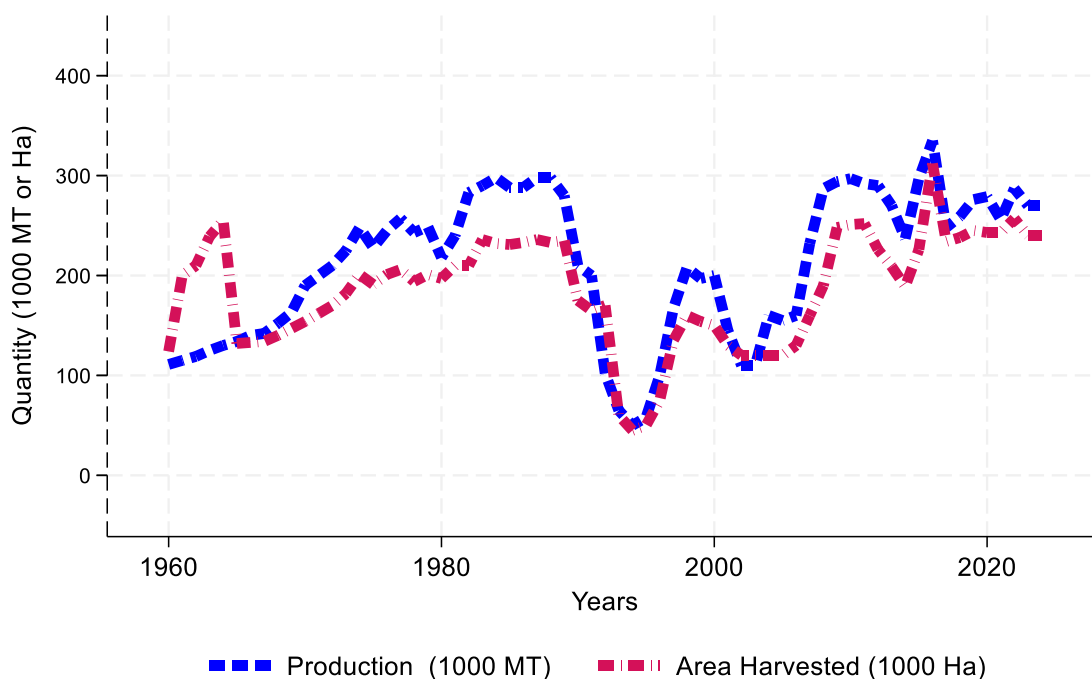


Fig 1. Rice production and area harvested in Liberia from 1960 to 2024

Source of the data: USDA 2024¹

¹ <https://apps.fas.usda.gov/psdonline/app/index.html#/app/advQuery>

There have been some improvements in rice yields in Liberia over the decades, but persistent challenges in maintaining stable productivity have been observed (Figure 2). Factors, such as changes in climate, agricultural practices, and investment, likely influenced the observed fluctuations.

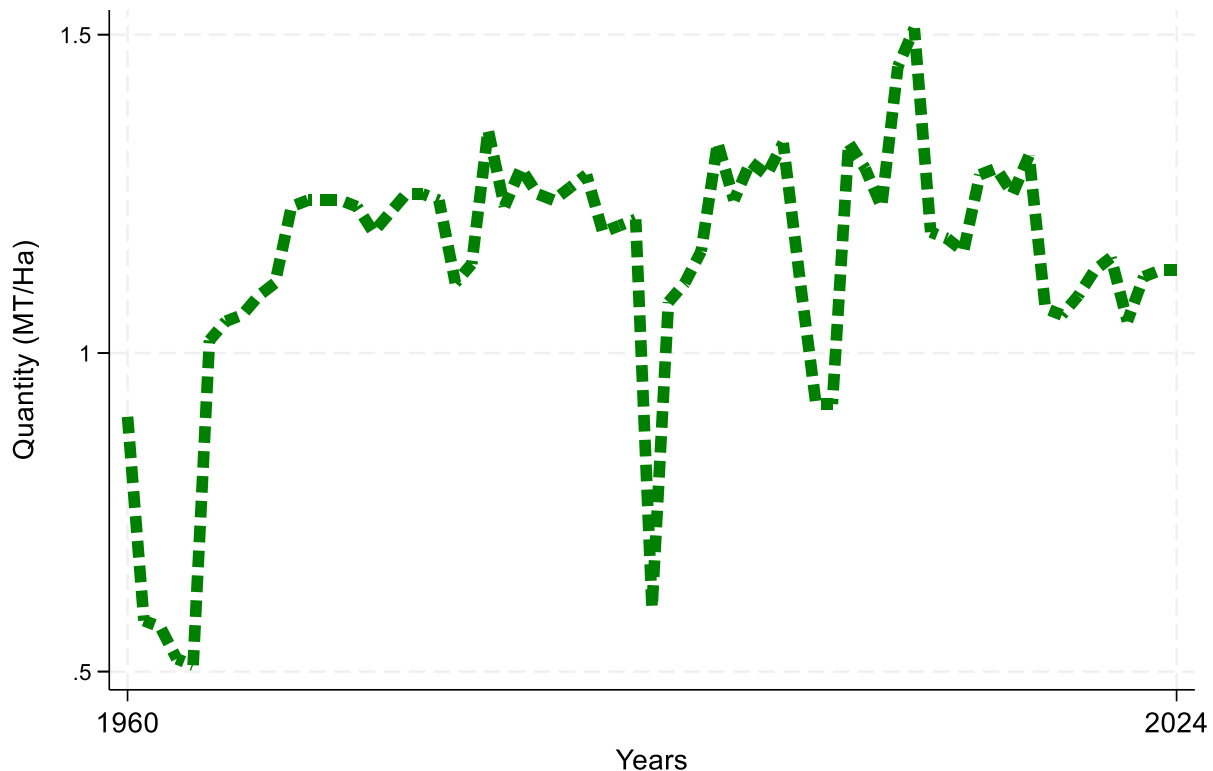


Fig 2. Rice yield (MT/Ha) in Liberia from 1960 to 2024

Source of the data: USDA 2024

Domestic production has not kept up with increasing consumption (Figure 3). This situation emphasizes the need to boost local rice production to meet national demand and reduce import dependency where food insecurity and child malnutrition remain persistent problems (Arouna et al., 2023).

The structure and performance of the rice seed value chain significantly influence rice production and distribution efficiency. Understanding these value chains is vital for formulating targeted

interventions to boost the development of Liberia's rice-seed industry. This report provides a detailed analysis of Liberia's rice seed value chains through SWOT analysis. It maps and evaluates both the formal and informal systems integral to seed distribution and usage in the country.

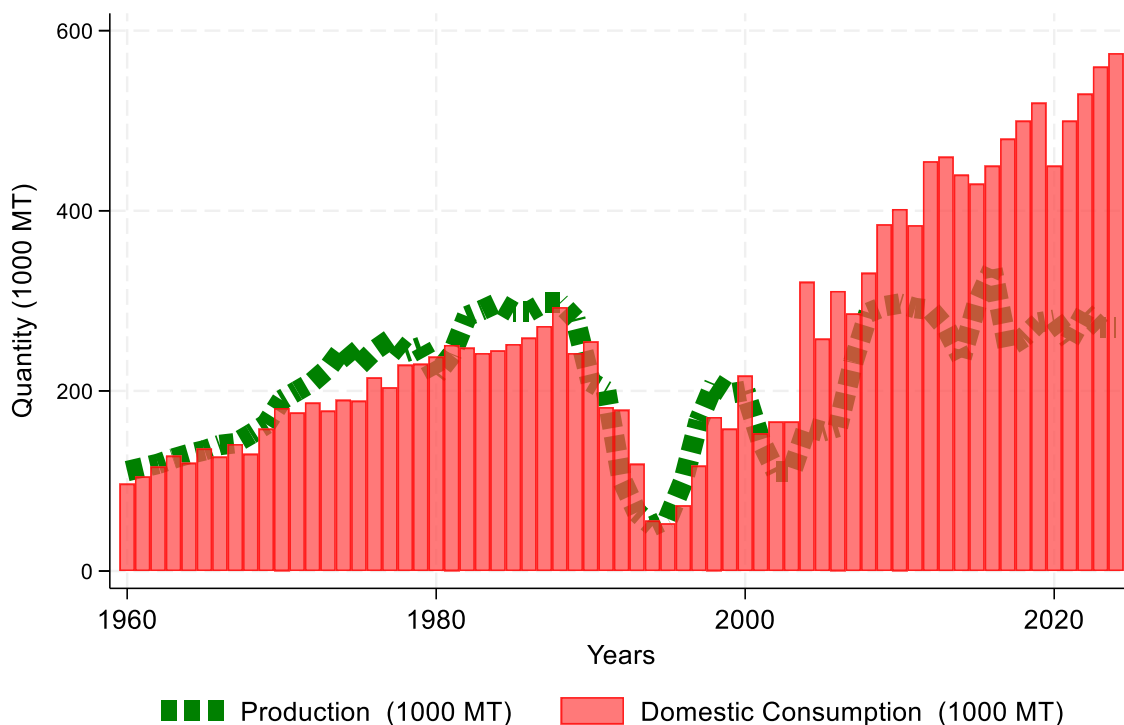


Fig 3. Gaps between domestic rice production (paddy) and consumption in Liberia from 1960 to 2024

