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THE NATURE OF RICE VALUE CHAIN PROGRAMME IN THE CENTRAL RIVER REGION, THE GAMBIA

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ABSTRACT

This study focused on the nature of the rice value chain programme in the Central River Region of The Gambia. The instruments used for data collection was Focus Group Discussion and in-depth interview. Simple random sampling was used to select sixteen (16) villages out of which three hundred and eighty-four (384) farmers were used for the study. The data collected were transcribed for all the focus group comments; the comments were rearranged to have answers grouped for each interview protocol. The main ideas were organized into themes to generate an idea or ideas and quotations were identified for each theme. The findings were written in a narrative to describe the themes with quotations. Regarding the quantitative analysis, simple descriptive statistics including frequency and percentages were used for the surveyed data collected from the rice farmers and key informants. However, challenges ranging from inadequate machinery, fertilizer, seeds and market structures were some of the problems reported. From these findings it is recommended that Non-Governmental Organizations and investors should supplement government efforts by providing sufficient and quality inputs (seed/fertilizer/machinery) and credit facilities to the rice farmers at a subsidized rate and on time and strengthen the linkages between farmer groups/cooperatives with buyers (Producer-Buyer linkage) for easy market access.

INTRODUCTION

Rice (*Oryza* spp.) belongs to the family of Graminae. It is a cereal grain grown in hot countries providing seeds that are used as food. Rice refers to two grass species (*Oryza sativa* and *Oryza glaberrima*) and is native to tropical and subtropical south-eastern Asia and Africa. The plant measures 2-6 feet tall and has long, flat, pointy leaves and stalk-bearing flowers which produce the grain known as rice. Rice is related to other grass plants such as wheat, oats, and barley which produce grain for food and are known as cereals. Rice is rich in genetic diversity, with thousands of varieties grown throughout the world (IRRI. 2015). Rice is a dietary staple for at least 62.8% of the earth's inhabitant's and accounts for 20% of the caloric intake for the world population.

Global paddy production in 2016 as forecasted by The Food and Agricultural Organization (FAO) reached 751.9 million tons (499.2 million tonnes, milled basis). Based on preliminary prospects for 2017 crops, FAO also forecasts world rice utilization in 2017/18 to expand by an additional 6.2

million tonnes to 506.5 million tonnes. Rice is currently grown in over a hundred countries that produce more than 715 million tons of paddy rice annually; 480 million tons of milled rice (FAO FaoStat, 2013). Fifteen countries account for 90% of the world's rice harvest (Muthayya, Sugimoto, Montgomery, & Maberly, 2014). China and India alone account for about 50% of the rice grown. Together with Indonesia, Bangladesh, Vietnam, Myanmar, Thailand, the Philippines, Japan, Pakistan, Cambodia, the Republic of Korea, Nepal, and Sri Lanka, Asian countries account for 90% of the world's total rice production (Muthayya, Sugimoto, Pervez et al. 2019, Montgomery, & Maberly, 2014).

Total rice consumption worldwide for 2008/09 season amounted to about 437,179 Million Metric Tons (MMT) on average (UNIDO). However, there is an annual increase in global rice consumption of 437,179 in 2008/09 to 475,637 MMT in 2016/17 season. Similarly, FAO reported that world rice utilization in 2016/17 amounted to 500.3 million tonnes (milled basis), up 1.0 per cent year on- year and little changed from December expectations, World rice utilization in 2017/18 to expand by an additional 6.2 million tonnes to 506.5 million tonnes. Consumption of rice as food is again expected to sustain most of this growth, reaching 406.4 million tonnes (FAO, 2017).

