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# Market study report for crops and associated technologies in The Gambia

Improving Agricultural **RE**silience to **SA**linity Through **DE**velopment and Promotion of Pro-poor Technologies and Management Strategies in Selected Countries of Sub-Saharan Africa (**RESADE** project)

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## Executive Summary

Farmers' engagement in the markets underlies the unlimited potential for improving agriculture worldwide. To ensure the development of the agricultural value chain, it is important to strengthen farmers' capacity to produce, process, and integrate into markets, thus the intervention of the RESADE project to develop the agricultural value chain from the production stage to the market supply. This report delivered a market analysis of the crops and technologies promoted by the RESADE project to identify opportunities raised and develop the market in the targeted countries. To do so, focus group discussions, key informant interviews with different actors, and direct observation as well as literature review results were used to highlight the main crops and agriculture technologies covered in the study area, the country's government agricultural and market improvement policies, the challenges faced by the market development as well as the trends and opportunities brought by the project in market development.

The country has an emerging marketplace with the rapid development of agriculture these recent years through government policies and agricultural development projects. However, many challenges to the full development of the agricultural sector and the market still exist and are reported by the actors. These include: -Agriculture is essentially running in small-scale farming based on traditional agricultural inputs and technologies and rainfed, leading to low productivity level. -A poor market organization. -Limited access to credit and subsidies. -Lack of inadequate information, education, and knowledge. -Inadequate and late supply and availability of critical production inputs (including seeds, fertilizer, farm tools, and so on). -In addition, the official agricultural input prices are not affordable for farmers. -Poor productive enterprise options for producers to invest in. -Skilled labor shortages; -Poor marketing skills, and extension services. -Inadequate infrastructure (storage facilities, transportation, road conditions, market conditions, equipment, irrigation, and processing facilities). -Limited access to credit and subsidies for actors to purchase inputs and develop their activities.

On the other hand, according to the stakeholders and analysis, there are great potential and opportunities to stimulate local and regional market demand. The investment made by the project has raised several market potential development opportunities: Considerable farm input including new crop varieties seeds and machines has been distributed to the farmers facilitating

crop production and processing. From this, agricultural crop yields and food production have been increased as well as crop diversification, food diversification, and food security. Small farmers and other market actors' income source in the market is developed and their connection to each other. Thanks to the establishment of farmers cooperatives and the connection with credit institutions, farmers are getting access to credit and forming themselves into small saving groups. So, the access to credit and extension services for farmers to develop their activities has been facilitated support. Women have been empowered through their active integration in the project activities and food processing. Agricultural market development through supporting the food-processing is one of the ways to contribute to increasing agricultural output food diversification and food security. Therefore, food processing training has been provided to women farmers to empower women's capacity and involvement in economic development. Women have transformed maize, sorghum, cassava, yams, tomatoes, oranges, and pineapple into couscous, juice, tomato paste, marmalade, and cakes, leading to increased food diversity, food availability, food security, revenue source diversification, and market development. New market development businesses have been developed, showing that the market is expanding to the national and regional levels. In Togo for example, the biochar production and biochar machine fabrication business development are on the way to developing the market.

However, for a full market potential development, the following relevant recommendations implementation are necessary for stakeholders in the agricultural sector, including farmers, technology providers, policymakers, and investors.

- Promote sustainable agriculture and empower small-scale farmers through quality seeds and fertilizers, irrigation systems development, modern farm materials, capacity-building training, and extension services support as engaged in the project.
- Empowering smallholder farmers, especially women, is crucial for achieving sustainable and climate-resilient agriculture.
- Farmers should be motivated to adopt and implement the promoted technologies and the successful technologies should be expanded to more areas in the country.
- Farmers should be trained in entrepreneurship and agribusiness.

- Farmers should be motivated and help to follow the path of market-oriented farming in market development.
- Farmers should be demonstrated how to effectively act in the market and teach them to develop their commercial skills. In addition, market prices should be regulated and market access to farmers and conditions should be improved.
- Consequent investments should be made in sustainable agro-processing businesses to transform products locally before selling or exporting to the international market. Food-processing is recognized to contribute to increasing agricultural product availability and agricultural market development.
- New sustainable agricultural business and entrepreneurship development should be strongly encouraged and supported financially as well as technical.
- Access to financial loans is still at a low stage, which is why it is important to improve access to credit. Many market actors are either unaware of the existence of credit or have limited access due to the terms and conditions involved. By providing farmers with easier access to credit, they can invest in advanced agricultural technologies, increase production, and expand their activities. Additionally, the government should increase agricultural and market subsidies to facilitate market transactions.
- Building and improving rural infrastructure, such as roads, irrigation systems, transport, and storage facilities, can help farmers transport their produce to market and minimize crop waste due to climate shocks and post-harvest losses. Improving access to markets and services in rural areas is a way toward good market development.
- To improve market accessibility, farmers need access to markets with favorable conditions to sell their products and generate profit.
- To add value to agricultural products, governments can help establish linkages with rural, national, regional, and international markets.
- Providing farmers with constant information on market developments and supporting the creation and development of new agricultural businesses as well as the expansion of agro-processing enterprises are also important.