Source of the data: USDA 2024

Liberia's rice seed sector is divided into two main value chains: the informal and the formal. The informal value chain consists of community-based seed enterprises that sell uncertified seeds in local markets, supported by service providers, such as credit and extension services. This chain covers approximately 95% of Liberian rice farmers who depend on seed from their previous harvests and engage in informal seed exchanges (FAO, 2022). By contrast, the formal value chain includes a network of early-generation seed producers, certified seed producers, agro-input

dealers, NGOs, seed importers, and various service providers, including those offering seed inspection and certification services. This formal chain serves the remaining 5% of the country's rice farmers and operates within a more structured institutional framework (USAID, 2023).

This report presents findings of a value chain verification exercise to identify and map the key actors and activities within the value chains, assess coordination mechanisms, and evaluate specific constraints and opportunities. By examining the composition and interdependencies of the value chains, this study aims to illuminate the major sources of inputs and services, their accessibility, and the differential access and control experienced by men and women across the chains.

The findings of this analysis provide critical insights for designing strategic interventions to improve the efficiency and effectiveness of Liberia's rice seed industry and highlight potential areas for further research. Understanding these value chain dynamics is essential for overcoming the major constraints faced by seed businesses and enhancing seed quality and distribution, thereby contributing to the sustainable development of the Liberian rice sector. This report serves as a scientific report of the focus group discussions for the mapping and SWOT analysis of rice seed value chain actors in Liberia.

2. OBJECTIVES OF THE FOCUS GROUP DISCUSSIONS

The focus group discussions with seed value chain actors aim to map the value chain and examine the strengths, weaknesses, opportunities, and threats that exist in the rice seed value chains in Liberia.

Specifically, the focus group discussions with rice seed value chain actors' aim to:

- i. Identify and map the key actors and processes within the rice seed value chain in Liberia
- ii. Analyze the strengths and weaknesses of the current rice seed value chains in Liberia
- iii. Assess the opportunities and threats present in the rice seed value chain in Liberia.



3. METHODOLOGY

3.1. Scope of the focus group discussions

The focus group discussions (FGDs) were conducted in Suakoko for two days (Figure 4). Formal and informal seed-value chain actors were involved. The first day of the focus group discussions was dedicated to formal actors and the second day was dedicated to informal actors. The following categories of rice seed value chain actors were included in the focus group discussions: producers of early generation seed (breeder and foundation seed), producers of certified seed, agro-input dealers, community-based seed enterprises, NGOs, service providers including credit and extension, seed inspection and certification services, seed importers (if any), and rice farmers.

The FGDs were facilitated by three experienced facilitators, each supported by a note-taker, and the discussions were guided by a value chain mapping tool and a SWOT analysis checklist. After the FGDs, a questionnaire was administered face-to-face to the producers of foundation and certified seed to assess their capacity to be engaged in seed production by the project.

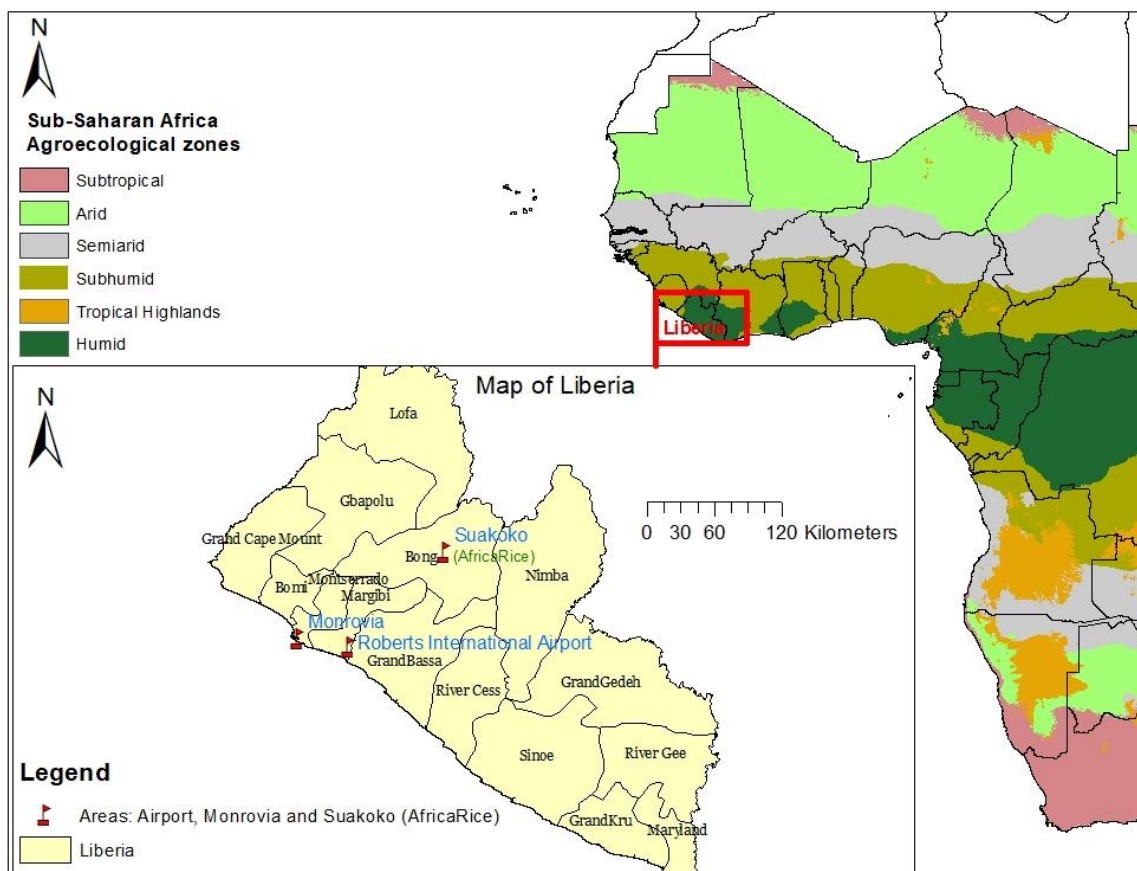


Fig 4. Map of Liberia

3.2. General guidelines to value chain mapping and SWOT analysis

The following broad guidelines were applied to the exercise:

Value chain mapping

- Map the value chains: Using cards, write key actors in advance. Give the cards to the participants and ask them to position them according to the flow of seeds through the value chain. They can use blank cards to write additional actors, as needed. Establishing consensus on the different segments that exist in formal and informal value chains.
- *Group the actors into two separate groups: one for those that operate in the formal value*

chain and one for those operating in the informal value chain.

- Establish the seasonal calendar – indicate months of most production/sales/purchases/ etc. of rice seed.

