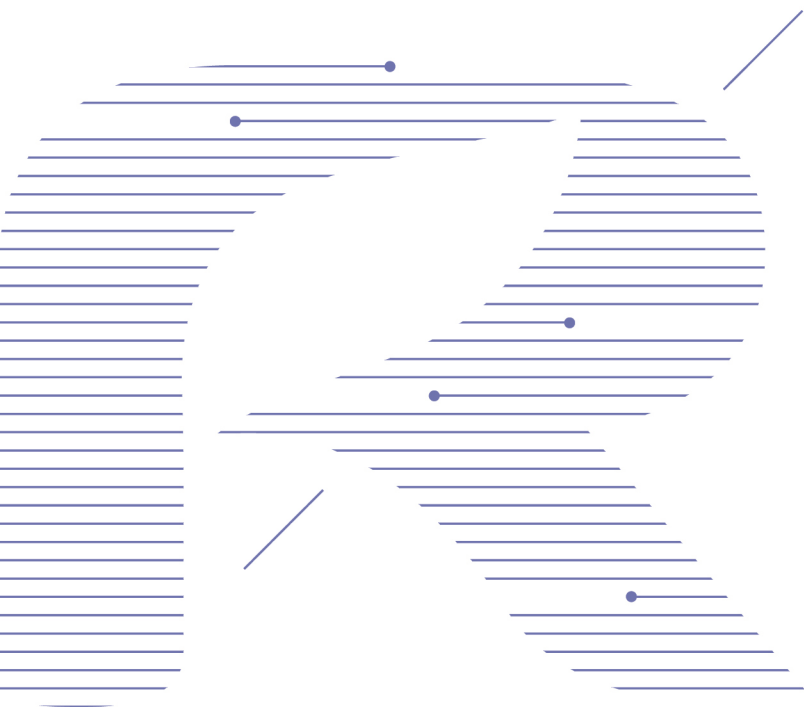


Current Dynamics of Rice Seed Value Chains in Seven African Countries

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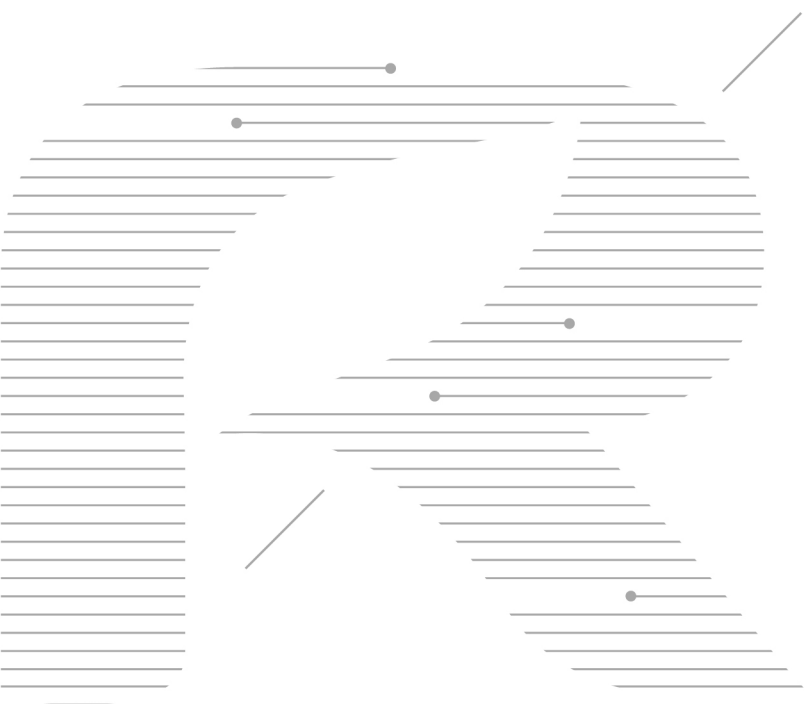


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R987 연구자료-1

Current Dynamics of Rice Seed Value Chains in Seven African Countries

등 록 | 제6-0007호(1979. 5. 25.)

발 행 | 2023. 12.

발 행 인 | 한두봉

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For Readers

1. This source book is a summary of the contents which are received after requesting commissioned research from researchers in the seven countries (Ghana, Gambia, Guinea, Uganda, Senegal, Cameroon, and Kenya). The commission was given to investigate the rice seed value chain and distribution system of each country of the Africa Rice Belt Project beneficiary countries.
2. This source book aims to present an effective implementation strategy for the K-Rice Belt Project promoted by the Ministry of Agriculture, Food and Rural Affairs to strengthen food security in the target countries.
3. This source book will also be available through our research institute (www.krei.re.kr) website upon publication.

□ Rice Seed Value Chain Analysis by Countries

Chapter 1 Ghana

1. Overview of the Rice Seed Value Chain	1
2. Stakeholder Analysis	6
3. Current Seed Distribution Systems	9
4. Scheme for a Seed Cultivation Complex and Seed Supply	13

Chapter 2 The Gambia

1. Overview of the Rice Seed Value Chain	17
2. Stakeholder Analysis	21
3. Current Seed Distribution Systems	24
4. Scheme for a Seed Cultivation Complex and Seed Supply	27

Chapter 3 Senegal

1. Overview of the Rice Seed Value Chain	31
2. Stakeholder Analysis	35
3. Current Seed Distribution Systems	38
4. Scheme for a Seed Cultivation Complex and Seed Supply	41

Chapter 4 Uganda

- 1. Overview of the Rice Seed Value Chain 45
- 2. Stakeholder Analysis 49
- 3. Current Seed Distribution Systems 52
- 4. Scheme for a Seed Cultivation Complex and Seed Supply 55

Chapter 5 Cameroon

- 1. Overview of the Rice Seed Value Chain 59
- 2. Stakeholder Analysis 63
- 3. Current Seed Distribution Systems 66
- 4. Scheme for a Seed Cultivation Complex and Seed Supply 69

Chapter 6 Kenya

- 1. Overview of the Rice Seed Value Chain 73
- 2. Stakeholder Analysis 77
- 3. Current Seed Distribution Systems 80
- 4. Scheme for a Seed Cultivation Complex and Seed Supply 83

Chapter 7 Guinea

- 1. Stakeholder Analysis 87

Reference 91

1

Ghana¹⁾

1. Overview of the Rice Seed Value Chain

The Ghana Seed Inspection Division (GSID) of the Plant Protection & Regulatory Services Directorate (PPRSD) oversees rice seed production quality. The Division's work encompasses seed producer registration, field inspections, seed testing, certification, post-market surveillance, and training stakeholders.

1.1. Geographical Focus

The rice seed value chain in Ghana extends across all sixteen

¹⁾ The chapter is written based on Kwasi wih's responses (2023) to KREI's questions for the Rice Seed Value Chain Analysis in seven African countries.

regions, including Greater Accra, Central, Western, Eastern, Ashanti, Brong Ahafo, Bono East, Upper West, Upper East, Northern, Oti, North East, Savannah, Western North, and Volta.

1.2. Development over 30 Years

In the past five years, there has been a shift towards using certified seeds over farmer-saved seeds. The PPRSD supports this transition through sustainable agriculture initiatives and strict seed laws and regulations adherence. Registered certified rice seed producers have increased from around 100 to over 300 nationwide.

1.3. Government Interventions

The Government of Ghana subsidises inputs like fertilisers and seeds for small-scale farmers, ensuring access to quality seeds and promoting food security. The Planting for Food and Jobs (PFJ) initiative is a notable government program to improve crop production through subsidised quality seeds and other inputs.

1.4. Services and Products

The GSID provides essential services like storage, quality control, training, input loans, and post-market surveillance. These services cater to many beneficiaries, including smallholder farmers, farmer organisations, traders, and rice seed producers.

1.5. Market Dynamics

The Ghanaian rice seed market is influenced by seasonality and contract-based sales. Challenges include delayed government payments for subsidised seeds, impacting the viability of rice seed businesses. Farmer-based organisations (FBOs) and marketing boards have emerged to enhance market access and negotiation capabilities.

1.6. Export and Import Practices

Ghana has relied primarily on locally produced rice seeds, with minimal imports for research purposes. The government imported seeds from Nigeria in 2019, but there has been no significant import activity.

1.7. Infrastructure and Operational Challenges

The rice seed value chain faces infrastructural challenges, including limited storage facilities, poor road networks, and inadequate financial services for rice farmers. These limitations affect the overall efficiency of the rice seed production and distribution process.

1.8. Production Regions and Varieties

Key rice-producing regions in Ghana include the Northern, Upper West, Upper East, Savannah, North East, and Greater Accra regions. The main varieties produced are AGRA, GBEWAA, SAVANNAH RICE, and LEGON 1, with production affected by climate change factors like flooding and drought.

1.9. Regulatory Framework

The regulatory landscape in Ghana includes the Plants and Fertilizer Act 2010 (ACT 803), Seed Certification and Standards Regulation 2018 (L.I 2363), and other critical legal instruments. These regulations ensure the quality and standardisation of rice seeds in the market.