Africa produces an average of 14.6 MMT of rough rice per year (1989-1996) on 7.3 million-hectare, equivalent to 2.6 and 4.6 percent of the world's total production and rice areas, respectively. However, Africa consumes about 11.6 million tonnes of milled rice per year Center, A. R. (2008). of which 3.3 million tonnes (33.6 per cent) is imported. About 21 of the 39 rice-producing countries in Africa import between 50 and 99 per cent of their rice to supplement their annual rice requirements. The distribution of rice importation on a regional basis appears skewed with the North and Central Africa regions setting the lower (1.7 per cent) and upper (71.7 per cent) limits. The average consumption of rice in Africa for 2014 to 2016 amounted to 32, 118 MMT (OECD-FAO, 2016).

Statement of the Research Problem

Rice is one of the most important food crops in Africa, where rice and the economic activities are related to its production, processing, distribution, and consumption are widely considered a key for economic development, food security, and poverty reduction. During the past three decades, the crop has seen consistent increases in demand and its growing importance is evident in the strategic food security planning policies of many countries. In the Gambia, rice is the main staple crop for the country and has one of the highest per capital consumption rates of 117 kg in the world. Consumption of rice for 2015/2016 stands at 190 MMT and 215 MMT in 2017/2018 periods. Despite the recent success in raising local rice production through the introduction of 'Nerica' varieties, there remain some doubts about the future of this growth trend as so far all efforts to boost domestic rice production have been unsuccessful and short-lived. Yields in rice farming remain low, at the level of coarse grains, despite the introduction of 'Nerica' and production increases have been based on increased area farmed. Price competitiveness of local rice versus imported rice remains a major question concerning the future of local rice marketing in The Gambia. While at small-scale local rice marketed by individual farmers seems to be able to compete with imported rice on rural markets, it is less clear whether the processing and marketing of local rice at a larger scale i.e. grouped sales by a farmers' association would be competitive. The question is What is the nature of Rice Value Chain programme in The Gambia? The objective of this study is to examine the nature of Rice Value Chain programme in The Gambia. The assumption is that a well-designed rice value chain programme can help in increasing rice production in The Gambia.

Significance of the Study

Value addition to most food products like rice is not limited to processing only, but also by storing (value increasing over time) and transporting it (amount increasing over space). The main reason for a Value Chain is to efficiently capture value in end markets to generate higher profits and create mutually acceptable outcomes for all parties involved in the chain process from production to consumption and disposal. However, there exists little information on the effects of Rice Value Programmes on rice production in the Gambia; this leads to assumptions that an increase in yields also leads to an increase in income and improvement of the farmers' livelihood. The research will be relevant to the rice value chain projects by highlighting the problems the rice farmers and other value chain actors' encounter in implementing the programme, and this will help them to design and implement impact-oriented programmes that can tackle the findings of the study and thus increase rice production. The conclusions of the survey will also enable government and its donor partners to invest on issues that are impeding the increase on rice production and other stakeholders like the National Research Institute (NARI), and National Seeds Secretariat will also be able to focus their efforts of providing seed varieties that are of consumer preference. The study explored the nature of the rice value chain programme and the effects of the value chain on production. The study covers from 2014 to 2018 (the period covered is from the beginning of the recent rice value chain programme) and includes the Central River Region of the Gambia.

Introduction and Literature Review

Significance of the Study

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Introduction and Literature Review

The Nature of Rice Value Chain Programme

The nature of the value chain will examine the roles and relationships among rice value chain actors. The rice value chain actors include government officials, researchers, investors, input suppliers, processors, agricultural extension agents, rice farmers and rice traders.

The Roles of the Rice Value Chain Actors

Government (Thailand, Cambodia and Nigeria)

Rice production has enjoyed unprecedented public sector support or subsidy through the Paddy Pledging Programme in Thailand. Currently, two crucial policies are being implemented by the government to further develop the rice industry: The Farm Income Guarantee Programme and the Rice Standard Control System. Under the Price Insurance Programme, the government provided farmers a guaranteed price for selected agricultural products (i.e., rice, maize, and cassava) for the crop year 2009–2010. The prices were set at 1.70 baht/kg (\$56.67/ton), (Titapiwatanakun, B., 2012).