- A gradual improvement in the domestic production capacity especially for women in relation to the promoted crop and commodities and processed products should be fostered.

## 1 Introduction

### Background

This report focuses on market analysis for crops, associated agricultural technologies introduced, and developed foods in the framework of the RESADE project, an agriculture project funded by the International Fund for Agricultural Development (IFAD) and the Arab Bank for Economic Development in Africa (BADEA). The project is implemented by the International Center for Biosaline Agriculture (ICBA) in partnership with the national partners- the National Agricultural Research and Extension Services (NARES). RESADE project has been introducing and promoting adapted climate-smart technologies and new crop varieties with high tolerance to salinity and drought-resilient crops to small-scale farmers in several villages in the targeted seven (7) countries since 2019. The targeted countries are Gambia, Liberia, Sierra Leone, and Togo in Western Africa, and Botswana, Mozambique, and Namibia in Southern Africa. Using the best practice hubs and farmer-field schools' approaches, the project allowed dissemination technologies, to increase awareness and to strengthen smallholder farmers with knowledge of new agriculture technologies to especially overcome the growing soil salinity problems, increase crop yield, and ensure household food security in the targeted areas.

The RESADE project aims to support national agricultural development policies and strategies of the targeted countries by rehabilitating and increasing the productivity of salinity-affected lands and providing technical assistance in salinity management to other IFAD- and BADEA-funded projects being implemented in these countries as well. The initiative will utilize ICBA's previous and current projects as a basis for pertinent and valuable experience in implementing salinity management techniques for small-scale farmers residing in harsh surroundings.

The RESADE project aims to enhance food security and alleviate poverty among smallholder farmers in salinity-affected areas, especially women, in selected countries. To achieve this, the project's objective is to boost agricultural productivity and income in these areas by introducing salt-tolerant crops and best agronomic management practices; developing value chains and markets for introduced cropping systems; and enhancing the skills of farmers and extension workers in agriculture that is resilient to salinity and climate-smart, in partnership with (NARES). As an outcome, the project is expecting the following results:

- The project aims to help around 11,550 smallholder farmers, with a focus on at least half of them being women, in specific areas. The goal is to encourage these farmers to adopt new cropping systems that can withstand changes in climate and salinity.
- To increase the productivity of saline lands by 30% and the economic returns of the targeted smallholder farmers by 20%.
- The incorporation of climate-smart and salinity-resilient agricultural models and approaches into national agricultural development policies and strategies in the seven targeted countries.

### **Objectives of the analysis**

The project has used a best practices hub, farmer field schools' approaches, and multiple capacity building training in the experiments hub and surrounding to disseminate technologies, increase awareness, and empower smallholder farmers with requisite knowledge on technologies to overcome salinity challenges and increase crop yields. The principal technologies introduced include the use of salt-tolerant crop varieties, the use of soil amendments, irrigation methods to reduce salinity through leaching, and soil and moisture conservation and management practices. Foods and recipes based on crops tested at the BPH with farmers and farmers cooperatives installed were also developed in a bid to create a strong agricultural value chain and market development. Creating a market study report for crops and associated agriculture technologies involves evaluating technology adoption by farmers, assessing the current state of the agricultural sector development from the intervention, understanding market trends,



constraints, and opportunities raised, and identifying other future market growth opportunities to develop.

The agricultural market system includes two sub-systems: input marketing and final product marketing. The input marketing sub-system includes all these actors involved in making available various farm production inputs to farmers such as input manufacturers, government and nongovernment institutions, individual input suppliers, and dealers. The output product marketing sub-system includes farmers, cooperatives, processors, traders, wholesalers, retailers, importers, and exporters. The main objective of this market study as part of the RESADE project intervention impact assessment in the targeted communities is to provide a comprehensive understanding and inform stakeholders in the agricultural value chain, including farmers, agro-industry players, policy-makers, and investors, about the dynamics, trends, and opportunities created in the market development for crops and technologies promoted by the project. This information as well as provided recommendations enables them to make better informed decisions about their intervention in the agricultural sector, improve productivity, and meet the challenges facing agriculture in the context of natural shocks such as climate change. Specifically, this report addresses the following objectives: Assess current agricultural market trends and demand, assess supply chain efficiency and potential constraints, determine the adoption of agricultural technologies, and analyze the competitive landscape of the market.