1.10. Environmental and Climate Impacts

Ghana's rice seed value chain faces threats from unpredictable weather, floods, droughts, bush fires, and pests like the Fall Army Worm. Government interventions such as irrigation facilities, provision of insecticides, and subsidies have been implemented to mitigate these challenges.

1.11. Market Opportunities and Future Outlook

Given the increasing demand and potential for export market expansion, the future market opportunities for rice in Ghana are promising. Challenges like trade barriers and the need for improved technologies remain critical for realising these opportunities.

Ghana's rice seed value chain is marked by significant growth and challenges. The government's role in providing subsidies and regulating the market is central to the value chain's performance. With increasing demand and technological advancements, the rice seed industry in Ghana holds substantial potential for growth and improved sustainability.

2. Stakeholder Analysis

2.1. Seed Producers

a) Background

- **Years of Production:** Many producers have over ten years of experience in rice seed production.
- **Changes in Production:** In the last five years, Northern Ghana has seen a high demand for rice seeds, with producers facing yield reduction due to low fertiliser usage, primarily influenced by cost factors.

b) Production Details

- **Land Utilization:** The average land size for agricultural production is 40 hectares, with 30 hectares dedicated to rice seeds.
- **Yield and Total Production:** The average yield is 3750 kg/ha, leading to an annual production of approximately 168750 kg.
- **Distribution:** 80% of produced rice seeds were sold last season, mainly through seed dealers at the community level.

c) Economic Aspects

- **Harvesting Challenges:** Difficulties include lack of access to combine harvesters and labor shortages. These are tackled by pre-harvest agreements with mechanization services.

- **Production Costs:** The cost for producing rice seeds was Ghs 349593.75 last season.
- **Market Regulations:** Compliance with Ghana Seed Inspection Division (GSSID) regulations and quality standards under the Plants and Fertilizer Act 2010.

d) Sales and Marketing

- **Buyer Selection:** Buyers are primarily chosen through government programs like Planting for Food and Jobs (PFJ).
- **Sales Channels and Pricing:** Sales through seed dealers and contractors offer ready cash to producers, with an average price received of \$0.58 per kilo.

2.2. Farmers' Organisations (FOs)

a) Background

- **Registration and Services:** Most FOs are registered, providing credibility and legal protection. They are critical in ensuring the adoption and utilisation of rice seeds.
- **Government Interventions:** FOs benefit from government interventions in the rice value chain, such as SAPIP/SADEP and Planting for Food and Jobs (PFJ).

b) Challenges and Operations

- **Main Challenges:** FOs face limited access to markets and information, poor infrastructure, and access to credit.
- **Operational Activities:** FOs are involved in various rice seed value chain stages, from production to marketing.

c) Economic Analysis

- **Production Costs and Sales:** FOs navigate a complex market environment, dealing with factors like fertiliser procurement costs and varying market prices for rice seeds.
- **Market Dynamics:** The FOs' participation in the market is influenced by demand fluctuations, government support, and infrastructural challenges.

Both rice seed producers and FOs in Ghana play vital roles in the rice seed value chain. While producers focus on meeting the increasing demand for rice seeds, FOs work towards addressing the challenges of market access, infrastructure, and credit. Both segments are crucial for the growth and sustainability of the rice seed industry in Ghana.

3. Current Seed Distribution Systems

3.1. Overview

The rice seed distribution system in Ghana is guided by various legislations and institutional standards. These include the National Seed Policy 2013, National Seed Plan 2015, Plants and Fertilizer Act 2010 (Act 803), Seed Certification and Standards Regulation 2018 (L.I 2363), Plant Protection Regulations 2012 (L.I. 2193), and others. The legislation governs the technical and regulatory functions of seed distribution, ensuring quality and compliance throughout the value chain.

3.2. Institutional Seed Standards

The Ghana Seed Inspection Division (GSID) adheres to International Seed Testing Association (ISTA) Rules for quality assurance and employs ECOWAS Harmonized minimum standards. Other standards like Truth in Labelling and Quality Declared Seed system (QDS) are also used. Ghana's Minimum Standards Certification covers a wide range of crops, including cereals, legumes, vegetables, roots, tubers, fruit, and tree crops.

3.3. Rice Field and Laboratory Standards

The rice seed distribution system in Ghana has established field and laboratory standards for different seed stages, including breeder, foundation, and certified seeds. These standards encompass factors like minimum isolation distance, disease plants percentage, noxious weeds and off-types, among others.

3.4. Seed Verification System

Seed certification in Ghana is a systematic process monitored by the GSID. It involves several phases, including administrative checks, verification of seed source, field inspection, post-harvest supervision, seed sampling and analysis, and granting of certificates.

3.5. Registered Varieties and Success Rate

As of 2020, Ghana had registered a significant number of varieties across different crops, including 30 rice varieties. The National Variety Release and Registration Committee (NVRRC) and the National Seed Council (NSC) have a high success rate in approving and registering varieties.

3.6. Seed Distribution and Sales

Certified seeds in Ghana are mainly distributed by registered seed companies and dealers. The government plays a facilitating role in distribution and extension service delivery. The major sales network includes seed companies and seed dealers' shops.

3.7. Pricing and Preferences

The pricing of certified seeds, such as rice, is detailed, with costs to farmers and government subsidies outlined. Preferences for seeds are influenced by geographical locations, with maize and rice being highly preferred.

3.8. Monitoring System and Challenges

The regulatory body, PPRSD-GSID, conducts post-certification monitoring to ensure compliance. Challenges in the system include adulteration, inadequate capacity for seed health testing, weak enforcement of regulations, limited traceability checks, and distribution accessibility issues.

3.9. Support and Improvements Needed

The system requires enforcement of legislation, logistics for inspection and monitoring, technical training on seed health testing, upgrading of laboratories, a robust seed trace-ability system, and establishment of more input outlets and cold rooms or warehouses.

3.10. Production Process and Registration

The document details the step-by-step production process for pre-basic, basic, and certified seeds in Ghana, including the procedure for registering as a seed producer under the Plants and Fertilizer Act 2010 (ACT 803).

The rice seed distribution system in Ghana is a comprehensive and regulated framework, ensuring the quality of seeds through rigorous standards, certification processes, and monitoring. While facing challenges, the system benefits from strong legislative support and institutional commitment, providing a solid foundation for sustainable rice production and distribution in the country.

4. Scheme for a Seed Cultivation Complex and Seed Supply

4.1. Objectives

The future-oriented strategies and schemes for Ghana's new rice seed production complex are designed to significantly enhance seed production capacity, quality, and distribution efficiency. These plans, focusing on technological advancements, expanded partnerships, and innovative distribution methods, are set to play a pivotal role in advancing Ghana's agricultural sector and ensuring long-term food security.

4.2. Management and Operational Plans

The Ghana Seed Inspection Division (GSID) will oversee operations, emphasizing future-oriented strategies to improve seed quality and increase production capacity. Plans include adopting advanced technologies and expanding training programs for seed inspectors and analysts.

4.3. Future Capabilities and Resource Planning

- **Expansion of Capabilities:** The GSID aims to upgrade its capabilities with cutting-edge technology for seed testing and processing. This

includes the acquisition of advanced machinery and the integration of digital tracking systems for seed quality management.

- **Projected Annual Production:** With these enhancements, the complex is expected to produce over 1,200 metric tons of certified seeds annually, a significant increase from current levels.
- **Quality Monitoring Enhancements:** Future strategies involve implementing more rigorous and technologically advanced quality monitoring systems. This includes remote sensing technology for field monitoring and blockchain for traceability.

4.4. Equipment Upgrade and Maintenance Plans

The GSID plans to procure state-of-the-art equipment and establish a robust maintenance protocol. This includes regular upgrades to ensure operational efficiency and adherence to evolving standards in seed production.

4.5. Innovative Distribution Strategy

a) Enhanced Distribution Channels

The following strategies aim to create a more dynamic and resilient seed distribution network, catering to the evolving needs of Ghana's agricultural sector.

- **Private Sector Engagement:** Strengthen partnerships with private seed companies for broader distribution.
- **Government Subsidy Programs:** Expand subsidy programs to reach more farmers, especially in under-served regions.
- **International Collaboration:** Collaborate with international agencies and NGOs for seed distribution, focusing on innovation in distribution methods.

b) Accountability and Financial Management

Future financial management strategies will focus on creating sustainable funding models, including exploring public-private partnerships. Enhanced accountability measures will be implemented, such as digital tracking of funds and regular audits, to ensure transparency and effective use of resources.

2 The Gambia²⁾

1. Overview of the Rice Seed Value Chain

The National Seed Secretariat (NSS) is pivotal in the Gambia's rice seed value chain. It is responsible for foundation seed production, receiving breeder seeds from research institutions and supplying them to certified seed producers through extension services.

1.1. Geographical Focus

NSS operates throughout the Gambia, with particular attention to

²⁾ The chapter is written based on Morro Manga's responses (2023) to KREI's questions for the Rice Seed Value Chain Analysis in seven African countries.

the Central River Region - South and North, due to their potential for producing rice in rainy and dry seasons, supported by freshwater and tidal irrigation systems.