SWOT analysis

- For each segment of the value chains, use pair-wise ranking to identify the top five Strengths, weaknesses (constraints), opportunities, and threats.
- Use the following questions to guide the discussions:
 - For each constraint, why is it a constraint and why is it important? What are the issues underlying these constraints? Discuss each constraint until you have a detailed understanding, including how it might affect men/women, rich/poor, and young/old in different ways.
 - For each opportunity, discuss how it might increase the effectiveness and performance of the value chain. That is, they are ranked based on their perceived effectiveness in enhancing the value chain and how the opportunity might benefit or disadvantage men/women, rich/poor, and young/old. Facilitate it until you have an adequate understanding of each opportunity.
 - Of these opportunities, what would an intervention look like? Who should be involved? What is needed? Refer to the segments that have been agreed upon earlier and identify entry points for the interventions discussed.
 - For each segment, discuss the idea of biofortification of rice, that is, genetic improvement of rice to attain higher levels of micronutrients and macronutrients such as iron, zinc, and protein. Have they heard of it? If not, discuss what it means and why it is important. Would biofortified rice seeds (upgraded products) have a substantial market? What kinds of interventions would be needed to strengthen and sustain the demand for and supply of biofortified seeds?

The above guiding questions were used for discussion during the focus group activities to analyse the informal and formal seed value chains separately (Annex A1 and A2).

3.3. The SWOT analysis method

SWOT analysis has been used in several studies (Gürel and Tat, 2017; Sarma et al., 2019; Wilson et al., 2015). It is a strategic planning tool used to identify and evaluate the Strengths, Weaknesses, Opportunities, and Threats (SWOT) of a business or project. A summary of each component is provided in the schematic below

<p>S STRENGTHS: (Internal, Positive)</p> <ul style="list-style-type: none"> ▪ Strengths are the internal factors that give a company an advantage over its competitors. 	<p>W WEAKNESSES: (Internal, Negative)</p> <ul style="list-style-type: none"> ▪ Weaknesses are internal factors that put the company at a disadvantage compared to competitors.
<p>O OPPORTUNITIES: (External, Positive)</p> <ul style="list-style-type: none"> ▪ Opportunities are external factors in the environment that the company can capitalize on to improve its position. 	<p>M THREATS: (External, Negative)</p> <ul style="list-style-type: none"> ▪ Threats are external factors that could potentially cause trouble for the business.



4. RESULTS

In Liberia, the rice seed sector is divided into two distinct value chains: formal and informal seed value chains. An informal seed value chain typically involves local farmers and community-based enterprises that rely on traditional methods of seed production, distribution, and exchange without formal regulation. In contrast, the formal seed value chain is structured around certified institutions, such as research centers, seed certification agencies, and regulated suppliers, ensuring quality control and adherence to standards. A value chain verification exercise was conducted separately for both systems to map the actors involved, their activities, and the coordination mechanisms that exist within each system. This distinction is critical for understanding the different dynamics and challenges faced by each value chain in Liberia's rice seed sector. The remainder of this section is organized as follows. First, we present the mapping results of the value chains, followed by the seasonal calendar for upland and lowland rice seed production. Second, a SWOT analysis of formal and informal rice seed value chains is presented. Third, we present perceptions of biofortified rice by seed producers. Finally, we make some policy recommendations and conclusions.

4.1. Mapping of the rice value chains in Liberia

4.1.1. Mapping of the formal rice seed value chain

To map the rice seed value chain in Liberia, participants were provided with cards representing the different actors and processes involved in seed flow. They were asked to arrange these cards according to the flow of seeds from production to the end user. Participants could also use additional blank cards to represent actors that were not initially included. The goal was to reach a consensus on the formal and informal segments of the rice seed value chain and identify how seeds move through the system. This mapping method helps to clarify the roles and interactions among formal actors in the rice seed value chain, laying the groundwork for improving efficiency and coordination.

The mapping of formal actors in the rice seed value chain in Liberia revealed a structured flow of seed production, certification, and distribution. It begins with the production of early-generation

seeds, including breeders and foundation seeds, which ensure high-quality genetic material. This is followed by the seed certification agency, a government body responsible for maintaining seed standards. Certified seed are then multiplied by the designated producers and distributed through agro-input and community-based seed enterprises. NGOs play a supportive role by offering capacity building and resources to both farmers and seed producers. Various service providers offer critical support services including credit, agricultural extension, and seed certification. In some cases, seed importers may also supplement the local supply, ensuring that farmers receive high-quality seeds for rice cultivation. The results of the mapping of formal rice seed value chain actors in Liberia and the description are summarized in Table 1.

Table 1. Formal rice seed value chain actors in Liberia

Order	Formal actors	Description of each category of actor
1 st	Producers of Early Generation Seed (Breeder and Foundation Seed):	These actors produce the initial stages of rice seed, ensuring genetic purity and high quality.
2 nd	Seed Certification Agency (Government Agency)	The agency is responsible for certifying that seeds meet the required standards for quality and viability.
3 rd	Producers of Certified Seed	Certified seed producers multiply early-generation seeds to provide seeds that are ready for distribution to farmers.
4 th	Agro-input Dealers	These are businesses that distribute certified seeds and other inputs like fertilizers and pesticides to farmers.
5 th	Community-Based Seed Enterprises	Local enterprises play a role in multiplying and distributing seeds at the community level.
6 th	NGOs	Non-governmental organizations often support seed production, distribution, and capacity building for farmers.
7 th	Service Providers	These include actors providing services like credit, agricultural extension, seed inspection, and certification services to support the seed system.
8 th	Seed Importers	Some actors import rice seeds from other countries to supplement local production.

9 th	Rice Farmers	The final recipients of seeds, cultivate rice for food production and further seed multiplication.
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4.1.2. Mapping of the informal rice seed value chains in Liberia

The informal rice seed value chain in Liberia is a critical component of the country's agricultural sector and is primarily driven by smallholder farmers, local cooperatives, and community-based initiatives. Unlike the formal system, which follows a regulated structure, the informal seed chain relies on traditional practices such as seed saving, farmer-to-farmer exchanges, and local market trading. These actors often operate outside government certification processes. The flexibility and adaptability of the informal system enable it to meet the immediate needs of farmers, particularly in remote areas where formal seed systems are limited.

The mapping of informal actors in Liberia's rice seed value chain reveals a network centered around smallholder farmers, local cooperatives, and community-based seed multipliers, all of whom rely heavily on traditional practices, such as seed saving and farmer exchanges. Local seed banks, informal agro-input dealers, and traditional market traders play crucial roles in seed distribution, ensuring that farmers in rural areas have access to seed during the planting season. Informal extension workers and community leaders also provide critical support, guidance, and knowledge-sharing. Although this system operates outside formal regulation and certification processes, it remains essential to ensure seed availability in remote regions that formal systems may not reach. Despite challenges, such as inconsistent seed quality and limited financial resources, the informal seed value chain is a vital component of Liberia's agricultural landscape, sustaining the livelihoods of many rural farmers. The results of the mapping of informal rice seed value chain actors in Liberia are summarized in Table 2.

Table 2. Informal rice seed value chain actors in Liberia

Order	Informal actors	Description of each category of actor
1 st	Smallholder rice farmers (Seed Producers)	These farmers often save and multiply seeds from their own harvests or exchange seeds with other farmers.

2 nd	Local farmer cooperatives	These cooperatives help organize smallholder farmers, facilitating seed sharing, informal seed sales, and collective seed production.
3 rd	Traditional seed traders	Individuals or local market vendors who sell seeds informally without formal certification.
4 th	Community-based seed multipliers	Informal groups or individuals who specialize in multiplying seeds at the community level, supplying seeds to nearby farmers.
5 th	Local extension workers (informal)	Community members with farming expertise who provide advice and support on seed selection and farming practices.
6 th	Informal agro-input dealers	Small, local businesses that sell seeds and other farming inputs directly to farmers without government oversight or certification.
7 th	Local seed banks	Informal community seed banks where farmers store and exchange seeds, ensuring access to quality seeds during planting seasons.
8 th	NGOs (Informal Support)	Local NGOs providing informal support to smallholder farmers in terms of training, seed donations, or facilitating seed exchanges.
9 th	Family and community labor	In many rural settings, family members and community groups collaborate in seed production and farming activities.
10 th	Traditional leaders and elders	In some areas, traditional leaders play an informal advisory role in agricultural practices, including the selection and distribution of seeds.
11 th	Rice farmers	Rice farmers use the seed to produce paddy rice.