The rest of the report is structured as follows: after detailing the methodology framework, the agricultural sector overview, the market trends and demands, the technology adoption, the market opportunities and challenges, and the government policies and support for the country and the study site country are provided.

## **2 Methodology Framework**

The information included in the report has been collected from two principal sources: primary data and secondary data. To collect the primary information, a mission to the mentioned countries' project sites was organized to meet different stakeholders in the agricultural value chain from the input supply, and production stage to the consumption. We used three qualitative

data collections including focus group discussion (FGD) key informant interview (KII) and direct observation to interview the agricultural value chain actors and gather the necessary information. Concerning the secondary data acquisition, using a literature review and various publicly available data sources, some useful information has been collected to build the report. During the in-depth interviews with the actors, the gathered primary information allowed us to validate the secondary data. Finally, the report was constructed using narrative and qualitative content analysis methods to analyze the information and come out with valuable results for policymaking in the pathway of expansion and better market construction.

### **3 Results and discussions per country**

#### **3.1 Agricultural Sector Overview**

The Gambia is a small country on the West Coast of Africa divided into North and South Banks by The River Gambia. With a Coastline of about 80 km long, the width varies from 24 to 28 kilometers from its Northern and Southern borders with Senegal. The country has an area of 11,300 km<sup>2</sup> and an estimated population of 2.7 million in 2022. The country is classified as one of the least developed countries in terms of socio-economic development, ranked 174th out of 189 countries in terms of HDI (2021) (FAO, 2023). Agriculture, forestry, and fishing together account for 23% of GDP in 2022, industry 20% and services 57% of GDP. The agricultural sector is especially one of the main drivers of GDP growth in The Gambia. The sector typically contributes around 31% of GDP (GBoS, 2016) and employs 46.4% of the labour force and 80.7% of the rural labour force (HIS 2015/2016). 72% of the population depends on agriculture for their livelihoods and 91% of the rural poor work as farmers. Despite the importance of this sector for the country, the Gambia's economy is limited due to the poor performance of agriculture and relatively modest industrial activity. However, Gambian agriculture is mainly based on small farms with traditional tools and is characterized by rainfed subsistence crops, including millet, maize, rice, sorghum, and cassava, and traditional cash crops, such as groundnuts, cotton, and cashew nuts. Approximately 56% of the country's total surface area is considered suitable for agriculture and is used for cereal and groundnut production, as well as for grazing and fallow land (Sambou, 2016). Less than 2% of the

cultivated land is irrigated and the average farm size is 1.5 to 2 hectares. Groundnuts are the main source of foreign exchange for The Gambia, accounting for 30% and meeting 50% of national food needs (CCA, 2015). Currently, only 4.8% of commercial bank loans are allocated to agriculture, while government funding for the agricultural sector is 6%. Furthermore, agro-industries account for 15% of GDP, which is an important component of Gambian industries and another driver of growth. The Gambia's agriculture sector, as the primary node for value chain development, is vulnerable and faces several challenges in terms of product marketing and market challenges, particularly concerning the development of the agricultural value chain in The Gambia. Despite their vital role in national food production, small-scale farmers have limited or no access to formal credit (GNDP, 2018) in addition to the lack of modern technologies and adequate support, the sector as well as its market is struggling to reach the next level of development.

However, numerous projects such as the RESADE are set to revolutionize the country's agricultural sector, the agricultural value chain and market, and the well-being of the rural population, notably by increasing food security and incomes and reducing poverty.

### 3.2 Government Policies and Support to Agricultural Market Development

This section highlights different government actions, policies, subsidies, and incentives in agricultural sector development and the role of government in promoting sustainable agriculture and technology transfer.

Conscious of its potential, the agriculture sector plays a crucial role in The Gambia's government's development plans. Agricultural development plans figure among the pillars of the government national's development roadmaps. Toward the development of the agricultural market, the government aims to boost and promote sustainable agriculture and technology transfer, create jobs, and increase income by placing the agricultural sector at the center of development. To this end, the government plans to increase agricultural productivity and yields, food security and develop markets via several policy implementations. Several strategic plans and policies have been implemented by the government toward the development of the Agriculture and Natural

Resources (ANR) sector, the market as well as the economy, and the population welfare improvement in the ANR Policy throughout time. From the story, following the July 1994 shock, the Gambia's government first developed The Gambia Incorporated Vision 2020, a long-term plan aimed at transforming the country into a middle-income and export-oriented country by 2020 by stabilizing the economy and cushioning it against external and internal shocks. Following the formation of the vision, a succession of important policies and programs were developed with the active participation of benefit groups. The policies are expected to have a direct and indirect impact on the performance of the ANR sector, and one of the important policies is the ANR Sector Policy, which has the overarching policy goal of achieving and sustaining measurable levels of food and nutrition security in the country (GNAIP 2011 – 2015).