1.2. Development over 20 Years

Over the past twenty years, the Gambia's rice seed value chain has evolved significantly, especially after the establishment of NSS. The emergence of structured processes and defined roles for various actors has marked a shift from rudimentary seed systems.

1.3. Government Interventions

The Gambian government prioritises the seed value chain, with institutions like NSS and NARI (National Agricultural Research Institute) playing critical roles. Subsidies on fertilisers and a realistic pricing system for seeds from the public sector are notable interventions. These efforts aim to boost private sector participation and ensure fair investment returns.

1.4. Services and Products

NSS provides services such as storage, quality control, training,

input loans, and foundation seeds to certified seed producers. The primary beneficiaries are traditional farmers, farmer organisations, and traders.

1.5. Market Dynamics

The rice seed market in the Gambia faces challenges like equipment shortages and old storage facilities. Seed fairs and voucher systems are used to distribute seeds to vulnerable farmers. In collaboration with various projects, the NSS often contracts seed producers for specific varieties, smoothing out the marketing process.

1.6. Export and Import Practices

There is minimal reliance on imported rice seeds, with notable exceptions like importing certain varieties from Senegal.

1.7. Infrastructure and Operational Challenges

The Gambia's rice seed value chain suffers from poor road conditions, inadequate storage facilities, and a lack of modern production equipment. These challenges hinder the efficiency of seed production and distribution.

1.8. Production Regions and Varieties

Rice is mainly produced in regions like the Central and Upper Rivers regions. Varieties such as WAB 105, SAHEL 134, and NERICAS are popular due to their resilience to climate change and other benefits.

1.9. Regulatory Framework

The Gambia's rice seed industry operates under regulations outlined in the Seed Quality Control and Certification Manual, ensuring seed quality and standards.

1.10. Environmental and Climate Impacts

Climate change, including flash floods, poses significant challenges to rice seed production. High-quality seeds are usually produced in the dry season to mitigate these effects.

1.11. Market Opportunities and Future Outlook

The Gambia's rice seed market has growth potential, with opportunities arising from increased project focus on rice. However, challenges such as collaboration among value chain actors and technological access remain.

The rice seed value chain in the Gambia has developed substantially, with the government playing a central role. Challenges such as infrastructural deficits and environmental threats persist, but the future holds promising opportunities for market expansion and technological advancement.

2. Stakeholder Analysis

2.1. Seed Producers

a) Background

- **Years of Production:** Producers have extensive experience in rice seed production, with some having over a decade of involvement.
- **Production and Supply Changes:** There has been significant demand for rice seeds, particularly in Northern Ghana, with challenges in yield due to factors like low fertiliser usage.

b) Production Details

- **Land Utilization and Yield:** On average, producers use around 40 hectares for agriculture, dedicating about 30 hectares to rice seed production, yielding approximately 3750 kg/ha.
- **Distribution Channels:** Most of the production (80%) is sold through community-level seed dealers.

c) Challenges and Solutions

- **Harvesting Challenges:** Low access to machinery and labour shortages are key issues addressed through pre-harvest agreements with mechanisation services.
- **Regulatory Compliance:** Producers must adhere to standards established by the Ghana Seed Inspection Division, including registration and quality control.

d) Economic Analysis

- **Costs of Production:** The cost for producing rice seeds was significant, highlighting the financial investment involved in seed production.
- **Sales and Marketing:** Seeds are sold primarily through dealers and contractors, with prices influenced by government programs like Planting for Food and Jobs (PFJ).

2.2. Farmers' Organisations (FOs)

a) Overview and Services

- **Registration and Services:** Most FOs are registered with the government, providing credibility and facilitating access to services.
- **Government Interventions:** FOs have benefited from government initiatives, which have improved seed adoption and utilization.

b) Challenges and Operations

- **Main Challenges:** Issues include limited market access, poor infrastructure, and restricted access to credit.
- **Operational Activities:** FOs are involved in various stages of the rice seed value chain.

c) Economic Analysis

FOs navigate complex market dynamics, with production costs influenced by factors like fertiliser prices.

2.3. Intermediaries

a) Role and Impact

Importance of Intermediaries: Intermediaries are crucial in connecting producers and FOs with the market, often bridging gaps in logistics and market information.

b) Challenges and Opportunities

Market Access and Infrastructure Issues: Similar to producers and FOs, intermediaries face market access and infrastructure challenges.

Potential for Growth: There is room for growth, primarily if challenges like poor road conditions and access to credit are addressed.

c) Collaboration and Competition

Working with Others: Intermediaries often collaborate with producers, FOs, and other stakeholders to improve efficiency and market reach.

They face competition from other intermediaries and larger market players, which impacts their negotiation power and market access.

The rice seed value chain in the Gambia involves diverse participants, each playing a critical role. Producers are focused on meeting the increasing demand, FOs are addressing the challenges of market access and infrastructure, and intermediaries are crucial in linking different parts of the chain. Collaboration and government support are key to overcoming challenges and tapping into the potential growth opportunities in the rice seed sector.

3. Current Seed Distribution Systems

3.1. Rice Seed Distribution System in the Gambia

The seed distribution system in the Gambia is structured to begin with research, primarily carried out by the National Agricultural Research Institute (NARI). NARI is responsible for breeding small quantities of breeder seeds, which are then tested on farms for adoption by farmers. If accepted, these seeds are handed over to the

National Seed Secretariat (NSS) for foundation seed production.

a) Institutional Framework

- **Distribution Channels:** The key public institutions for early generations seeds (EGS) are NARI and NSS. NARI oversees breeder seed production and varietal maintenance, while NSS handles foundation seed production.
- **Variety Registration:** NSS is also responsible for registering certified seed producers and managing variety registration through the Variety Release Committee (VRC). The VRC conducts tests to ascertain the qualities of candidate varieties before recommending their release.

b) Seed Marketing and Pricing

- **Seed Marketing:** Government-supported marketing and distribution efforts include extension and promotional programs, such as farmer field visits, seed fairs, and media advertisements, to enhance seed utilization and demand.
- **Pricing Strategy:** The government recommends a realistic pricing system for seeds, aiming to prepare for private sector participation and ensure fair returns on investment.

c) Formal and Informal Seed Sector

- **Recognition of the Informal Sector:** The government acknowledges

the predominance of the informal seed sector, comprising farmer-saved seeds, exchange, and local market supplies. Efforts are directed towards supporting and enhancing this sector's role in household food security.

- **Evolution of Informal Entities:** The Ministry of Agriculture encourages informal seed sector groups to develop their practices and, where desired, evolve into formal seed sector entities.

d) Seed Distribution and Support

- **Distribution Agreements:** Projects often sign MoUs with NSS for certified seed production. NSS contracts reputable seed companies or registered seed grower associations for production, ensuring quality assurance through certification processes.
- **Government Support:** The government's efforts are crucial in enhancing the private sector's marketing capabilities, balancing farmer interests and industry growth.

e) Challenges and Future Outlook

- **Challenges:** The seed distribution system faces challenges such as ensuring seed quality, streamlining the certification process, and balancing the interests of various stakeholders.
- **Future Outlook:** The Gambia aims to strengthen its seed distribution system by enhancing the capacity of institutions like NARI and NSS and fostering collaboration between the formal and informal sectors.

In conclusion, the Gambia's rice seed distribution system is a structured process involving key institutions like NARI and NSS. The system is designed to ensure the production and dissemination of quality seeds, supported by government initiatives and policies. While facing certain challenges, the system shows potential for growth, especially with the government's continued support and the evolving role of the informal seed sector.

4. Scheme for a Seed Cultivation Complex and Seed Supply

4.1. Management and Operational Plans

The National Seed Secretariat (NSS) is designated to oversee the seed complex's operations. A multi-disciplinary task force, led by NSS and comprising representatives from NARI, DoA, and other stakeholders, will be established to monitor the complex throughout the project. This task force represents a forward-thinking approach, integrating diverse expertise for effective management.

4.2. Future Capabilities and Resource Enhancement

- **Expansion of Capabilities:** While NSS has limited human and financial resources, collaborations with government institutions

such as NARI and DoA are planned. Enhancing both human and financial capacities is crucial for running the seed complex efficiently. Investments in training and infrastructure are envisaged to meet the growing demands.

- **Projected Annual Production:** The National Seed Plan anticipates production of 1,651 metric tons of certified seeds by 2023. This projection is subject to funding mechanisms and other factors, highlighting the need for flexible and upscale operational plans.

4.3. Quality Monitoring and Assurance

An established quality monitoring system and assurance mechanisms exist, including seed field inspectors and certification processes. The future strategy involves augmenting this system with more technologically advanced tools and protocols, ensuring the highest seed quality standards.

4.4. Equipment and Maintenance Future Plans

A dedicated task force will monitor and maintain equipment and machinery. This proactive approach includes regular maintenance schedules and upgrades, ensuring the longevity and efficiency of the complex's assets.

4.5. Innovative Distribution Strategy

The enhanced distribution channels will include:

- **Private Sector Engagement:** A significant portion of seeds will be sold to private companies, fostering private sector involvement in seed distribution.
- **Government Subsidy Programs:** A considerable percentage will be provided as a government subsidy to rice farmers, ensuring accessibility to quality seeds.
- **International Collaboration:** A share will be allocated for distribution through international agencies or NGOs, leveraging their networks for broader reach.