The Value Chain Development Programme is a six-year development initiative of the Federal Government of Nigeria and International Fund for Agricultural Development programme that is improving cassava and rice value chains for small farmers in six states of Anambra, Benue, Ebony, Niger, Ogun and Taraba, while addressing the constraints along the value chain. Agricultural transformation through commodity value chain approach with an emphasis on enhancing productivity and access to markets for rice and cassava smallholder farmers via Value Chain Development Programme is embedded in Nigeria government's plan. This is achieved through an inclusive strategy of strengthening the capabilities of actors along the chain (including producers and processors as well as public and private institutions, service providers, policymakers and regulators).

The value chain approach adopted by the Federal Government of Nigeria is therefore aimed at concentrating commodity production activities around existing rice mills by organizing farmers in groups (Farmers Organizations/cooperatives) to readily access inputs such as improved seeds, agrochemicals, fertilizers and innovative methods of production from extension services. Intense efforts are been made to achieve self-sufficiency in rice production in Nigeria in which several bilateral, multilateral agencies as well as local entrepreneurs are currently supporting rice production and processing in Nigeria.

Researchers (Thailand, Cambodia and Nigeria)

From the outset, rice breeding and genetics were seen as essential research issues to begin the development of short, stiff-strawed, non-lodging, fertilizer-responsive, and pest- and disease-resistant cultivars (Chandler, 1992). Rice researches in Thailand are dominated by government agencies under the Ministry of Agriculture and Cooperatives (MOAC), mainly funded from the annual government budget. The Rice Research Institute of the Department of Agriculture is the major government institution directly involved in rice research, primarily in increasing productivity through continuous development and deployment of high-quality varieties with varying maturity periods to suit different production conditions, acid-tolerant rice varieties, and varieties with added attributes such as disease and pest tolerance, designed to improve rice yields. The institute also has the mandate for research and extension activities for better crop protection and water and soil management technologies that can help improve yields.

In a developing country like Cambodia, the Cambodian Agricultural Research and Development Institute is the country's main research institute, its mission is to increase agricultural crop productivity. From the year 1990 to 2016, CARDI had released 38 rice varieties which have high yielding and good quality for farmers' use. All of these varieties had been purified through annually rice seed production. 10 of 38 high yielding varieties were encouraged for farmers used in the purposes of food security and rice for exportation.

Similarly, in Nigeria, the National Cereals Research Institute (NCRI) is the oldest Research Institute in the Country. It was originally founded by the Lagos Colonial Protectorate Administration of

Governor Alfred Maloney in 1898. It was given the mandate to conduct research into the genetic improvement and production of the major staple grains like rice, maize, cowpea and sugarcane. NCRI has so far released 57 improved rice varieties which most farmers are using in Nigeria. This has enabled the farmers to increase their yields and income (Phillip et al.,(2016).

Investors (Thailand, Cambodia and Nigeria)

In an effort to further implement the rice research agenda of the country, the Royal Thai Government through the Rice Department recently approved an annual donation of THB 3,600,000 (the equivalent of USD 100,000) starting the fiscal year 2014-2015 to the International Rice Research Institute (IRRI).

According to Thailand's agricultural research, the largest share of the government budget was for crop research with relatively small budgets for livestock, forestry and fisheries (Fan, Omilola, & Lambert, 2009). Of these crop researches, the rice research received the highest priority. These budgets funded research activities, lead to technological development in rice production. Like most developing countries, investing in rice production is solely executed by the government.

However, In Nigeria, certain companies and individuals have helped to boost rice production. For example, Olam is one of the multinational companies involved in the production of rice in Nigeria. With a farm situated in Rukubi village in Doma Local Government of Nasarawa State, it is currently cultivating 4,000 hectares of rice. The total hectare according to the farm officials is 10,000.