The formulation and approval of the ANR's sector policy framework 2009-2015 is one of the important endeavors of the country. The sector policy of the ANR describes the goal of the sector in the following way: "an increased focus on transforming the sector from a traditional low-yield subsistence economy with centralized structures into a modern market-led sector with efficient value chains, a diversified production base, and effective decentralized structures". The following is a set of goals to achieve in the agriculture sector through the ANR's key strategies: 1. To improve the food and nutrition security of the entire country, especially vulnerable populations, measurably and sustainably. 2. To establish a marketing sector that is competitive, efficient, and sustainable, ensuring measurable agricultural and food value chains and market linkages. 3. To strengthen public and private institutions in the sector, providing necessary services in a stable and enabling environment, and reducing susceptibility to food and nutrition insecurity. 4. To manage the sector's natural resource base sustainably and efficiently (ANR 2017-2026).

The Gambian government has also implemented a medium-term strategic plan (2011-2015), the National Agricultural Investment Plan (GNAIP), with an estimated investment of USD 296.7 million. GNAIP is fully connected with the 2020 vision's national objectives and aims to support the achievement of key national strategic programs such as the Poverty Reduction Strategy Paper II (2007-2011) and the ANR Policy (2010). GNAIP's development objective is based on six important strategic programs: 1. improving agricultural land and water management; 2. managing other shared resources; 3. Develop agricultural chains and market promotion by

transforming the agricultural sector from a traditional subsistence economy into a modern market-oriented business sector with well-integrated food chains and a viable agro-industrial private sector, leading to increased incomes for agricultural value chain actors (including farmers, input suppliers, processors, traders, and exporters); 4. Improve national food and nutrition security; 5. Support agricultural development by introducing farming practices that improve and preserve local natural resources and the environment, and help small farmers adapt to climate change; 6. Monitor, evaluate, and coordinate GNAIP to ensure the effective implementation of the first five strategies and achieve the objectives set (GNAIP 2011 – 2015).

Other major policies addressing the ANR sector and GNAIP include:

-The decentralization of authority to local governments creates a new system of decentralized local administration with increased room for civil society participation in local decision-making through the involvement of regional, district, neighborhood, and village development committees. -The National Trade Policy focuses on regulating import criteria for animals, marine life, plants, their products, and processed foods of plant or animal origin. - The National Policy for the Advancement of Gambian Women, which addresses women's inclusion in the national development process in all sectors by strengthening and developing women's productive capacities to increase their contribution to household welfare, particularly food security; reducing rural women's drudgery to improve their quality of life; and eventually improving women's access to resources, production inputs, and support services (GNAIP 2011-20115).

Despite the efforts of the government, many policy objectives have not been met in 2015. Achieving macro-level policy objectives, such as encouraging smallholders, particularly women, who make up the majority of agricultural and agro-industrial workers, to produce more efficiently and generate surpluses for the market, remains a pipe dream. Similarly, governmental initiatives have not generated enough chances for small farmers to enhance their output of food and cash crops, livestock, and fishery goods, as envisaged. The majority of farmers continue to adopt traditional agricultural methods that are no longer suitable to deal with the rising population strain on the ANR sector, to the detriment of environmental integrity. As a result, expectations for better living and market conditions for the population to be materialized.

The evidence of the performance of the ANR sector over the last two decades (the period 1995-2015) in the context of structural changes in the economy, has clearly indicated the emerging and persistent constraints facing the current and future development of the sector. These major constraints to ANR sector development are as follows: -Lack of a plentiful supply of water and energy, resulting in agriculture's reliance on rainfall -Limited access to credit (with high interest rate), resulting in little private sector investment in the ANR industry. -Inadequate information and knowledge -Inadequate and late supply and availability of critical production inputs (seeds, agrochemicals, modern inputs, and so on). -Poor productive enterprise options for producers to invest in, which is exacerbated by poor productivity and a lack of suitable ANR incentive schemes to help farmers reduce production costs. -Skilled labor shortages; -poor marketing, research, and extension services; and rural infrastructure. -Inadequate infrastructure (transportation, market, equipment, irrigation, and processing facilities), resulting in a glut, post-harvest losses, and scarcity of ANR goods. -Limited arable land due to unprecedented high rates of population expansion. -Marketing and access to both input and product markets are significant barriers to ANR development. -Inadequate access to financing for smallholder farmers or operators to purchase inputs.