This multifaceted distribution strategy is optimal for the Gambia's context as it involves a mix of government support, private sector participation, and international collaboration, ensuring wide accessibility and affordability of quality seeds to farmers.

4.6. Accountability and Financial Sustainability

Future financial management strategies will focus on creating sustainable and transparent funding models. The task force will define clear rules and regulations for financial management and operations, ensuring accountability and effective use of resources.

The Gambia's approach to operating the new rice seed production complex and distributing seeds is multidimensional, involving technological

advancements, expanded partnerships, and innovative distribution methods. These future-oriented strategies are designed to enhance seed production capacity, quality, and distribution efficiency, playing a pivotal role in advancing the nation's agricultural sector and ensuring long-term food security.

3 Senegal³⁾

1. Overview of the Rice Seed Value Chain

In Senegal, the rice seed value chain is overseen by various state agencies, including the National Seed Secretariat (NSS). The NSS focuses on producing foundation seeds and collaborating with certified seed producers, extension services, and research institutions.

1.1. Geographical Focus

The rice seed value chain predominantly operates in the Casamance

³⁾ The chapter is written based on Jeanot Diatta's responses (2023) to KREI's questions for the Rice Seed Value Chain Analysis in seven African countries.

and Senegal River Valley agroecological zones. These regions are known for both irrigated and rainfed rice production.

1.2. Development and Changes

Over the past 12 years, significant rainfed rice seed production growth has been observed, improving both quantity and quality. Government projects and programs have played a crucial role in this development.

1.3. Government Interventions

The Senegalese government subsidises inputs like fertilisers and seeds and sets sales prices for different seed categories. There are also various state projects and programs focused on seed production.

1.4. Services and Products

Key services the NSS provides include storage, quality control, training, and input loans. These services benefit traditional farmers, farmer organisations, and traders.

1.5. Market Dynamics

The rice seed market in Senegal is mainly informal, with producers often selling seeds within their associations. Women face challenges in participating in market activities, which men predominantly manage.

1.6. Export and Import Practices

Senegal imports rice seeds mainly for government projects, and some companies export seeds to ECOWAS countries. Local production is generally preferred over imports.

1.7. Infrastructure and Operational Challenges

The country has made significant efforts to build production tracks and storage facilities. However, challenges like poor road conditions during the rainy season, especially in humid areas, remain.

1.8. Production Regions and Varieties

The Senegal River Valley and Casamance are the central rice-producing regions. Varieties include Saahel 108, Sahel 134, Nerica 8, and others,

chosen for their resilience to environmental challenges.

1.9. Regulatory Framework

Rice seed producers in Senegal must comply with specific regulations, including having a license issued by the Minister of Agriculture and possessing necessary agricultural equipment and infrastructure.

1.10. Environmental and Climate Impacts

The rice seed value chain faces environmental constraints like salinity, iron toxicity, and low temperatures. Research has developed rice varieties tolerant to both low and high temperatures.

1.11. Market Opportunities and Future Outlook

With the harmonious regulations within the ECOWAS community, there are significant opportunities for the rice market in Senegal. The main challenge is complying with quality standards to remain competitive.

The rice seed value chain in Senegal has evolved with substantial government involvement and significant advancements in infrastructure

and production. The future holds promising market opportunities, though challenges like compliance with quality standards and environmental constraints remain.

2. Stakeholder Analysis

2.1. Participation of Rice Seed Producers

a) Producers' Involvement in the Seed Sector

- **Experience and Development:** Producers, particularly pre-basic seed production managers, have over a decade of experience in the industry. The last five years have seen an increase in seed demand from farmers, prompting a need for expanded production.
- **Production Expansion and Challenges:** The potential for increasing production depends on improved water control, as current operations depend solely on rain. Financial means for labor management are also necessary.

b) Production Details

Producers manage 25 hectares, dedicating 15 hectares to seed production and 10 hectares to research activities. The average yield in the station is 35 tons/ha for rain-fed rice, resulting in 13 tons of pre-basic seeds produced last year.

c) Economic and Market Dynamics

- **Sales and Distribution:** Seeds are sold to seed operators and companies approved by the Ministry of Agriculture. The production cost was 15 million CFA francs⁴⁾ (approx. 24,723 USD).
- **Harvesting and Sales Challenges:** Manual labor intensiveness during harvesting is a key challenge. Sales occur post-certification, typically in April and May.

d) Regulatory Compliance

Compliance with ECOWAS rules is mandatory, including having approval for seed production, producing registered varieties, and meeting quality standards.

2.2. Farmers' Organisations (FOs)

a) Overview and Operations

- **Role of FOs:** FOs play a crucial role in seed marketing, purchasing pre-basic seeds from producers and distributing them among their members.
- **Government Subsidies:** State subsidies significantly impact FOs' operations, especially in input provision and facilitating market access.

⁴⁾ West African CFA franc.

b) Challenges and Opportunities

- **Market Access and Infrastructure:** FOs face challenges similar to producers, such as limited market access and poor infrastructure. Government joint orders aid in facilitating market access.

2.3. Intermediaries

a) Role and Impact

Intermediaries bridge the gap between producers, FOs, and the market, enhancing logistics and market information flow.

b) Market and Operational Challenges

Intermediaries confront issues in market access and infrastructure, similar to producers and FOs.

c) Collaboration and Growth Potential

- **Working with Stakeholders:** Collaboration with producers, FOs, and other market players is key to improving efficiency and market penetration.
- **Growth Opportunities:** The harmonization of seed production and trade rules within ECOWAS offers significant market expansion opportunities.

To sum up, in Senegal, the rice seed value chain is a collaborative ecosystem involving producers, FOs, and intermediaries, each playing a critical role. Producers focus on meeting the rising demand for quality seeds, FOs work on distribution and member support, and intermediaries facilitate market access and logistics. Government interventions and regional collaborations (like ECOWAS) are pivotal in shaping the industry's future. The value chain's success hinges on addressing challenges such as labor management, infrastructure, and regulatory compliance, while capitalising on opportunities for market expansion and enhanced collaboration.

3. Current Seed Distribution Systems

3.1. Overview of Legislation and Standards

The rice seed distribution system in Senegal is governed by a robust legislative framework, including Law 94-81 of December 23, 1994, various application decrees, and technical regulations specific to cultivated species. These national regulations are reinforced by the harmonized seed regulatory framework of ECOWAS, WAEMU, and CILSS, promoting quality control and marketing of seeds.

3.2. Institutional Seed Standards and Verification System

Senegal adheres to ECOWAS Regulation n° C/REG.4/05/2008, which allows the free circulation of seeds that meet quality standards. The country is also a member of the OECD seed scheme, enabling local seed companies to offer seeds certified according to OECD standards. The quality control of seeds is managed by the Official Control Service (SOC), with the Seed Division (DISEM) responsible for pre-basic seeds and the Regional Directorates of Rural Development (DRDR) for basic and certified seeds.

3.3. Seed Distribution and Sales

- **Main Agents of Distribution:** Seed distribution in Senegal is primarily managed by the producers themselves, including Producer Organizations, individuals, or private companies.
- **Government Involvement:** The government is a major buyer through its subsidy program, mainly involved in the distribution of subsidized seeds. Other customers include projects, programs, NGOs, and traders with input sales stores.

3.4. Performance Results and Selection Process

- **Verification Performance:** The document details the verification

performance for different seed stages and varieties in recent years.

- **Selection Standards:** Rice varieties in Senegal are selected based on consumer and processor preferences, with a focus on yield, drought and salinity tolerance, disease resistance, grain quality, lodging resistance, and taste.

3.5. Seed Registration and Sales

- **Registration Success Rate:** The process of releasing and registering varieties is overseen by the National Seed and Seedling Advisory Committee, with a high success rate for variety registration.
- **State Subsidy Status:** The State of Senegal subsidizes 100% of rainfed rice seed, while fertilizers such as urea and DAP receive a 50% subsidy.

3.6. Challenges and Support Needs

- **Challenges:** The system faces challenges such as weak trust and formal relationships between actors, low agricultural yields, and insufficient control of the market and prices.
- **Support Needs:** There is a need for better promotion and communication on local rice, more resources for control services, and a formal seed distribution network.

3.7. Production Process

The document outlines the production process for different seed stages, from pre-basic to certified seeds.

Senegal's rice seed distribution system is characterized by a comprehensive legislative and regulatory framework, ensuring the quality and standardization of seeds. While facing certain challenges, the system benefits from government subsidies and institutional support, providing a solid foundation for sustainable rice production and distribution in the country.

4. Scheme for a seed cultivation complex and seed supply

This report presents a comprehensive overview of the advanced strategies and future-oriented schemes for the operation and distribution of rice seeds from a new production complex in Senegal. Emphasis is placed on sustainable practices and innovative approaches to meet the increasing demands for rice production.

4.1. Management and Operational Framework

The Senegalese Agricultural Research Institute (ISRA) is designated to oversee the seed complex operations. The institute's technical

capacity and existing infrastructure, including seed storage warehouses and qualified personnel, form the backbone of this initiative.