4.2. Seasonal calendar for upland and lowland rice seed farming in Liberia

An explanation of the seasonal calendar structure for upland and lowland rice farming in Liberia is presented in Table 3. The same calendar was applied to the formal and informal seed value chains.

- **January-March:** Off-Season Activities



During these months, farmers plan and prepare for the upcoming planting season. This includes selecting high-quality seeds, preparing tools, and assessing soil health. Farmers also focus on clearing previous crop residues and performing soil amendments to enhance fertility.

- **April-June:** Seed Production and Planting Season

Land preparation for upland rice begins in April, with planting occurring from late April to early June. Farmers use practices such as burning vegetation and direct seeding. For lowland rice, planting starts in late May, when land is often flooded for transplantation. Effective crop management during this period includes weed control, pest management, and water management in lowland fields.

- **July-August:** Agronomic Practices and Crop Management

Farmers continue to monitor fields, apply fertilizers, and manage pests. For lowland rice, water levels are closely monitored to ensure optimal conditions, whereas upland rice requires attention to the soil moisture.

- **September-December:** Harvesting and Post-Harvest Activities

Harvesting for upland rice occurs from late September to October, whereas lowland rice is harvested from October to December. Post-harvest activities include drying, milling, and storing the harvested grains. Farmers also begin planning for the next planting cycle, reflecting on the current season’s performance, and adjusting for improvements.

Table 3. Seasonal calendar for upland and lowland rice production in Liberia

Month	Seed Production	Sales and Distribution	Planting Season	Agronomic Practices and Crop Management	Harvesting and Post-Harvest Activities	Off-Season Activities (Planning and Preparation)
January						
February						
March						
April						
May						
June						

July						
August						
Sept						
October						
November						
December						

4.3. SWOT analysis of the formal and informal rice seed value chain in Liberia

The SWOT analysis of the formal and informal rice seed value chains in Liberia provides a comprehensive understanding of the strengths, weaknesses, opportunities, and threats faced by both value chains. By examining the distinct roles, challenges, and potential of formal institutions and informal actors, this analysis highlights critical areas for improvement and collaboration to strengthen the overall efficiency and resilience of the rice seed value chain in Liberia.

4.3.1. Results of the SWOT analysis with formal rice seed value chain actors

Strengths (Internal, Positive)

The internal strengths of the rice seed value chain in Liberia refer to the inherent advantages of the agricultural environment and local initiatives that support the production and distribution of high-quality seeds, thereby contributing to increased yields and national food security. The strengths identified in the formal rice seed value chain in Liberia are listed below:

1. **Trained manpower:** Existing knowledge of rice farming and seed production.
2. **Available land:** Liberia has large areas of arable land that are suitable for rice cultivation.
3. **Adequate water resources:** Availability of water for irrigation in many parts of the country.
4. **Favorable climate:** Climate conditions support rice production, particularly in lowlands and swampy areas.
5. **Seed policy development:** A national seed policy framework exists to regulate and improve seed production.

6. **Diverse rice varieties:** Traditional and indigenous rice seed varieties adapted to local conditions.
7. **Government commitment:** Government support for rice production and seed development initiatives.
8. **Potential for sustainable practices:** opportunities for eco-friendly farming methods such as organic seed production.
9. **Partnerships with international organizations:** Collaborations with NGOs, donors, and development agencies.
10. **Strong community-based farming systems:** Established farmer cooperatives and networks help seed distribution.

Weaknesses (Internal, Negative)

The internal weaknesses of the rice seed value chain in Liberia pertain to structural and organizational obstacles that limit the effectiveness of seed production and distribution. These shortcomings include inadequate infrastructure, lack of financing, and insufficient training, which hinder rice sector optimization. The weaknesses identified in the formal rice seed value chain in Liberia are presented below:

1. **Lack of policy implementation:** Inadequate enforcement of seed quality control regulations.
2. **Underdeveloped infrastructure:** Insufficient irrigation systems, seed processing, and storage facilities.
3. **Limited access to finance:** Farmers and seed producers face challenges in securing affordable loans and investments.
4. **Access to land:** Land tenure issues and disputes can limit rice cultivation expansion.
5. **Insufficient trained manpower:** shortage of skilled professionals for high-level seed production and management.
6. **Labor shortages:** Declining the rural labor force due to youth migration to urban areas.
7. **Limited mechanization:** Lack of modern farming equipment for efficient seed multiplication and harvesting.



8. **High post-harvest losses:** Poor post-harvest management leads to significant seed spoilage and wastage.
9. **Fragmented distribution networks:** Weak distribution systems, limiting the reach of quality seeds to remote farmers.
10. **Limited research and innovation:** Inadequate research into developing locally adapted, high-yield seed varieties.

Opportunities (External, Positive)

External opportunities for Liberia's rice seed value chain involve favorable conditions and emerging trends that can enhance seed production and distribution. These opportunities include the growing market demand for locally produced rice seed, support from international organizations and NGOs, advancements in agricultural technology, and the potential for developing climate-resilient rice varieties, all of which can significantly contribute to increasing productivity and food security. The following are the opportunities identified in the formal rice seed value chain.

1. **High market demand for rice seed:** The increasing demand for high-quality seeds is driven by local and regional rice consumption.
2. **Export potential:** Liberia could become a regional exporter of rice seed to neighboring West African countries.
3. **Technology adoption:** Growing interest in using technology (e.g., irrigation systems and seed processing machines) to enhance productivity.
4. **Support from international organizations:** Continued assistance from the government, NGOs, and international agencies for seed production improvement.
5. **Climate-resilient rice varieties:** development and use of seeds that can withstand drought and other climatic stresses.
6. **Investment in research and development:** Opportunities for partnerships with academic institutions for seed research.

7. **Public-private partnerships:** Potential to attract private sector investment in the rice seed value chain.
8. **Capacity building:** Opportunities to train more farmers and technicians in modern seed production and distribution techniques.
9. **Organic seed production:** The increasing global demand for organic food creates niche markets for organically grown rice seeds.
10. **Youth engagement in agriculture:** Growing efforts to involve the younger generation in seed production through innovation and modern farming techniques.

Threats (External, Negative)

External threats to the rice seed value chain in Liberia encompass various challenges that could adversely impact seed production and distribution. These threats include the effects of climate change, such as unpredictable weather patterns and extreme weather events; the prevalence of pests and diseases; competition from imported seeds; economic instability leading to inflation; and the potential loss of genetic diversity in rice varieties, all of which pose significant risks to the sustainability and resilience of the sector. The threats identified in the formal rice seed value chain in Liberia are listed below.

1. **Climate change:** Unpredictable weather patterns including droughts and floods can negatively affect rice cultivation.
2. **Pests and diseases:** Outbreaks of pests and diseases can significantly damage rice crops and seed quality.
3. **Conflicts and pandemics:** Political instability, conflicts, or health crises such as pandemics can disrupt the value chain.
4. **Inflation and rising costs:** Economic downturns and inflation may increase the input costs for seed production.
5. **Market competition:** Rice seeds imported from other countries may outcompete local seeds because of pricing or perceived quality.

6. **Loss of genetic diversity:** Focusing on hybrid and high-yield varieties might lead to erosion of traditional seed varieties.
7. **Regulatory challenges:** Inconsistent enforcement of seed laws and poor regulatory oversight can harm the credibility of local seed production.
8. **Poor infrastructure:** Continued underdevelopment of transportation and storage infrastructure affects seed distribution
9. **Fluctuations in global rice prices:** Changes in international rice markets can affect local seed demand and profitability.
10. **Land tenure conflicts:** Ongoing disputes over land ownership could hinder access to suitable land to expand rice seed production.