Thus, in the recent strategic plan, The Gambia aims to develop a market-led commercialized, efficient, competitive, and dynamic ANR Policy 2017-2026 in the context of sustainable development through multiple actions. The ANR's 2017 - 2026 policy is an ambitious vision that draws lessons from the ANR's 2009/2015 policy constraints to significantly build new priorities and lines of development from the last twenty years to overcome ANR sector development constraints. The ANR 2017-2026 policy aims to: Enhance commodity production and productivity by improving ANR production systems through rehabilitation, intensification, and expansion; foster growth and advancement in the food industry sub-sector; facilitate broader and more effective involvement of subsistence farmers, particularly women, and youth, in modern and commercial production, agro-industry, and trade; ensure balanced development between the ANR sector and other sectors of the economy and strengthen the economic and structural integration of the ANR sector with other sectors such as manufacturing, and tourism (ANR 2017-2026).

Overall, the success of all these strategies, policies, and actions toward the agricultural sector as well as the economic development depend on the real determination, commitment, and investment of the government.

### 3.3 Study Site and Technology Adopted

This section provides a brief overview of the study site and assesses the implementation and impact of agricultural technologies on the selected crops within the study community. The objective is to identify the technologies that have resulted in increased crop yields, improved resource management, and enhanced efficiency across the agricultural value chain.

In the framework of this analysis, the data and information have been collected at Jahaur village (the BPH site), at the weekly market called “Loumo” situated at the regional urban centre in Farafenni and in the Farafenni market (situated at 35 km kilometers from Jahaur). The principal site of the project, the village Jahaur is located in the Central River Region North of The Gambia. The area is predominantly agricultural with an annual rainfall of less than 600mm. It is a Sahelian agroecological zone with a saline ecosystem at the lowland. The main economic activities for the local community include farming, vegetable gardening, and livestock breeding. Most of the farm products are taken to the weekly market called "Loumo" in the regional urban center of Farafenni.

On the project site (Jahaur village) and nearby communities (Genji Wolof, Mamufana, Bati Yonga, and Kerevan Sitakoto), the technologies implemented focus principally on salinity and drought-tolerant crop varieties, and other climate-smart agricultural practices grouped into five main technological packages. The technologies comprise new crops and varieties assessment (In this trial, Two Varieties of Pearl millet (that is IP-19586 and MC 94 C2), two varieties of Sorghum ( i.e ICSV-700 and ICSR - 93034), and two varieties of Cowpea (i.e ILRI 9334 and ILRI 9643) were implemented), soil amendments (including manure like cow dung, Green manure (Leucaena), biochar and Limestone), fertilization ( usage of NPK 15-15-15, NPK 15-15-15 + foliar nutrients and Chicken manure), crop management (assesses different sowing periods to minimize the impact

of soil salinity on plant development. This trial was purposely related to the types of crop management such as sowing dates and weed management and practices to conserve water in small-scale farmers' fields), leaching fraction trials, and drip irrigation systems to meet water demand. However, irrigation and leaching fraction trials were not successful in the trials. Three crops were successfully implemented: pearl millet, sorghum, and cowpea. Two improved varieties for each crop were successfully tested in crop varietal assessment. The crop varieties have been tested locally which can help farmers assess which varieties perform best in their local conditions. Some of these technologies are in an experimental stage (in the project site plots), while others are potentially being used in the site farming community and in surrounding villages communities as well. The associated best management practices are land preparation and management, sowing and post-harvesting techniques, seed choice and community seed bank management, fertilizer application, drip irrigation system management, biochar, and other soil amendments production, and crop/product processing (Table 1). The experiment hub/Best Practice Hub (BPH) has involved 60 farmers (with 93% women, 56 out of 60) who were supposed to implement the technologies in their farms outside the BPH and teach others in the neighborhoods to spray and transfer the technologies.



Table 1. Technologies and Crops Implemented.

Intervention		Treatment	Crops		
			Millet	Sorghum	Cowpea
Crop varieties	Millet	IP 19586	✓		
		MC 94 C2	✓		
	Sorghum	ICSV-700		✓	
		ICSR-93034		✓	
	Cowpea	ILRI 9334			✓
		ILRI 9643			✓
Soil amendment		Cattle dung	✓	✓	
		Lime	✓	✓	
		Green manure (Leucaena)	✓	✓	
		Biochar	✓	✓	
		Control	✓	✓	
Fertilization		NPK 15-15-15	✓	✓	
		NPK 15-15-15 + foliar nutrients	✓	✓	
		Chicken manure	✓	✓	
		Control	✓	✓	
Crop management		Sowing dates 1		✓	
		Sowing dates 2		✓	

### 3.4 Market Challenges

This section discusses the challenges and regulatory issues affecting crop production and technology adoption, as well as market access and development. Although many opportunities have been created to develop the agricultural value chain and the market through the project intervention, several challenges faced by the actors make it difficult to reach their full potential. The consequences of climate change result in productivity losses, some constraints in transport, modern technology and infrastructure access, limited access to credit, deficiencies in marketing and market information systems, lack of extension services, high cost, insufficient and timely availability of farm machinery and inputs including fertilizers, improved seeds, and pesticides are some constraints highlighted to production and productivity improvement (GNDP, 2018). The following challenges have been identified in this analysis.