4.2. Expansion of Capabilities and Resource Planning

- **Current and Future Capabilities:** ISRA boasts significant technical expertise and has plans to further enhance its human and financial resources. The institute is poised to maintain and operate the complex efficiently, addressing the needs of the burgeoning rice seed market.
- **Projected Annual Production:** The complex is projected to produce 600 tons of certified seeds annually, with 150 tons reserved as security stocks. This projection indicates a forward-thinking approach to managing seed availability and ensuring consistent supply.

4.3. Quality Monitoring and Control

The management of the complex, including quality control, will be entrusted to a dedicated team led by a storekeeper. The complex will be equipped with modern ventilation and humidity control systems, with regular inspections to maintain optimal storage conditions.

4.4. Equipment Management and Maintenance

The equipment management manager will receive specialized training from Korean experts. This training will focus on the management and maintenance of new machines acquired for the project, ensuring long-term operational efficiency.

4.5. Innovative Distribution Strategy

The enhanced distribution channels will include:

- Direct Distribution to Farmers: 70% of the seeds will be distributed free of charge to farmers, adhering to Senegal's subsidy policy.
- Sales to Seed Companies: 20% of the seeds will be sold to seed companies, promoting private sector involvement and profitability.
- Partnerships with NGOs and International Agencies: The remaining 10% will be sold to NGOs and international agencies engaged in local food security projects.

This distribution strategy is tailored to Senegal's agricultural context and subsidy policies. The mix of direct distribution, private sector sales, and partnerships ensures comprehensive seed access across different sectors of the economy.

4.6. Accountability and Financial Sustainability

Transparent Financial Management: ISRA will manage the financial resources generated from seed sales with high accountability. A dedicated bank account will be established for this purpose, adhering to the institute's strict accounting procedures. This approach ensures transparency and effective use of funds for the complex's maintenance and operation.

In conclusion, Senegal's approach to operating the new rice seed production complex and distributing seeds is well-rounded, encompassing technological advancements, resource optimization, and a distribution strategy that effectively balances government policies, private sector engagement, and international collaboration. These future-oriented strategies are designed to bolster seed production, ensure quality, and improve distribution, thereby enhancing the country's agricultural sector and contributing to long-term food security.

4

Uganda⁵⁾

1. Overview of the Rice Seed Value Chain

In Uganda, the Ministry of Agriculture, Animal Industry and Fisheries (MAAIF) and its divisions, like the National Seed Certification Services (NSCS), play a crucial role in the rice seed value chain. They oversee training, authorisation, and accreditation in seed quality control and support the seed value chain through subsidies and the construction of seed stores.

⁵⁾ The chapter is written based on Jimmy Lamo's responses (2023) to KREI's questions for the Rice Seed Value Chain Analysis in seven African countries.

1.1. Geographical Focus

The rice seed value chain in Uganda is active across the country, with intense activities in the rice hubs of Northern and Eastern Uganda for basic seed and training of seed growers and in Central Uganda for research and development.

1.2. Development over 20 Years

Over the past two decades, Uganda has seen increased demand for seed but a slow response in production. There has been significant growth in seed procurement from neighbouring countries like the Democratic Republic of Congo (DRC) and South Sudan.

1.3. Government Interventions

Government interventions include subsidies under project modes, where the government contributes a percentage of the seed cost, and electronic tagging and verification systems to eliminate seed adulteration. Price fixation is guided by the National Seed Traders Association, though with some variation.

1.4. Services and Products

The National Agricultural Research Organization (NARO) and MAAIF offer storage, training, and quality control services. These services benefit extension staff, seed company agronomists, and seed producers.

1.5. Market Dynamics

The market dynamics for rice seeds in Uganda include increased demand for irrigated varieties like WITA-9 and NARORICE-1. However, the market faces challenges like fluctuating demand and weak market information.

1.6. Export and Import Practices

Uganda exports rice seeds to South Sudan and the DRC. Importation is limited, with only a small percentage of hybrid seeds imported due to a lack of local capacity to produce them.

1.7. Infrastructure and Operational Challenges

Infrastructure challenges include poor road conditions, especially

during the rainy season, lack of seed storage facilities, and inadequate market and transport infrastructure.

1.8. Production Regions and Varieties

Northern, Eastern, Central, and Western Uganda are key rice-producing regions. Popular varieties include NamChe-5, NERICA-4, NARORICE-2, and WITA-9. Production is affected by climate change factors like floods, drought, and disease outbreaks.

1.9. Regulatory Framework

The MAAIF under NSCS sets quality standards for rice seeds, with regulations covering testing, field inspection, labelling, sealing, and certification. Producers must comply with seed crop declaration and other regulatory requirements.

1.10. Environmental and Climate Impacts

Environmental and climate factors affecting rice seed production include floods, drought, low temperatures, and disease outbreaks. These factors impact seed quality and quantity, reducing income for seed growers.

1.11. Market Opportunities and Future Outlook

Future market opportunities are linked to the increased area under rice irrigation and demand from neighbouring countries. Challenges include limited capital for production, certification body staffing, and storage facilities.

Uganda's rice seed value chain has developed with significant government intervention and market growth. Challenges remain in infrastructure, environmental impacts, and market dynamics, but the future holds potential for increased production and export opportunities.

2. Stakeholder Analysis

2.1. Seed Producers

a) Background

Producers in Uganda, particularly those involved in pre-basic and basic seed production, possess significant experience, often exceeding a decade. The past five years have witnessed a considerable increase in seed demand, prompting efforts to expand production.

b) Production Details

- **Land Utilization and Yield:** Producers typically manage substantial land areas, dedicating significant portions to seed production.

Average yields vary, with a notable focus on increasing production efficiency and quality.

- **Production Expansion:** Expansion efforts are focused on better water management and financial resources for efficient labor handling.

c) Economic and Market Dynamics

- **Sales and Distribution:** Seeds are generally sold to certified operators, with the Ministry of Agriculture playing a key role in regulation. The production costs highlight the financial investment in seed production.
- **Harvesting and Sales Challenges:** Manual labor intensiveness and timing of sales post-certification are key challenges.

d) Regulatory Compliance

Producers adhere to ECOWAS regulations, ensuring seed production approval, variety registration, and quality standards.

2.2. Farmers' Organisations (FOs)

a) Operations

FOs are pivotal in seed marketing, purchasing seeds from producers and distributing them to members. They often face challenges in

market access and infrastructure.

Government subsidies play a significant role in aiding FOs, particularly in input provision and facilitating market access.

2.3. Intermediaries

a) Role and Impact

Intermediaries serve as crucial connectors in the value chain, linking producers, FOs, and the market. They help in enhancing logistics and information flow.

b) Market and Operational Challenges

Intermediaries encounter issues similar to producers and FOs, such as market access and infrastructure.

In Uganda, the rice seed value chain is a collaborative effort involving producers, FOs, and intermediaries, each playing a vital role. Producers focus on meeting the rising demand for quality seeds, FOs work on distribution and member support, and intermediaries facilitate market access and logistics. Challenges such as labor management, infrastructure, and regulatory compliance are prevalent, but opportunities for market expansion and enhanced collaboration exist.

3. Current Seed Distribution Systems

Uganda's seed management system evolved from a government-run system in the 1970s to a more liberalized market in the 1980s. This transition required clear policies and frameworks to ensure smooth operation. The current system is guided by various policy frameworks and strategies, including the National Seed Policy of 2018.

3.1. Legislation and Institutional Framework

- **Detailed Legislation:** The Agricultural Plant and Seeds Statute of 1994 and the Seeds and Plant Act of 2006 established many organizational entities that manage the seed sector today. These laws lay out the roles and functions of the National Seed Board, Technical Committee, and the National Seed Certification Service.
- **Responsibility for Implementation:** The Ministry of Agriculture, Animal Industry and Fisheries (MAAIF) and its various directorates and departments are responsible for overall implementation. Crop breeding, varietal release, and early generation seed production are the mandate of the National Agricultural Research Organization (NARO).

3.2. Seed Verification and Distribution Process

- **Seed Stage Management:** Different stages of seed development, such

as nucleus, pre-basic, basic, and certified seeds, are managed by entities like NARO and the National Seed Certification Services (NSCS).

- **Main Distributors:** Key players in the distribution of seeds include NARO, seed companies, agro-input dealers, and farmer organizations. The private sector plays a significant role in marketing seeds through a network of distributors and dealers.

3.3. Challenges and Support Needs

- **Challenges:** Uganda's seed system faces challenges such as policy implementation, weak enforcement, limited capacity for seed testing, and a lack of infrastructure for seed production.
- **Support Needs:** The system requires development and implementation of clear guidelines for seed enterprises, improved agricultural extension services, accreditation of the National Seed Laboratory, and strengthening farmer engagement in the seed sector.

3.4. Seed Production and Registration Process

- **Step-by-Step Production Process:** The document outlines the production process for various seed classes, including pre-basic, basic, and certified seeds. The NSCS inspects and certifies the production of these seed crops.

- **Registration Process:** The process for registering new varieties involves testing, distinctive feature evaluation, and registration with MAAIF. The registered varieties are then listed in a public catalogue.