SWOT analysis matrix of the formal rice seed value chain in Liberia

HELPFUL	HARMFUL
Strengths (internal)	Weaknesses (internal)
<ul style="list-style-type: none"> ▪ Trained manpower for seed production ▪ Available land suitable for rice cultivation ▪ Adequate water resources for irrigation ▪ Favorable climate conditions for rice production ▪ A developed seed policy to regulate the sector ▪ Diverse rice varieties ▪ Government commitment ▪ Potential for sustainable practices ▪ Partnerships with international organizations ▪ Strong community-based farming systems 	<ul style="list-style-type: none"> ▪ Lack of effective policy implementation, especially in seed quality control ▪ Underdeveloped infrastructure (irrigation systems, processing facilities, and storage) ▪ Limited access to finance for farmers and seed producers ▪ Difficulty in accessing land for large-scale farming ▪ Insufficient trained manpower for high-level agricultural activities ▪ Lack of labor in rural areas due to urban migration ▪ Limited mechanization ▪ High post-harvest losses ▪ Fragmented distribution networks ▪ Limited research and innovation
Opportunities (external)	Threats (external)

<ul style="list-style-type: none"> ▪ High market demand for rice seeds, both locally and regionally ▪ Potential for exporting high-quality rice seeds to neighboring countries ▪ Growing adoption of agricultural technologies (e.g., mechanization, better irrigation) ▪ Support from international organizations, the government, and NGOs for seed development ▪ Development of climate-resilient rice varieties to address environmental challenges ▪ Increased research and development in seed innovation and agricultural technologies ▪ Public-private partnerships ▪ Capacity building ▪ Organic seed production ▪ Youth engagement in agriculture 	<ul style="list-style-type: none"> ▪ The adverse effects of climate change, including droughts and flooding ▪ Pests and diseases that could affect rice production and seed quality ▪ Conflicts, pandemics, and inflation affecting seed prices and accessibility ▪ Inflation and rising costs ▪ Market competition from imported seeds, which may be cheaper or better promoted ▪ Loss of genetic diversity in traditional rice varieties due to the focus on high-yield hybrids ▪ Regulatory challenges ▪ Poor infrastructure ▪ Fluctuations in global rice prices ▪ Land tenure conflicts
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4.3.2. Results of the SWOT analysis of the informal value chain

Strengths (Internal, Positive)

Informal seed value chain actors in Liberia, including smallholder farmers, local cooperatives, and community organizations, play a pivotal role in seed production, distribution, and preservation, contributing significantly to the sustainability and accessibility of rice seeds across the country.

The strengths of informal rice seed value chains are as follows:

1. **Availability of land:** Informal farmers often utilize vast areas of arable land for rice cultivation, thus enhancing production capacity.
2. **Favorable climatic conditions:** Local farmers benefit from favorable climatic conditions that are suitable for growing rice throughout the year.
3. **Soils suitable for rice production:** Informal actors often cultivate rice in soil types that naturally support high yield.

4. **Labor availability:** Many informal farming communities have access to family and community labor, which reduces labor costs.
5. **Water resources:** Informal farmers typically utilize natural water sources and local irrigation knowledge to optimize rice farming.
6. **Community knowledge sharing:** Informal networks allow for the exchange of traditional farming knowledge and practices among farmers.
7. **Diverse local varieties:** Informal actors often maintain and cultivate diverse indigenous rice varieties that are well-adapted to local conditions.
8. **Flexibility in farming practices:** Informal farmers can quickly adapt their farming practices to local conditions and market demands.
9. **Strong community bonds:** Informal farmer groups and cooperatives often provide social support and collective bargaining power for seed distribution.
10. **Local seed banks:** Some communities have established informal seed banks to preserve and distribute high-quality seeds.

Weaknesses (Internal, Negative)

The weaknesses of informal seed value chain actors in Liberia stem from various internal challenges, including limited access to resources and inadequate organizational structures. These weaknesses hinder their capacity to scale and improve seed quality, thereby affecting the overall productivity of the rice sector. Below are the weaknesses identified in the informal rice seed value chain in Liberia:

1. **Lack of timely support:** Informal farmers struggle to receive timely assistance from government agencies or NGOs, which impacts their productivity.
2. **Insufficient funding:** Limited access to credit or financial services prevents informal farmers from investing in improved technologies and seeds.
3. **Absence of comprehensive policy:** Informal actors often operate outside formal policy frameworks, limiting their access to resources and support.

4. **Inadequate storage facilities:** Many informal farmers lack proper storage facilities, which leads to post-harvest losses and quality degradation.
5. **Limited access to information:** Informal actors have restricted access to modern agricultural practices, research, and market information.
6. **Dependence on traditional methods:** Many informal farmers continue to rely on traditional farming methods, which can limit their productivity.
7. **Poor organization:** Lack of formal organization among informal farmers can hinder collective action and bargaining power.
8. **Vulnerability to market fluctuations:** Informal actors are often more susceptible to sudden changes in market prices of rice and seeds.
9. **Quality control issues:** Without formal certification, the quality of seeds produced by informal actors can be inconsistent.
10. **Limited networking opportunities:** Informal farmers have fewer opportunities to network with other stakeholders in a value chain.

Opportunities (External, Positive)

The opportunities for informal seed value chain actors in Liberia arise from external factors, such as increasing demand for local rice seeds, support from international organizations and NGOs, and access to improved agricultural technologies. These opportunities can enhance the capacity of informal actors to boost productivity, improve seed quality, and expand their markets, both locally and internationally. The opportunities identified in the informal rice seed value chain of Liberia include the following:

1. **Access to training programs:** Increased availability of training and workshops help informal farmers enhance their skills and production methods.
2. **Technology adoption:** Opportunities exist for informal actors to adopt innovative technologies such as mobile apps for market information and agricultural practices.
3. **Market expansion:** Growing demand for locally produced rice seeds creates new opportunities for informal farmers.

4. **Support from NGOs:** Many NGOs focus on empowering informal farmers and providing resources, training, and access to markets.
5. **Collaborative farming initiatives:** Informal groups establish cooperatives to enhance seed production and distribution efficiency.
6. **Engagement in research:** Opportunities for informal farmers to collaborate with research institutions to develop improved seed varieties.
7. **Increased access to credit:** Initiatives aimed at improving financial inclusion can provide informal actors with access to credit and financial resources.
8. **Community seed exchange:** Informal farmers establish seed exchange programs to diversify and improve seed quality.
9. **Climate-smart agriculture initiatives:** Opportunities to adopt climate-resilient farming practices and seeds to mitigate the effects of climate change.
10. **Enhanced local governance:** Strengthened community governance structures improve coordination and support for informal farmers.

Threats (External, Negative)

The threats facing informal actors in Liberia's rice seed value chain include external challenges, such as climate change, which causes unpredictable weather patterns, increased pest infestations, and diseases that threaten crop yields. In addition, competition from imported seeds, economic instability, and limited market access further complicate their ability to thrive. Political uncertainty, pandemics, and lack of regulatory support also pose significant risks, undermining the growth and sustainability of informal seed producers. The threats identified in the informal rice seed value chain in Liberia are presented in the matrix below.

1. **Theft of production:** Informal farmers face theft of their crops or seeds, leading to financial losses.
2. **Pests, insects, and diseases:** Increased pest and disease outbreaks can threaten the production and quality of the rice seeds cultivated by informal actors.

3. **Climate change impact:** Unpredictable weather patterns can significantly affect rice yield and sustainability.
4. **Market competition:** Informal actors face competition from larger formal seed producers, limiting their market share.
5. **Lack of planting calendar:** The absence of a defined planting calendar can lead to inefficiencies in crop management among informal farmers.
6. **Reliance on traditional practices:** Continued reliance on outdated methods can hinder adoption of more efficient agricultural practices.
7. **Pandemics and health crises:** Health emergencies disrupt labor availability and access to markets, thereby impacting production.
8. **Regulatory changes:** Changes in policies or regulations that favor formal over informal actors can marginalize small farmers.
9. **Economic instability:** Fluctuations in the economy lead to increased costs and reduced access to essential inputs by informal farmers.
10. **Loss of biodiversity:** Monoculture practices or reliance on a few seed varieties lead to a loss of genetic diversity among local rice varieties.