**-Production level is low:** The sector is characterized by small-scale farming and farmers heavily rely on traditional agricultural inputs and technologies. In addition, there is insufficient water, poor quality of water and soil, and rural infrastructure with a continued use of rudimentary agricultural equipment make it difficult the sector development. Thus, the low productivity growth and low processing of agricultural production, adversely affect the incomes of farmers, particularly smallholders.

**-Difficulty in accessing seed, fertilizer, and farm tools:** Farmers are struggling to get access to seed especially new seed varieties tolerant to climate change. In addition to being expensive, getting authorized seed and fertilizer is a long administrative process so farmers are not able to get those inputs on time for the farming season. Moreover, farmers don't have access to modern farm materials such as tractors and other machines for crop production. These mentioned difficulties in addition to climate change consequences are the reason why crop yields are low and not competitive in these countries.

**-Low education level and limited access to extension services:** Most of the farmers are illiterate, so face a lack of knowledge and difficulties in developing their production and marketing activities. Extension services agents are supposed to assist and help farmers from the production process to the market. However, most of the farmers don't get full extension agent services.

**-Market organization and status:** Rural markets are small, not well organized, and offer few opportunities so most of the markets are weekly market open only once a week. The social and physical status of the markets is precarious and uncertain, with high levels of poverty and extremely low literacy rates, not to mention the lack of adequate shops and sanitary facilities, which has always been a major obstacle to the growth of this trading place.

**-Access to storage and transport facilities:** Farmers have difficulties getting access to storage and transport facilities. Farmers used to stock their products in their rooms and in case of climate shocks like floods and wet periods, they lost most of their product. The roads to access markets are not very practicable and well-established transport means do not exist. Farmers walk for miles to get to the market or sometimes use so-called horses and donkeys' cars.

**-Lack of information and communication means:** One of the big problems is that farmers have a lack of market information including market demand, consumer needs, and the determination of market price. Market prices fluctuate too much and are fixed in the market according to what the demander is ready to give to the farmers leading to a low income for farmers, and farmers do not communicate with market participants besides those times. Despite, the products being seasonal sold, sometimes, the supply exceeds the demand and vice versa which can be a huge loss for farmers who don't have adequate storage and transport facilities. Market prices should be regulated.

**-Financial access and subsidies support:** One of the most significant obstacles is access to financial support, resulting in limited development of new market businesses. All the actors in the value chain claim that they need financial support to improve their business or create new one. For example, most of the actors do not have access to credit and credit access information and are not connected to credit institutions. Otherwise, the ones who have access to credit are suffering with the repayment because of the high credit interest rate that goes from 18 to 20%. However, the poor organization of the value chain exacerbated the lack of access to credit, as credit institutions mostly provide credits to cooperatives rather than individual farmers. Furthermore, the country's low agricultural productivity is partly caused by taxation and production market rules, as well as insufficient subsidies and budget allocations to agriculture.

**-Barriers to market access:** Market access for small-scale farmers has obviously been hampered by a wide range of factors, such as distance, asymmetric information, high transaction costs, low education level, lack of commercial skills, lack of collaboration and connection between the market actors, and limited financial access.

### 3.5 Market Opportunities

This section highlights the current market trends for the selected crops and associated technologies, including production volume, consumption patterns, preference, and demand drivers. It also identifies growth opportunities for the selected crops and technologies, based on emerging market trends and consumer demands. To develop the agricultural value chain, farmers must be empowered to produce, transform, and integrate markets. The intervention of the RESADE project has created many market development opportunities in the study region, country, and at the regional level.

**-Input access and cultivation area:** The agricultural market begins with input supply. More input has been provided to farmers including seed, soil amendment, agricultural, and processing machines. This has facilitated farmers in their agricultural production and processing. Input (seeds, fertilizers, soil amendments, machines...) demand from individual input suppliers as well as from research centers like the National Agricultural Research Institute (NARI) that produce new crop seed varieties have increased. Furthermore, farmland has increased because farmers have now overcome salinity issues. Thanks to the new technologies introduced by the project, farmers are now able to produce in saline areas that were abandoned because of soil salinity issues, decreasing productivity performance.