3.5. Seed Sales and Distribution Channels

- **Preferred Seed Varieties:** Farmers' preferences for seed varieties are influenced by factors such as climate conditions, prices, and marketing channels.
- **Sales Network:** Seed is marketed through various channels, including direct sales by seed companies, cooperatives, farmer dealers, and commission agents. Government projects also play a role in seed procurement.

3.6. Pricing and Subsidies

Government-led subsidy models for seed procurement vary, including the Agriculture Cluster Development Project (ACDP) model and emergency relief distribution.

3.7. Problems and Solutions

The seed management system faces logistical challenges in policy implementation, accreditation of laboratories, and enforcement of

policy. Natural stresses like drought and floods also impact seed production.

Uganda's rice seed distribution system is a complex interplay of government policies, private sector involvement, and farmer participation. While facing several challenges, the system shows potential for growth with improved policy implementation, capacity building, and infrastructure development. Efforts to enhance the seed management system are crucial for sustainable rice production and distribution in Uganda.

4. Scheme for a seed production complex and seed supply

4.1. Management and Operational Framework

Responsible Entity: The National Agricultural Research Organization (NARO), through its institutes NaCRRI and ZARDI, along with the National Seed Certification Services (NSCS), will play pivotal roles. NARO institutes are tasked with rice research, seed production, and extension staff training. The NSCS, under MAAIF, will handle seed inspection and certification.

4.2. Future Capabilities and Resource Enhancement

Human and Financial Resources: NARO's institutes and NSCS currently face human resource and financial challenges. Future plans include bolstering these areas through government support and potential international partnerships.

Infrastructure and Technology: Enhancements in solar dryers, seed laboratories, and IT-based facilities for seed tracking are planned to meet advanced operational needs.

4.3. Projected Annual Production

The complex is expected to produce 250 metric tons of certified rice seeds annually, distributed across two growing seasons. This target reflects a balance between current capabilities and future expansion plans.

4.4. Quality Monitoring and Control

A multi-institutional team, including NARO-NaCRRI, MAAIF-NSCS, and regional institutes, will oversee seed demand and quality. This collaborative approach ensures comprehensive monitoring and adherence to quality standards.

4.5. Equipment Management and Maintenance

Training and Maintenance: MAAIF's National Mechanization and Maintenance Center (NMMC) will oversee the maintenance of new machinery. Specialized training programs, possibly involving international experts, are planned to enhance equipment management skills.

4.6. Innovative Distribution Strategy

The enhanced distribution channels will include:

- Private Seed Companies: 30% of seeds will be sold to companies, promoting a sustainable business model.
- Government Subsidy to Farmers: 50% will be distributed as a government subsidy, ensuring accessibility for smallholder farmers.
- International Agencies or NGOs: 20% will be allocated for distribution through NGOs, focusing on emergency situations and disenfranchised communities.

This strategy balances commercial viability with social responsibility, aligning with Uganda's agricultural policies and addressing the diverse needs of the rice farming community.

4.7. Accountability and Financial Sustainability

A special account will be set up for managing funds related to seed production. This account will be subject to audits, ensuring transparency. A revolving fund will cover input costs, and sales to seed companies will help maintain financial sustainability.

In conclusion, Uganda's approach to operating the new rice seed production complex and distributing seeds is comprehensive and future-oriented. It involves leveraging technology, enhancing human and financial resources, and implementing an innovative distribution strategy. These plans are poised to significantly improve the nation's seed production capacity, quality, and distribution efficiency, contributing to Uganda's agricultural development and food security.

5

Cameroon⁶⁾

1. Overview of the Rice Seed Value Chain

The rice seed value chain in Cameroon involves a range of activities from certified seed production to dissemination among rice farmers across the country. The government, through projects and training centres, plays a significant role in building capacities and supporting farmers' organizations (FOs) with various resources such as seeds, fertilizers, mechanization, and extension services.

⁶⁾ The chapter is written based on Patrice Gautier Levodo's responses (2023) to KREI's questions for the Rice Seed Value Chain Analysis in seven African countries.

1.1. Geographical Focus

The rice seed value chain in Cameroon spans multiple regions, including the Far North (Logone Plain), North (Benoue Valley), North West (Nun Valley), West (Mbam Basin), Center (Sanaga Valley), East, and South regions. Each of these regions has unique characteristics and contributes differently to the overall rice production in the country.

1.2. Development over the Years

Over the last decade, there has been a noticeable shift towards using high-yielding varieties and improved production, post-harvest processing techniques, and small-scale mechanization. These advancements have raised rice yields from less than 2 t/ha to over 5.5 t/ha for irrigated/lowland and less than 1 t/ha to over 3 t/ha for upland ecology.

1.3. Government Interventions

The government intervenes in the rice seed value chain:

- Agricultural Research: Support in providing foundation seeds and conducting variety trials.

- **Seed Multiplication:** Support for certified seed multiplication in state farms and private seed producers.
- **Subsidies and Quality Control:** Subsidies for seed producers in terms of fertilizers and fixation of rice seed prices.

1.4. Services and Products

The services and products provided along the rice seed value chain include storage, quality control, training (extension services), input loans, and small-scale machinery for farm operations. These services are primarily availed by traditional farmers (smallholders), FOs, and traders.

1.5. Infrastructure and Services

The current infrastructure for roads, markets, storage facilities, and operational services like transportation and processing is inadequate, presenting significant challenges to the rice seed value chain.

1.6. Production Regions and Varieties

Key rice-producing regions include the Far North, North, North West, West, Center, East, and South. The main varieties produced are

adapted to the local conditions and include IR 46, NL36, and other high-yielding varieties.

1.7. Regulatory Framework

The regulatory landscape includes training and certification requirements for private rice seed producers and registration of new rice varieties in the official national catalogue.

1.8. Environmental and Climate Impacts

Climate change poses significant challenges to rice seed production in Cameroon, with increased weather variability, drought, water scarcity, heat stress, and loss of soil fertility affecting yields.

1.9. Market Opportunities and Future Outlook

There are substantial opportunities for market expansion and improvement in rice seed production, especially with government and institutional support. However, challenges like infrastructure deficits, environmental threats, and the need for improved technology remain critical.

The rice seed value chain in Cameroon is marked by significant advancements in seed production and distribution, driven by government interventions and the adaptation of improved techniques. While facing challenges such as climate impacts and infrastructure deficits, the future holds promising opportunities for market expansion and technological advancements.

This report provides a comprehensive analysis of the rice seed value chain in Cameroon, covering the roles of various actors, government interventions, environmental impacts, and future prospects. It serves as a valuable resource for stakeholders and policymakers in the agriculture sector.

2. Stakeholder Analysis

2.1. Seed Producers

a) Producers' Participation

- **Experience and Production Trends:** Producers have been active for about seven years, with an increase in rice production and the use of quality rice seeds. Challenges include land preparation and bird attacks.
- **Land Utilization:** The average land size for agricultural production is 31 hectares, with at least half used for rice seeds.

- **Yield and Production Capacity:** The average yield is 5,000 kg/ha, with a total production of 66 tons of rice seed each cropping season. Producers can potentially produce up to 310 tons across two cropping seasons.

b) Economic and Market Dynamics

- **Production Costs and Distribution:** The cost of production is around 6 million CFA franc⁷⁾ per hectare, totalling 79.3 million CFA franc for 132 hectares. Rice seeds are distributed based on demand, often accompanied by training sessions.
- **Harvesting and Challenges:** Harvesting occurs in May and November, with labour shortages addressed by using farm machinery.

c) Regulatory Compliance

Producers distribute seeds following quality standards set by the government's Department of Regulation and Quality Control (DRCQ) of MINADER.

2.2. Farmers' Organisations (FOs)

a) Overview and Operations

- **Registration and Services:** Registered FOs receive government

⁷⁾ Central African CFA franc.

support, including capacity building, subsidies, and contracts for rice seed provision.

- Production and Sales Trends: FOs have noted increases in yield when using self-produced seed, though both area and production of rice seed have decreased due to high land consolidation costs.

b) Challenges and Opportunities

Challenges include poor infrastructure, with government agreements facilitating market access.

2.3. Intermediaries

a) Role and Impact

In Cameroon, intermediaries play a lesser role as seeds are directly delivered to the government by the FOs. The intermediary role is mainly limited to facilitating government agreements.

b) Market and Operational Challenges

The limited role of intermediaries restricts their challenges, mainly regarding ensuring compliance with government standards and effective delivery.

Cameroon's rice seed value chain involves a collaborative effort between producers, FOs, and the government. Producers focus on enhancing production and tackling operational challenges, while FOs work on distribution and member support, often in collaboration with the government. The intermediary role is less pronounced, with direct government involvement in the seed distribution. Challenges such as labour management, infrastructure, and regulatory compliance are prevalent, but there are opportunities for market expansion and enhanced collaboration within the value chain.

3. Current Seed Distribution Systems

3.1. Overview and Institutional Framework

The rice seed distribution system in Cameroon is managed by the Ministry of Agriculture and Rural Development (MINADER). The K-Rice belt project, established in December 2029, plays a significant role in the production and distribution of rice seeds. The government owns the project, which employs a significant number of full-time and part-time staff.