SWOT analysis matrix of the informal rice seed value chain in Liberia

HELPFUL	HARMFUL
Strengths (internal)	Weaknesses (internal)
<ul style="list-style-type: none"> ▪ Availability of Land ▪ Favorable Climate Conditions ▪ Soils Suitable for Rice Production ▪ Labor Availability ▪ Water Resources ▪ Community Knowledge Sharing ▪ Diverse Local Varieties ▪ Flexibility in Farming Practices ▪ Strong Community Bonds ▪ Local Seed Banks 	<ul style="list-style-type: none"> ▪ Lack of Timely Support ▪ Insufficient Funding ▪ Absence of Comprehensive Policy ▪ Inadequate Storage Facilities ▪ Limited Access to Information ▪ Dependence on Traditional Methods ▪ Poor Organization ▪ Vulnerability to Market Fluctuations ▪ Quality Control Issues ▪ Limited Networking Opportunities
Opportunities (external)	Threats (external)
<ul style="list-style-type: none"> ▪ Access to Training Programs ▪ Technology Adoption 	<ul style="list-style-type: none"> ▪ Theft of Production ▪ Pests, Insects, and Diseases

<ul style="list-style-type: none"> ▪ Market Expansion ▪ Support from NGOs ▪ Collaborative Farming Initiatives ▪ Engagement in Research ▪ Increased Access to Credit ▪ Community Seed Exchanges ▪ Climate-Smart Agriculture Initiatives ▪ Enhanced Local Governance 	<ul style="list-style-type: none"> ▪ Climate Change Impact ▪ Market Competition ▪ Lack of Planting Calendar ▪ Reliance on Traditional Practices ▪ Pandemics and Health Crises ▪ Regulatory Changes ▪ Economic Instability ▪ Loss of Biodiversity
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4.4. Perception of biofortified rice by seed value chain actors

Biofortified rice refers to rice varieties that have undergone genetic improvement to increase their levels of essential micronutrients, such as iron and zinc, as well as protein, thereby enhancing their nutritional profiles. This innovative approach aims to combat malnutrition and micronutrient deficiencies in populations that rely heavily on rice as a staple food, contributing to better health outcomes and improved nutrition security. The idea of biofortified rice was discussed during a focus group discussion with formal and informal seed value chain actors in Liberia. Discussions have focused on awareness and the importance of biofortification, potential markets, and interventions to strengthen the demand for and supply of biofortified rice seed in Liberia. The results are as follows.

- **Awareness of biofortification**

The initial inquiry into the awareness of rice biofortification among both formal and informal seed value chain actors revealed a significant gap: none of the participants of the focus group discussion had heard about biofortification. This lack of awareness highlights the need for education and information dissemination regarding innovative agricultural practices that could enhance the nutritional quality of staple crops, such as rice.

- **Understanding biofortification and its importance**

The concept of biofortification was explained to the participants during the focus group discussion. Biofortification refers to the process of enhancing the nutritional value of food crops through selective breeding and agronomic practices. Specifically for rice, biofortification aims to increase the levels of essential nutrients, such as vitamins and minerals, addressing common micronutrient deficiencies prevalent in many diets. This is particularly important in regions where rice is a staple

food, as it can significantly improve public health and enhance food security for vulnerable populations that rely on rice as a primary food source. Understanding the significance of biofortification is crucial for encouraging its acceptance and adoption among farmers and consumers.

- **Potential market for biofortified rice seed in Liberia**

The potential market for biofortified rice seeds in Liberia was discussed during the focus group discussion. Despite the initial lack of awareness regarding biofortification, the assessment indicated that there is substantial market potential for biofortified rice seed. Participants expressed willingness to purchase biofortified rice if they were sufficiently informed about its nutritional benefits. This suggests that, with adequate awareness campaigns, biofortified rice could find a ready market among consumers who prioritize health and nutrition in their dietary choices.

- **Required interventions to strengthen demand for and supply of biofortified rice seed in Liberia**

Interventions to strengthen the demand for and supply of biofortified rice seed in Liberia were proposed by participants. Several key interventions are necessary to ensure the successful introduction of and sustained demand for biofortified rice seed. First, launching awareness campaigns to educate farmers and consumers on the benefits of biofortified rice is essential. These campaigns should focus on promoting the nutritional advantages and potential health effects of consuming biofortified rice. Additionally, efforts must be made to regenerate biofortified seed to ensure a consistent and sustainable supply through local seed producers.

Training programs for rice farmers in the cultivation and management of new biofortified rice varieties will be critical in facilitating successful adoption. Ensuring the availability and accessibility of seeds through local agro-input dealers and cooperatives is equally important. Furthermore, establishing a pricing strategy that reflects the added value of biofortified rice while remaining affordable will help stimulate demand. Finally, implementing trial programs will allow farmers to test these new varieties on a smaller scale, gaining firsthand experience that can encourage broader acceptance and eventually widespread cultivation.

4.5. Detailed guide for focus group discussions and participants answers

Table 4 summarizes the guiding questions used for the discussion and analysis of informal and formal seed value chains, and the results obtained.

Table 4. Guide for the focus group discussion and participants answers

Order	Questions	Answers from formal actors	Answers from informal actors
The seed market map			
1	Identify the main locations where seed suppliers operate and the distance from their clients	R1: CARI R2: Depends on where you come from.	R1: From farmers R2: 15-20 min by foot
2	How many seed suppliers, sellers, and buyers exist in each channel? Simply guesstimate the percentages	One seeds supplier and many buyers along the chain	
3	What proportions of men and women supply/sell seed into / buy seed from each of the channels?	More Women than men. 90 and 10	R: More Women than men. 90 and 10
4	What is the seasonal proportion of sales in each channel?	One seed supplier in the formal system: CARI	More seed in rainy season than dry season. 90 and 10
5	What are the average annual sales revenues of the different types of seed sellers in different channels?	CARI is a government institution and not commercial.	Difficult to estimate but it is more than the revenues that the government make
6	Do men and women play specific roles in selling/distributing seeds?	No	No, Men and women do the same.
7	Identify credit sources available to seed businesses and farmers	AfriLand Bank and BRAC	Susu club, Village saving Loan Association, VSLA. 10 to 20 percent interest
8	Discuss whether seed demand and supply vary during the year in the different channels. If so, does fluctuation in demand or supply constrain the seed business?	Yes. Fluctuation in demand or supply constraints the seed business	Yes. Fluctuations in demand or supply constrain the seed business. Especially during the rainy season
About seed prices			
9	What are the current prices in each channel?	Price of 1kg of certified seed: 1.5 USD	Price of 1kg of certified seed: 1.32 USD per kg
10	Are prices any different when paid to or by men or women?	Same price	Same price

11	When do seasonally high or low prices occur in each channel? What were High and low prices during the last 12 months	Low demand during the dry period High demand during the planting season	Low demand during the dry period: Dry season, High demand during the planting season: rainy season.
12	Why do prices vary across channels?	Demand is high, and price increases Increase of input prices	High demand, Demand is high, and price increases, Increase in input prices
13	How are the seed prices determined?	Production cost	Production cost, Inputs cost
About seed quality			
14	Which seed quality attributes do buyers look for? Do seed buyers inform seed Producers/importers of seed quality: How is this communicated?	Germination, Higher yield, Purity of the seed, Price	Infestation Moisture content
15	How is this communicated?	On the label	Germination test
16	Are seed-quality grades in place? If so, then list and describe them.	No	No
17	What channels are these grades in use? Record for each attribute and each channel.	No	No
18	How are the seed quality standards enforced?	No	No
19	Do farmers in any channel pay a price premium for high-quality seeds?	No	No
20	Do farmers in any channel pay lower prices for poor-quality seed?	No	No
21	Do farmers in any channel reject seeds due to poor quality? What is the Experience of rejection in the group	No	No
22	Do farmers test seeds for any quality attributes?	No	No
23	Are seed suppliers able to meet farmers' quality requirements?	No	No
About payment			
24	What is the payment mechanism for each channel?	No	Barter system
25	Do seed buyers, including farmers, in any channel offer advance payments?	No	No
26	Are check-off arrangements available for any channel? (when, for instance, seed is advanced to a farmer buy a rice trader, and the cost is later deducted from the trader's price	No	No
27	How long does it take seed suppliers to receive payment after sales for each channel?	No arrangement	No arrangement
28	Is there a long-term relationship between seed suppliers and buyers? If so, describes these relationships.	No relationship	No relationship