Machinery Providers (Thailand, Cambodia and Nigeria)

Traditionally, Thai farmers used simple tools, animal-drawn implements and water wheels. Mechanization with power technology began in 1891 when the government imported steam power tractor and rotary hoes that were found to be unsuitable for paddy conditions and also quite expensive. Local firms around Bangkok started to fabricate a Thai-made rice combine harvester Thepent, V., & Chamsing, A. (2009). It was accepted for use by farmers and popularly used in hiring services, especially in the Central plain and then its use spread in other regions of the country (Krishnasreni and Kiattiwat, 1998).

Machinery providers in Thailand serve as hiring services to farmers who can afford Planting machinery, Rice threshers, tractors and walking ploughs. An emerging market for farm machines services helped farmers to reduce the hired labour cost as a result of the high wage rate. The services are available throughout the country at very reasonable cost and relatively cheaper to use hired labour. Similarly, Thai government provides small dryers (30tons/day) to cooperatives and farmers' group in the rice-producing and processing areas and also provided soft loans to the millers and paddy central markets for dryer installation.

Shifting from manual agriculture into agricultural mechanization in Cambodia is just recently developing and progressing. In the past decades, up to 80% of Cambodia farmers had used animal (cattle and buffalo) as draft power and manual practices for their agricultural cultivation and the country was unable to feed itself. From the year 2000 up to 2010, the using of mechanization of rice production is increasing from 16% - 63% of the total rice cultivation area (Liese et al., 2014). Individual owners use their tractors for approximately 10% of the time on their own farms and contract the remainder of the usage at \$10-20 ha⁻¹ depending on the locality (Bakker, Bell, & Rickman, 2002).

Fertilizer Providers (Thailand, Cambodia and Nigeria)

Fertilizer manufactured by Thailand is Thailand Central Chemical Public Company (TCCC) is sold domestically in Thailand through approximately 400 dealers, thereby contributing to the growth of

Thailand's economy by increasing agricultural yield and restoring fertilizer production. TCCC was first established in 1973, production was at 100 thousand tons, a number which has risen to an annual production of 1.2 million tons today. The government also supports rice production through its a crop insurance programme, through which subsidized fertilizers are available. However, farmers are required to register with BAAC to enable them to join the programme. Farmers can either buy fertilizers on a cash basis or borrow from BAAC at 7% annual interest.

Contrarily, farmers in Cambodia traditionally apply farmyard manure and some cut-and-carry green manures such as *Chromolaena odorata* to maintain fertility levels in their fields. Farmyard manure supplies are, however, limited and nurseries receive most of the applied material. Incorporation of the introduced legumes including *Sesbania rostrata* has been shown to increase rice yields in the main rice fields. Soeun and Nesbitt (1993), demonstrated an average yield increase of 40% in on-farm trials using this technology.

According to the Federal Ministry of Agriculture and Rural Development of Nigeria Survey, nitrogen deficiency is severe in more than 80% of the land in Nigeria (nitrogen content below 0.1%), more than 75% of the land is in serious phosphorus deficiency (phosphorus content below 10mg / kg), more than 60% of the land is in moderate or severe potassium deficiency (potassium content below 25 mg / kg). Due to high prices, the annual application amount of fertilizer is only 1 million tons (of total various fertilizer), only an average of more than 30 kilograms per hectare, which is well below China's farmland fertilizer usage.

Seed Suppliers (Thailand, Cambodia and Nigeria)

Most certified seed produced by Rice Seed Centres is sold to farmers and private enterprises, especially small local businesses at low prices. Due to the limited quality of seeds produced by the Rice Seed Sector, small local enterprises which can be single large farmers or a collection of small farmers that are contracted by an enterprise and whose production is aggregated. These small enterprises source seeds either from the Rice Seed Centre or, what are more likely, through provision by the contractor (Makasiri, 2011).