3.2. Facilities and Equipment

The project covers an area of 131 hectares, with irrigated and

non-irrigated fields for rice seed production. The project is equipped with various farm machinery and a rice milling plant, though maintenance and spare parts availability remain challenges.

3.3. Operational Strategy and Seed Production

- **Annual Production:** The project aims for an annual production of 1,200 tons of lowland rainfed rice seeds and 44 tons of upland rainfed rice seeds across two cropping seasons.
- **Training Center:** The project includes facilities like a training center, lecture room, dormitory, cafeteria, and warehouse, facilitating training and technical support for stakeholders in rice cultivation techniques and seed production.

3.4. Financial and Operational Management

- **Budget and Funding:** The project is funded through the MINADER budget, with a focus on producing rice seeds to fill the national gap and disseminate quality seeds across the country.
- **Research and Development:** Collaborations with agricultural faculties of universities and consultations with various organizations support breeding new varieties and improving rice seed quality.

3.5. Seed Distribution Strategy

- **Distribution Channels:** The project outlines potential distribution percentages for certified seeds, allocating portions to private seed companies, government subsidies, and NGOs.
- **Optimal Distribution Strategy:** The strategy aims to balance the distribution of seeds across different agro-ecological zones, ensuring wide-reaching impact and support for rice farmers.

3.6. Challenges and Improvement Plans

- **Monitoring and Evaluation:** The project includes self-evaluation and monitoring of field activities and yields, with improvements planned based on these evaluations.
- **Accountability:** The creation of a cross-cutting agency ensures proper coordination and accountability of the rice seed complex.

3.7. Country Rice Background and Objectives

- **Rice Production Goals:** Cameroon aims to increase rice production to around 750,000 tons by 2030, with the development of the seed sub-sector being a key measure to achieve this goal.
- **Role of the State and Private Sector:** Both the state and private sector are involved in the seed sector, with government efforts focused on producing required quantities of seed.

3.8. Estimated Seed Distributions

Cameroon's rice seed distribution system is a comprehensive initiative aimed at boosting national rice production and seed quality. The system integrates production, training, and distribution strategies, backed by government support and research collaborations. Despite challenges in maintenance and coordination, the project's structured approach to seed distribution is pivotal in achieving Cameroon's rice production goals.

- **Agro-Ecological Zones:** The distribution plan includes detailed breakdowns for different zones, such as the Sudano Sahelian, High Guinea Savannah, Western high lands, and Humid forests.
- **Distribution Percentages:** The plan outlines the percentages allocated to private companies, government subsidies, and NGOs in each zone.

4. Scheme for a seed production complex and seed supply

4.1. Management and Operational Framework

Responsible Entity: The Ministry of Agriculture and Rural Development (MINADER) is the primary entity responsible for operating the seed production complex, under the K-Rice Belt project. The project is set

to commence in December 2029, with MINADER overseeing all aspects of operation and management.

4.2. Expansion of Capabilities and Resource Planning

- **Human and Financial Resources:** The project will employ 15 full-time and at least 30 part-time staff, indicating a significant investment in human resources. The government, as the proprietor, will provide the necessary financial capital and resources for the project's sustainable operation.
- **Infrastructure and Technology:** The complex will span an area of 131 hectares, with 120 hectares dedicated to irrigated fields and 11 hectares to non-irrigated fields. Advanced equipment like seeding machines, tractors, power tillers, transplanters, combine harvesters, milling machines, and electrical dryers will be utilized.

4.3. Projected Annual Production

The complex is anticipated to produce a significant volume of certified rice seeds annually, addressing the national gap in rice seed availability.

4.4. Quality Monitoring and Control

Quality monitoring and maintenance of rice seed standards will be a key focus. Regular inspections and use of state-of-the-art technology will ensure high-quality seed production.

4.5. Equipment Management and Maintenance

Training for project staff in equipment maintenance will be provided at least once a year. The Cameroonian government will allocate a yearly budget for equipment maintenance and operational efficiency.

4.6. Innovative Distribution Strategy

The strategy for seed distribution aligns with Cameroon's agricultural policy, balancing commercial viability with social responsibility, and is designed to cater to diverse sectors of the economy.

The enhanced distribution channels will include:

- **Private Seed Companies:** A percentage of the seeds will be sold to private companies, fostering commercial engagement.
- **Government Subsidy to Farmers:** A significant portion will be distributed as a government subsidy, ensuring access for smallholder farmers.

- International Agencies or NGOs: A share will be allocated for distribution through NGOs, focusing on social assistance.

4.7. Accountability and Financial Sustainability

Financial Management and Accountability: A cross-cutting agency will be created to ensure proper coordination and accountability of the rice seed complex. This agency will oversee the transparent management of revenues generated from seed distribution.

In conclusion, Cameroon's approach to operating the new rice seed production complex and distributing seeds is comprehensive and future-oriented. It involves a blend of technological advancement, resource optimization, and innovative distribution methods. These strategies are designed to significantly improve the nation's seed production capacity, quality, and distribution efficiency, contributing to Cameroon's agricultural development and food security.

6 Kenya⁸⁾

1. Overview of the Rice Seed Value Chain

Kenya's rice seed value chain is intricately managed by the Kenya Agricultural and Livestock Research Organization (KALRO), which is instrumental in maintaining breeder seeds of released rice varieties. KALRO's role extends to supervising the production of early-generation seeds and overseeing certified seed production, ensuring high-quality rice seed dissemination throughout Kenya.

⁸⁾ The chapter is written based on Musila Ruth Nzisa's responses (2023) to KREI's questions for the Rice Seed Value Chain Analysis in seven African countries.

1.1. Geographical Focus

KALRO Mwea, focusing on all rice-growing regions in the country, particularly centralises its activities in Central Kenya and Kirinyaga County, including the Western region's Ahero and Bunyala irrigation schemes. This geographical distribution reflects the varied agroecological zones suitable for rice cultivation in Kenya.

1.2. Development over 7 Years

Kenya's rice seed value chain has witnessed transformative changes in the past seven years. Notably, there has been a marked increase in the awareness of certified seeds among small-scale farmers, a surge in demand for these seeds, a rise in the number of seed merchants and private companies engaging in rice seed production, and a notable improvement in rice seed quality.

1.3. Government Interventions

The Kenyan government plays a pivotal role in the rice seed value chain through direct subsidies and innovative programs like the e-voucher system. Through the Ministry of Agriculture, the government purchases certified seeds from seed merchants or companies for distribution to farmers, making high-quality sources more accessible.

1.4. Services and Products

KALRO offers various services essential for the rice seed value chain, including storage facilities, quality control, extension training, and input loans. These services cater to stakeholders, including traditional farmers, farmer organizations, traders, and licensed seed merchants.

1.5. Market Dynamics

The Kenyan rice seed market is characterised by a liberalised market environment, allowing seed companies to set prices based on incurred costs. This liberalisation has contributed to the dynamic nature of the market, with varying prices and product availability.

1.6. Export and Import Practices

While Kenya primarily focuses on local rice seed production, the country imports hybrid rice seeds, mainly driven by the private sector. The preference for locally produced seeds is due to their comparable yields and lower costs than hybrid varieties.

1.7. Infrastructure and Operational Challenges

Kenya's rice seed value chain faces numerous infrastructure and

operational challenges. These include poor road conditions, especially during the rainy season, inadequate and improperly designed storage facilities, a lack of seed processing equipment, and insufficient training facilities.

1.8. Production Regions and Varieties

Central and Western Kenya are key rice-producing regions. The main varieties include NIBAM110, NIBAM11, BW196, Komboka, NERICA 1-11, and IR 2793-80, each chosen for their specific advantages in terms of yield, aroma, and suitability for different ecological zones.

1.9. Regulatory Framework

The Kenyan seed market operates under stringent regulations to ensure quality and standardisation. Seed merchants must be registered and comply with the Kenyan government's quality standards and other rules.

1.10. Environmental and Climate Impacts

Environmental and climate factors, including drought and flooding significantly impact rice seed production in Kenya. These factors

affect yields and seed quality, posing challenges for seed growers.

1.11. Market Opportunities and Future Outlook

The future of the rice seed market in Kenya is promising, with opportunities for expansion in mechanised field operations and improved storage and processing facilities. However, high production costs, inadequate infrastructure, and transport costs remain.

Kenya's rice seed value chain has undergone significant evolution, marked by development in regulatory frameworks and dynamic market conditions. While challenges in infrastructure, climate impacts, and market access persist, there is potential for increased production and market expansion.

2. Stakeholder Analysis

2.1. Participation of Rice Seed Producers

a) Overview

Producers in Kenya have been engaged in rice seed production for approximately 7 years. They have witnessed increased production and adoption of quality rice seeds, despite challenges like land preparation and bird attacks.

b) Production

Producers typically utilize an average of 31 hectares for agricultural production, with at least half dedicated to rice seed production. The average yield is 5,000 kg/ha, and producers are capable of producing up to 310 tons across two cropping seasons.

c) Economic and Market Dynamics

- **Production Costs and Distribution:** The cost of production is around 6 million FCFA per hectare. Producers distribute rice seeds based on demand, often accompanied by training sessions.
- **Harvesting and Challenges:** Harvesting, which occurs in May and November, is hampered by labour shortages. The use of farm machinery is a key solution.

d) Regulatory Compliance

Producers must comply with standards set by the government's Department of Regulation and Quality Control (DRQC) of MINADER.