29	Are there long-term relationships between seed suppliers and their input and service providers? If so, is this the same for both men and women?	No	No
30	Are formal or informal agreements or contracts (of any kind – written, verbal, customary) used for sales or purchases? In which channel? Is this the same for men and women?	No	No
About transport			
31	Who pays for transportation of seed to the market/buyer in each channel?	Self	Self
32	What mode of transport is typically used in each channel?	Motorbike; Vehicle	Motorbike; Vehicle
33	What is the average cost of transport per unit (defined units) in each channel. How much time does it take to get the seed to market (return trip) each time the seed is sold.	NA	NA
34	Does transportation affect seed quality or result in seed loss?	Yes	Yes. Rain; accident; etc
35	What transport-related constraints exist in the different channels? (<i>record separately by gender if applicable</i>)	Bad road	Bad road
About other seed marketing issues			
36	Is the packaging of seed required by farmers?	Yes, required but not been done.	Yes, required but not been done.
37	How long does it take for seed suppliers to find buyers?	NA	Depends on the season
38	Are there seed industry-specific fees paid by seed sellers?	No	No
39	Would enhancing of seed certification services be of interest to value-chain agents?	YES	YES
40	Would the introduction of Quality-Declared Seed as an alternative to certified seed be of interest to value-chain agents?	YES	YES
Credit services			
41	List all public and private providers of credit to the different seed value chain agents.	AfriLand Bank BRAC	VSLA. SUSU
42	Do agents find it difficult to obtain credit? If so, why?	Yes. High interest rate, Banks don't trust farmers	Yes. High interest rate Banks don't trust farmers
43	Are sources of credit equally accessible to both men and women?	Yes	No
44	What credit is normally used?	Children's School fee, Food	Used for farming activities, Children School fee Food

45	What is the preferred source of credit for different agents? Why?	AfriLand Bank BRAC VSLA	SUSU, VSLA Most preferred source: VSLA
46	What interest rates are charged by different sources of credit today? From 10 to 25 percent	AfriLand Bank: BRAC: VSLA:	SUSU VSLA
Information and extension services			
47	List all public and private providers of market information.	Radio, TV, Electronic and medias	Farmers friends, Radio,
48	Where do agents find market information? (Information on price, quality, quantities demanded, and buyers' locations). Does this differ between women and men? Is the available information reliable?	Public and private/ NGOs	Farmers
49	Who provides the extension services for seed production and rice cultivation?	CARI MOA	Friends Farmers Sometimes CARI
50	Are extension services of good quality?	Good but needs improvement	No extension Sometimes CARI
51	How is extension delivered (e.g. demonstration plot, farm visit, training course)?	Farm visit Demonstration Video training	Farm visit, Field visit
Collective action			
52	Are there any ways in which value chain agents collaborate collectively? (List ways)	No	Yes
53	Are collective efforts formally organized?	No	Yes
54	Which formal and informal organizations specifically facilitate seed production and marketing? Provide names, if possible.	-Formal: CARI, MOA -Informal: Community-based seed enterprises	Farmer. Sometimes CARI & NGOs
55	What specific challenges do collective actions address?	Price harmonization	Dispute in farmer association, Stable Price
56	What external support is available for collective action in seed-value chains? (training, credit, etc.)	Training, Credit or loan	Training, Credit or loan
57	What are the challenges of collective action in seed-value chains?	Credit, Availability of Quality improved seed, Lack of Inputs	Credit, Availability of Quality improved seed, Lack of Inputs.
58	General recommendations by actors	- Training - Agricultural loan - Government to provide subsidize -Improved technologies	-Provide certified seeds affordable; available, accessible - Access to credit to farmers -Road improvement.

		<ul style="list-style-type: none"> -Infrastructure development -Public-private partnership 	<ul style="list-style-type: none"> -Technologies, tools, materials, machines -Make the seed production sector attractive to youth -Capacity building -More extension workers.
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5. POLICY RECOMMENDATIONS

Based on the SWOT analysis of Liberia's rice seed value chain, an effective intervention could focus on enhancing strengths and opportunities and addressing weaknesses and threats in the seed value chain. We recommend strategies and interventions aimed at strengthening the rice seed value chains in Liberia by leveraging existing strengths and opportunities, while addressing critical weaknesses and threats. A detailed description of each intervention and strategy for the rice seed value chain in Liberia is provided below.

1. Capacity building and training

To enhance the skills and knowledge of informal seed producers and farmers, implementing comprehensive capacity-building initiatives is essential. These programs include workshops and training sessions focusing on best practices in seed production, pest management, and sustainable farming techniques. Local agricultural experts and extension workers will lead these workshops by utilizing practical demonstrations and participatory learning approaches to ensure that participants can directly apply the knowledge gained. By empowering farmers with the necessary skills, this intervention aims to improve overall seed quality and increase productivity within the informal rice seed value chain.

2. Access to quality seeds

Increasing the availability of high-quality seeds to smallholder farmers is critical for enhancing productivity and food security. This intervention will facilitate partnerships between informal seed producers and research institutions to develop and distribute improved seed varieties, including those that are climate resilient and suited to local conditions. By leveraging local agricultural



research and promoting the use of high-quality seeds, farmers can benefit from higher yields and better disease resistance. This strategy also involves establishing community seed banks that provide access to certified seeds, ensuring that farmers have reliable options for planting.

3. Strengthening local cooperatives

Enhancing collaboration among farmers through the training and strengthening of local cooperatives is vital to improving their bargaining power and resource management. This intervention will support existing cooperatives and help them establish new ones by providing training in cooperative management, governance, and marketing strategies. By promoting collective action, farmers can streamline seed production, storage, and marketing processes, leading to more efficient operations and greater market access. Cooperatives also serve as platforms for sharing resources, knowledge, and best practices, fostering a sense of community and solidarity among farmers.

4. Improved access to financing

Alleviating the financial constraints faced by informal actors is essential to their growth and sustainability. This intervention will develop microfinance programs or partnerships with local banks to offer accessible credit options specifically designed for seed production and agricultural input. By providing affordable loans and financial literacy training, farmers can invest in necessary resources such as quality seeds, fertilizers, and irrigation systems. Improved access to financing enables informal seed producers to scale their operations, enhance productivity, and ultimately increase their income.

5. Market linkages

Expanding market access for informal seed producers is crucial to their economic viability. This intervention creates platforms or networks that connect informal seed producers with local and regional markets, facilitating direct sales and reducing reliance on intermediaries. By organizing market fairs, trade shows, and online platforms, farmers can showcase their seeds and reach potential buyers more effectively. Additionally, this strategy will provide training in marketing and negotiation skills, empowering farmers to secure better prices for their products and increase their competitiveness in the market.

6. Enhancing seed certification processes

To improve the credibility and quality of the seed produced in the informal sector, it is necessary to collaborate with government agencies to develop a simplified certification process for informal seed producers. This intervention would aim to establish clear guidelines and support mechanisms that enable informal actors to access certification, while ensuring that they meet quality standards. By facilitating access to certification, farmers can enhance the marketability of their seeds and increase consumer trust. This strategy will also include education on the importance of seed quality and the benefits of certification for farmers and consumers.

7. Promoting research and development

Fostering innovation within the rice seed sector is essential for addressing the unique challenges faced by informal actors. This intervention will encourage collaboration among local universities, agricultural research institutions, and informal seed producers to conduct research on local seed varieties, pest management, and sustainable practices. By integrating the research findings into practical applications, farmers can benefit from improved technologies and methods tailored to their specific contexts. This strategy also involves training farmers to participate actively in research activities, ensuring that their experiences and insights contribute to the development of effective solutions.

8. Addressing threats from climate change

Mitigating the risks posed by climate change is critical to the sustainability of the rice seed value chain. This intervention will promote the adoption of climate-smart agricultural practices such as crop rotation, diversification, and water conservation techniques. By providing training and resources, farmers can learn to adapt their practices to changing climatic conditions and reduce their vulnerability to extreme weather events. Additionally, this strategy will involve the introduction of climate-resilient seed varieties that can withstand environmental stresses and ensure stable yields and food security in the face of climate change.

9. Awareness campaigns

Increasing awareness of the importance of quality seeds and sustainable farming practices is crucial for driving change in the agricultural sector. This intervention will implement community



awareness campaigns to educate farmers on the benefits of using certified seeds, adopting improved agricultural techniques, and the long-term advantages of sustainable practices. Through local media, workshops, and community gatherings, these campaigns aim to shift perceptions and encourage a culture of quality and sustainability among the farmers. By empowering communities with knowledge, campaigns will foster informed decision-making and contribute to the overall improvement of the rice seed value chain.