**-Agricultural production and diversification:** Through the implementation of the mentioned technologies, the project has introduced new crops and varieties and thus increased crop diversity in agriculture and agricultural productivity and yield. Besides the farmers involved in the BPH, more than 1000 farmers have received new crops and varieties, and biochar and other amendments production training are estimated to adopt these technologies. The introduction of

new crops and varieties has expanded crop diversification in these salinity-affected areas considering the high returns from value-added crops with more marketing opportunities. Research has shown that crop diversification increases rural communities' food security (e.g. Adjimoti et al., 2018; Mango et al., 2018).

According to the cost-benefit analysis results, all three crops' promotion will be profitable under the following conditions: for millet production, for example, the IP 19586 should be promoted. In this process, green manure or lime should be used for soil amendment and NPK 15-15-15 for fertilization. For higher profitability of sorghum production, the ICSV-700 variety should be produced under soils treated with cattle dung and chicken manure, and planting done using sowing date one as successfully experimented. Cowpea production profitability under those conditions should be completed soon. However, according to the NPV, both cowpea varieties' production is profitable. Furthermore, in the community, the interviews conducted with farmers results show that the crop varieties have attracted attention and are now being cultivated by more farmers in the surrounding villages who received the seed varieties. These perspectives will increase market demand, presenting a good opportunity for farmers and other market participants and local and regional market development.

**-Crop/food processing and women empowerment:** The development of food processing for agricultural products has two primary effects. Firstly, the connections between inputs and outputs create influential upstream multiplier effects on agriculture, which stimulate its growth. The additional value-added generates demand, leading to economic growth and contributing to household livelihoods. Secondly, value added is created in processing and agriculture, leading to job creation and returns on capital (Miller et al., 2019). Research has shown that simply increasing agricultural production without developing the value chain can lead to negative outcomes for farmers, such as lower prices for their products. However, a study conducted by Kinkpe et al., 2023 found that improving food processing can increase the demand for agricultural raw materials, resulting in higher output and prices. This, in turn, reduces income inequality and poverty rates. The researchers conclude that investing in food processing has the potential to promote agricultural development and reduce poverty in economies that rely heavily on agriculture, such as those in sub-Saharan Africa.

The project has however captured this aspect of development. Besides, the agricultural new technologies implementations in the project intervention, women farmers have been empowered and trained on how to transform different crops and products into consumable local foods. Women now are able to transform more crops into local food, leading to food diversification, food security improvement, and market expansion as well as revenue improvement. Farmers have processed maize, sorghum, cassava, yams, tomatoes, oranges, and pineapple into couscous, juice, tomato paste, marmalade, bread and cakes. These products can be consumed at the household level and also be sold in the market. In addition, the rice miller activities have been developed thanks to the increase of rice cultivation in the community. In addition to hushing rice, the miller is also planning to improve his business and revenue by supplying rice husks as one of the biochar production inputs.

**-Business development and entrepreneurship:** The biochar training and implementation have developed the biochar production chain and market in the region and nearby communities. This will likely develop and spread the wide use of biochar, this climate-friendly soil amendment with many advantages and which is not commonly used in Africa and new business development in The Gambia like in the case of Togo where some local palm oil production industry managers who received biochar production training have developed the idea to make it an additional business. They are ready to produce biochar in large quantities at the local level near farmers where farmers can get access easily to biochar at a lower price than chemical fertilizer and low transport cost. These industries already process a large quantity of Biochar input (which is the palm nutshell) to produce biochar in large quantities. If realized, this is a big advantage for the industries as well as farmers in terms of revenue and job creation. In addition, the biochar machine maker in Togo is also ready to make more machines as he said that local industries as well as farmers are interested in the machine and are ready to buy it. These last businesses are prominent, and while developing, they can grow in the local and regional markets in The Gambia.

**-Capacity building and market actors' linkages development:** The project has built farmers' and extension workers' capacity through multiple training sessions such as seed production and processing training, biochar production, food processing, and community seed bank establishment and management. It has also brought actors together through a series of activities

and thus developed the rural economy. Farmers have been organized in cooperatives, and have been connected to extension services, credit institutions, and input suppliers. As farmers are now organized into cooperatives, credit institutions have started providing credit to them to develop their activity. This will be a great opportunity for farmers' activities, so the market development.

**-Income source diversification and revenue increase:** All those mentioned activities development have enabled the market actors especially farmers to diversify their income source, meet market and consumer demand, and increase their revenue, food security, and household and community welfare. For example, researchers have stated that crop diversification is the source of food security and establishment and income increase.

Table 2 summarizes the market opportunities raised by the RESADE project and the existing challenges.