2.2. Farmers' Organisations (FOs)

a) Overview and Operations

- **Registration and Services:** Registered FOs receive government support, including capacity building, subsidies, and contracts for

rice seed provision.

- Production and Sales Trends: FOs report increases in yield using self-produced seeds, though both area and production have decreased due to high land consolidation costs.

b) Challenges and Opportunities

FOs are challenged by poor infrastructure and limited market access, with government agreements often facilitating market entry.

2.3. Participation of Intermediaries

a) Role and Impact

In Kenya, intermediaries play a less pronounced role as seeds are often directly delivered to the government by FOs. They mainly facilitate government agreements.

b) Market and Operational Challenges

The limited role of intermediaries results in fewer challenges, mainly focused on ensuring compliance with government standards and effective delivery.

In Kenya, the rice seed value chain is a collaborative effort among producers, FOs, and the government. Producers focus on enhancing

production and overcoming operational challenges, while FOs manage distribution and member support. The role of intermediaries is less significant due to direct government involvement in seed distribution. Challenges such as labor management, infrastructure, and regulatory compliance are present, but there are opportunities for market expansion and collaboration within the value chain.

3. Current Seed Distribution Systems

This section addresses the sustainable operation of the rice seed complex under the K-Rice Belt Project in Kenya. The primary focus is on the plan of KALRO Mwea for the management and distribution of rice seeds. Key aspects of the plan include the entity responsible for operations, current capabilities, projected production volumes, quality monitoring strategies, equipment maintenance, and distribution channels.

3.1. Management and Operations

The operations of the seed production complex will be overseen by the KALRO Management at the Headquarters, led by the Director General. Day-to-day operations are to be managed by KALRO ICRI Mwea. The human resource is currently inadequate, necessitating the

employment of additional capacity at the project's commencement.

3.2. Capabilities and Resources

- **Current Capabilities:** KALRO ICRI Mwea possesses trained personnel, land with irrigation, and seed production equipment. However, improvements in all areas are required to enhance seed production.
- **Resources Available:** Adequate land, water, human resources, and a combined harvester.
- **Resources Needed:** Seed store, drying floors, equipment store, complete seed processing unit, office building with conference facilities, cold rooms, paddy fields, water reservoir, field machinery, storage bags, and transportation vehicles.

3.3. Projected Production and Quality Monitoring

- **Annual Production:** The projected annual seed production is 750 tons across 150 acres in two seasons per year. To meet the national demand, seed growers will be trained and contracted to cover the deficit.
- **Quality Monitoring:** KALRO, a licensed seed merchant, will collaborate with KEPHIS for quality control. Regular monitoring by KEPHIS inspectors will ensure seed quality and purity.

3.4. Equipment Maintenance

A specialized machinery and equipment maintenance team in Mwea, supported by the KALRO Head Quarters team, will follow a Service Operational Procedure (SOP) for maintenance activities. Plant operators will receive training on equipment use and regular maintenance.

3.5. Distribution Strategy

The seeds will be distributed through government institutions, private entities, and farmer cooperatives. The distribution strategy includes:

- 20% as government subsidies to rice farmers at no cost.
- 30% through government institutions like the National Cereals and Produce Board (NCPB).
- 20% sold to private seed merchants and farmer cooperatives.
- 30% allocated to NGOs.

This strategy aligns with Kenya's agricultural sector's devolution to county governments, facilitating direct links between farmers and the ministry. The involvement of NCPB and cooperatives ensures widespread and efficient distribution, while NGOs assist in subsidizing and distributing seeds to needy farmers.

3.6. Accountability and Financial Management

The seed complex will adhere to the government's accounting and audit systems for transparency. Procurement processes will follow Kenya's Supplies and Procurement Act. Maintenance of various records and reports will ensure accountability.

The plan by KALRO Mwea for the rice seed complex under the K-Rice Belt Project demonstrates a comprehensive approach to ensuring sustainable seed production and distribution. It encompasses adequate resource management, quality control, and an efficient distribution strategy aligned with Kenya's agricultural framework. The focus on accountability and financial transparency further strengthens the project's potential for success.

4. Scheme for a seed cultivation complex and seed supply

This report examines the comprehensive strategies and schemes for the sustainable operation and distribution of rice seeds from a new production complex in Kenya, under the K-Rice Belt project. It focuses on future-oriented approaches to enhance rice seed production and distribution in line with Kenya's agricultural development goals.

4.1. Management and Operational Framework

The Kenya Agricultural and Livestock Research Organization (KALRO) will oversee the operations of the seed production complex. KALRO Management at the Headquarters, led by the Director General, will provide strategic oversight, while KALRO ICRI Mwea will be responsible for day-to-day operations.

4.2. Expansion of Capabilities and Resource Enhancement

Human and Financial Resources: KALRO ICRI Mwea currently has trained personnel, land with irrigation, and seed production equipment. However, there is a need for more human resources and financial capital at the project's commencement. The institution plans to acquire additional resources, including a seed store, drying floors, equipment store, and a complete seed processing unit.

4.3. Projected Annual Production

The projected annual seed production is 750 tons across 150 acres in two seasons per year. The acreage under the seed complex will not fully meet the country's seed demand, necessitating training and contracting seed growers to meet the deficit.

4.4. Quality Monitoring and Control

Strategies for Quality Assurance: KALRO, a licensed seed merchant, will collaborate with KEPHIS, the regulatory body for quality control in Kenya. KEPHIS inspectors will conduct regular monitoring of the fields to ensure seed quality and purity.

4.5. Equipment Management and Maintenance

The Mwea complex has an experienced machinery and equipment maintenance team. The team will follow a Machine and Equipment Service Operational Procedure (SOP) and will undergo training on using and maintaining the equipment.

4.6. Innovative Distribution Strategy

The seed distribution channels will comprise the followings.

- Government Subsidies: 20% of the rice seeds will be provided as government subsidies to rice farmers at no cost.
- Government Institutions: 30% will be distributed through institutions like the National Cereals and Produce Board (NCPB).
- Private Seed Merchants and Farmer Cooperatives: 20% will be sold to private entities for distribution.
- NGOs: 30% will be allocated to NGOs.

This strategy is designed to ensure widespread and efficient distribution of rice seeds across Kenya, leveraging government support, private sector participation, and NGO involvement to cater to different segments of the agricultural sector.

4.7. Accountability and Financial Sustainability

The seed complex will adhere to the government's accounting and audit systems to ensure transparency. Various records and reports will be maintained and audited to ensure accountability in financial management.

Kenya's approach to operating the new rice seed production complex encompasses technological advancements, resource optimization, and an innovative distribution strategy. These strategies are designed to significantly improve the nation's seed production capacity, quality, and distribution efficiency, contributing to Kenya's agricultural development and food security.

7

Guinea⁹⁾

1. Stakeholder Analysis

1.1. Rice Seed Producers

a) Overview of Producers' Participation

- **Years of Production:** Producers in Guinea have been engaged in rice seed production for approximately 30 years, with a recent shift towards certified seed production in the last five years.
- **Land Utilization and Yield:** The average land size for agricultural production is about 5 hectares. The average yield achieved for rice

⁹⁾ The chapter is written based on Mamadou Laho Barry's responses (2023) to KREI's questions for the Rice Seed Value Chain Analysis in seven African countries.

seeds is an impressive 25 tons/ha, with a total production of 150,000 tons last season.

b) Production Capacity and Expansion

- **Capacity to Increase Production:** Producers have the potential to produce up to 300,000 tons, dependent on the demand from farmers or projects. The production costs increase proportionally with the land size used.
- **Distribution Channels:** All of the produced rice seeds (150,000 tons) were distributed this season.

c) Economic and Market Dynamics

- **Production Costs:** The cost of producing rice seeds is approximately \$1,000 per hectare.
- **Harvesting and Distribution:** Harvesting occurs in October and April. Challenges include processing machines and land management for water, tackled by lending harvesters and not utilizing all available land.

d) Regulatory Compliance

Producers follow quality standards set by local institutions, focusing on germination power testing and packaging.

1.2. Farmers' Organisations (FOs)

a) Overview and Operations

- **Registration and Support:** Registered FOs receive government support, including capacity building, subsidies, and contracts for rice seed provision.
- **Production and Sales Trends:** FOs are not specifically for seed production, and farmers often exchange seeds. Hybrid seeds have been imported from Burkina Faso by the government, increasing production.

b) Challenges and Opportunities

FOs face challenges like poor infrastructure, with government support often facilitating market access.

In Guinea, the rice seed value chain sees significant involvement from both producers and FOs. Producers have adapted to changing demands and increased their capacity for certified seed production. FOs, while not exclusively focused on seed production, play a vital role in seed distribution and benefit from government support. Challenges like infrastructure and market access are common, but opportunities for growth and expansion exist, especially with government and institutional support.

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