10. Monitoring and evaluation

Establishing a robust monitoring and evaluation framework is essential for assessing the effectiveness of interventions and making the necessary adjustments. This strategy involves setting clear indicators of success and regularly collecting data on progress and outcomes. Engaging stakeholders, including farmers and local organizations, in the evaluation process, will ensure that their feedback informs future strategies and interventions. By continuously monitoring the impact of these initiatives, this approach will facilitate adaptive management, ensuring that the rice seed value chain in Liberia evolves in response to the needs and challenges faced by informal actors.

6. CONCLUSION

Focus group discussions (FGDs) with formal and informal seed value chain actors to map the rice value chain and examine the strengths, weaknesses, opportunities, and threats that exist in the rice seed value chains in Liberia were conducted in Suakoko from July 22 to 23, 2024. A total of 32 rice value chain actors (including formal and informal actors) participated in the focus group discussions. The FGDs were facilitated by three experienced facilitators, each supported by a note taker, and the discussions were guided by a value chain mapping tool and the SWOT analysis checklist. The report was validated by the participants and CARI staff.

The SWOT analysis for both formal and informal value chains highlights a complex landscape of strengths, weaknesses, opportunities, and threats. Formal actors benefit from established structures, such as seed certification agencies, agro-input dealers, and access to improved technologies. However, they face challenges in terms of infrastructure development, policy enforcement, and limited financing. Informal actors operate with greater flexibility but lack access to quality seeds, proper training, and formal market opportunities. Both value chains share significant opportunities, such as increasing market demand for biofortified seeds and support from international organizations. Simultaneously, they are threatened by climate change, pests, diseases, and market competition. The integration of biofortified rice, along with targeted interventions, such as capacity building, market linkages, and improved access to quality seeds, presents a pathway to strengthen the value chain and address nutritional needs.

The rice seed value chains in Liberia hold great potential provided that the challenges identified in the SWOT analysis are addressed through strategic interventions. The promotion of biofortified rice, along with enhanced access to quality seed, improved infrastructure, and comprehensive training programs, will not only improve productivity but also contribute to better food security and nutrition in Liberia. By leveraging opportunities and mitigating threats, Liberia can foster a more resilient and sustainable rice seed sector, ultimately benefiting farmers and consumers.

ANNEX

Annex A1: Guide for the focus group discussion

1. Map the value chains: According to the flow of seed through the value chain, position the cards
2. Map the value chains: Using cards, write key actors in advance. Give the cards to the participants and ask them to position them according to the flow of seeds through the value chain. They can use blank cards to write additional actors, as needed. Establishing consensus on the different segments that exist in formal and informal value chains.
3. The actors are grouped into two separate groups: one for those operating in the formal value chain and one for those operating in the informal value chain.
4. Establish the seasonal calendar – indicate months of most production/sales/purchases of rice seeds.
5. For each segment of the value chains, use pair-wise ranking to identify the top five Strengths, weaknesses (constraints), opportunities, and threats
 - a. For each constraint, why is it a constraint and why is it important? What are the issues underlying these constraints? Discuss each constraint until you have a detailed understanding, including how it might affect men/women, rich/poor, and young/old in different ways.
 - b. For each opportunity, we discuss how it might increase the effectiveness and performance of the value chain. That is, they are ranked based on their perceived effectiveness in enhancing the value chain and how the opportunity might benefit or disadvantage men/women, rich/poor, and young/old. Facilitate it until you have an adequate understanding of each opportunity.
 - c. Of these opportunities, what would an intervention look like? Who should be involved? What is needed? Refer to the segments that have been agreed upon earlier and identify entry points for the interventions discussed.
6. For each segment, we discuss the idea of biofortification of rice, that is, genetic improvement of rice to attain higher levels of micronutrients and macronutrients such as iron, zinc, and protein.
 - Have they heard of it?
 - If not, discuss what it means and why it is important.
 - Would biofortified rice seeds (upgraded products) have a substantial market?
 - What kinds of interventions would be needed to strengthen and sustain the demand for and supply of biofortified seeds?

Annex A2: Questionnaire guide for the seed market map

1. Identify the main locations where seed suppliers operate and the distance from their clients.
2. How many seed suppliers, sellers, and buyers exist in each channel? Simply guesstimate percentages.

3. What proportions of men and women supply/sell seed into / buy seed from each of the channels?
4. What is the seasonal proportion of sales in each channel?
5. What are the average annual sales revenues of the different types of seed sellers in different channels?
6. Do men and women play specific roles in selling/distributing seeds?
7. Identify credit sources available to seed businesses and farmers.
8. Discuss whether seed demand and supply vary during the year in the different channels. If so, does fluctuation in demand or supply constrain the seed business?

About seed prices:

9. What are the current prices in each channel?
10. Are prices any different when paid to or by men or women?
11. When do seasonally high or low prices occur in each channel? What were High and low prices during the last 12 months
12. Why do prices vary across channels?
13. How are the seed prices determined?

About seed quality:

14. Which seed quality attributes do buyers look for? Do seed buyers inform seed Producers/importers of seed quality: How is this communicated?
15. Are seed-quality grades in place? If so, then list and describe them.
16. What channels are these grades in use? Record for each attribute and each channel.
17. How are the seed quality standards enforced?
18. Do farmers in any channel pay a price premium for high-quality seeds?
19. Do farmers in any channel pay lower prices for poor quality seeds?
20. Do farmers in any channel reject seeds because of their poor quality? What is the Experience of rejection in the group
21. Do farmers test seeds for any quality attributes?
22. Are seed suppliers able to meet farmers' quality requirements?

About payment:

23. What is the payment mechanism for each channel?
24. Do seed buyers, including farmers, in any channel offer advance payments?
25. Are check-off arrangements available for any channel? (when, for instance seed is advanced to a farmer buy a rice trader and the cost is later deducted from the trader's price)
26. How long does it take seed suppliers to receive payment after sales for each channel?
27. Is there a long-term relationship between seed suppliers and buyers? If so, describes these relationships.
28. Are there long-term relationships between seed suppliers and their input and

service providers? If so, is this the same for both men and women?

29. Are formal or informal agreements or contracts (of any kind – written, verbal, customary) used for sales or purchases? In which channel? Is this the same for men and women?

About transport:

30. Who pays for transporting seeds to the market/buyer in each channel?

31. What mode of transport is typically used in each channel? What is the average cost of transport per unit (defined units) in each channel. How much time does it take to get the seed to market (return trip) each time the seed is sold.

32. Does transportation affect seed quality or result in seed loss?

33. What transport-related constraints exist in the different channels? (*record separately by gender if applicable*)

Other seed marketing issues.

34. Is seed packaging required by farmers?

35. How long does it take for seed suppliers to find buyers?

36. Are there seed industry-specific fees paid by seed sellers?

37. Would enhancing of seed certification services be of interest to value chain agents?

38. Would introduction of Quality-Declared Seed as an alternative to certified seed be of interest to value-chain agents?

Credit services:

39. List all public and private providers of credit to the different seed value chain agents.

40. Do agents find it difficult to obtain credit? If so, why?

41. Are sources of credit equally accessible to both men and women?

42. What credit is normally used?

43. What is the preferred source of credit for different agents? Why?

44. What interest rates are charged by different sources of credit today?

Information and extension services

45. List all public and private providers of market information.

46. Where do agents find market information? (Information on price, quality, quantities demanded, and buyers' locations). Does this differ between women and men? Is the available information reliable?

47. Who provides the extension services for seed production and rice cultivation?

48. Are extension services of good quality?

49. How is extension delivered (e.g. demonstration plot, farm visit, training course)?

Collective action:



50. Are there any ways in which value chain agents collaborate with each other collectively? (List ways)
51. Are collective efforts formally organized?
52. Which formal and informal organizations specifically facilitate seed production and marketing? Provide names, if possible.
53. What specific challenges do collective actions address?
54. What external support is available for collective action in seed-value chains? (training, credit, etc.)
55. What are the challenges of collective action in seed-value chains?



Actors in the formal seed value chain



Actors in the informal seed value chain



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