*Table 2. Market Opportunities and Challenges Summary*

<b>Opportunities raised in market development</b>	<b>Challenges to overcome</b>
More input has been supplied to the farmers and cultivated areas have increased to overcome salinity.	Poor production technology and production level
Agricultural crop yields and food production have increased	Difficulty in accessing seed, fertilizer, and farm tools
Crop diversification, food diversification, and food security have been increased	Poor market organization and market status
Small farmers' income source in the market is developed	Difficult access to storage and transport facilities
Market actors' revenue and activities are developed	Lack of information and communication means
Women have been empowered	Difficult access to rural infrastructure
Access to financial support information is developed	Lack of investment, difficult access to credit, and subsidies support

Capacity building, developing the linkages with the market's different actors.	Poor education level and limited access to extension services
Facilitated farmer's cooperatives access to credit	Most of the market actors don't have access to credit and the information to access credit
New market businesses and entrepreneurship have been developed	Poor connection between market actors
The market is expanding to the national and regional level	Market development and expansion remain slow with trade barriers

**Conclusion and Recommendations**

This report aims to deliver a market analysis of the crops and technologies promoted by the RESADE project in order to identify opportunities raised and develop the market in the targeted countries. As findings, many opportunities have been developed toward the local, regional, and international markets through the multiple strategies implemented in the framework of the project to strengthen agricultural systems and related chains. The opportunities raised to develop the market are: Considerable farm input including new crop varieties seeds and machines has been distributed to the farmers facilitating crop production and processing. From this, agricultural crop yields and food production have been increased as well as crop diversification, food diversification, and food security. Small farmers and other market actors' income source in the market is developed and their connection to each other. Women have been empowered through their active integration in the project activities and food processing. Access to credit and extension services for farmers to develop their activities has been facilitated support. New market development businesses have been developed, showing that the market is expanding to the national and regional levels.

However, some challenges to the market's full potential development still exist. These include poor production technology (mostly using traditional technologies) with difficulties in accessing



seed, fertilizer, and farm tools. The production level is still at small-scale farming not enough to feed the population with a poor market organization. Difficult access to storage facilities at home and stores in the market and transport facilities to the market (in addition to difficult access to rural infrastructure like adequate roads), and lack of education, information, and communication means are among the biggest challenges. Lack of investment, subsidies support from government institutions, difficult access to credit, and limited access to extension services as well as a poor connection between market actors makes the market development and expansion remain slow.

Based on the analysis, for market development, the following relevant recommendations execution (to enhance crop production, technology adoption, and market competitiveness) are necessary for stakeholders in the agricultural sector, including farmers, technology providers, policymakers, and investors.

- Farmers should be provided with modern agricultural technologies to accelerate crop production and motivate them to adopt and implement the promoted technologies.
- Promote sustainable agriculture and empower small-scale farmers through quality seeds and fertilizers, modern farm materials, capacity-building training, and extension services support as engaged in the project.
- Empowering smallholder farmers, especially women, is crucial for achieving sustainable and climate-resilient agriculture. This can be achieved by providing farmers with more access to new and improved seed varieties, identifying beneficiaries, promoting collaboration, enabling continuous seed production, and continuing to share modern cropping knowledge.
- Farmers should be motivated and help to follow the path of market-oriented farming in market development.
- Farmers should be demonstrated how to effectively act in the market and teach them to develop their commercial skills.
- Consequent investments should be made in agro-processing businesses to transform products locally before selling or exporting to the international market. Food-processing

is recognized to contribute to increasing agricultural product availability and agricultural market development.

- New agricultural business and entrepreneurship development should be strongly encouraged and supported financially as well as technical. Especially, consequent investment should be made for food processing sector development.
- Access to financial loans is still at a low stage, which is why it is important to improve access to credit. Many market actors are either unaware of the existence of credit or have limited access due to the terms and conditions involved. By providing farmers with easier access to credit, they can invest in advanced agricultural technologies, increase production, and expand their activities. Additionally, the government should increase agricultural and market subsidies to facilitate market transactions.
- Building and improving rural infrastructure, such as roads, irrigation systems, transport, and storage facilities, can help farmers transport their produce to market and minimize crop waste due to climate shocks and post-harvest losses. Improving access to markets and services in rural areas is a way toward good market development.
- To improve market accessibility, farmers need access to markets with favorable conditions to sell their products and generate profit.
- To add value to agricultural products, governments can help establish linkages with rural, national, regional, and international markets.
- Providing farmers with constant information on market developments and supporting the creation and development of new agricultural businesses as well as the expansion of agro-processing enterprises are also important.
- A gradual improvement in the domestic production capacity especially for women in relation to the promoted crop and commodities and processed products should be fostered.

By addressing these aspects, the initiative contributes to the broader goals of improving agricultural productivity, enhancing rural livelihoods, and fostering regional agricultural sustainability and market development.

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