The importance of good seed in crop production is generally acknowledged. However, farmers in Cambodia usually keep their own seed for next season's planting. The quality of farmers' seeds is generally lower than the standard. In order to improve rice yield and grain quality by utilization of standard seed in rice production, seed production and Seed Exchange Programme was implemented. Instead of buying rice seed from seed agencies at a high cost, farmers can bring their own seed in exchange for good seed at the same price (Kupkanchanakul, 1998). Similarly, Lando and Mak (1994a) stated that many traditional varieties being cultivated in Cambodia give low yields.

The government of Nigeria supports the formal seed sector through the National Agricultural Seed Council which provides seed producers with foundation seed and quality control. The federal and state ministries of agriculture often buy seed from companies to give or sell at subsidized prices to farmers (Bentley, Ajayi, & Adelugba, 2011). There are 13 companies registered to produce certified seed in Nigeria. There are about nine out-growers, whose main role is to produce foundation seed for the National Agricultural Seed Council. Farmers' associations also produce about 12–20% of the certified seed used in Nigeria.

Rice Producers (Thailand, Cambodia and Nigeria)

Rice production in Thailand represents a significant portion of the Thai economy and labour force ("Country Profile: Thailand" 2007) 40% of Thais work in agriculture, 16 million of them as rice farmers by one estimate (Smith, 2016).

Until the 1960s, rice planting in Thailand consisted mainly of peasants farming small areas and producing modest amounts of rice (Phongpaichit & Baker, 2005). They are tasked with the production of rice for home consumption, feed the increasing population and to improve their livelihoods.

Rice farmers in Cambodia are predominantly subsistence producers. Majority of the rice farmers do not produce a paddy rice surplus and are thus likely to suffer from food insecurity. A national survey of the Cambodia Development Resource Institute revealed that only 35% of Cambodian farm households produce a paddy rice surplus and the rest produce less than enough for consumption needs or just a sufficient amount. A study of 1,070 households in 15 typical villages across Cambodia, (Chan and Ngo 2010), suggested that 61% of surveyed households in rural villages encountered food insecurity in August–October 2009. Similarly, the role of the rice farmers is to produce paddy for consumption both domestically and for export if there is surplus.

In Nigeria, rice farming roles are allocated along gender lines, but in some areas, men and women work together. Women are typically responsible for the transplanting of seedlings to the fields and threshing, while it is often the men who hoe. Most farmers produce one rice crop each year, but some have made irrigation channels which allow them to reap two or even three harvests in the year. This allows them to plant seedlings when there is less danger from disease or pests.

Credit Institutions (Thailand, Cambodia and Nigeria)

The credit institutions are responsible for providing farm credit, in Thailand. Previously farm credit was provided by informal lenders, particularly merchants in villages, charging a very high-interest rate. Thus, establishing the Bank for Agriculture and Agricultural Cooperatives (BAAC) in 1966 by government was a crucial change for farm credit market.

In addition to BAAC, there are 15 commercial banks that provide financial services in rural areas of Thailand. Most of these commercial banks concentrate on deposit services, with some providing loans to large-scale commercial farmers cultivating cash crops for export, who are able to adequately collateralize their loans. These banks also provide a variety of other services to their clientele, e.g., letters of credit, foreign exchange transactions, etc., which do not yet form part of BAAC's product line (Fitchett & Eschborn, 1999).

Cambodia's first large-scale rice bank offering both financial and storage services launched and tasked with the role of keeping a crucial supply of paddy available for local millers and exporters (Sothear, 2014). Similarly, the Rural Development Bank of Cambodia (RDB) was created by the Royal Government of Cambodia in 1998. The RDB is a public and autonomous enterprise, authorized to operate as a specialized bank. The RDB is a key mechanism to support and strengthen microfinance and rural credit services, promote small and medium enterprises. RDB is a state-own bank. Started in 2002, the RDB has provided both short term loan to farmers (2,300 families) for production, as well as medium-term loan for establishing a dryer facility. The loan amount has increased since from US\$ 20,000 to US\$ 1.5 million (Sothear, 2014). Similarly, Nigeria Incentive-Based Risk Sharing System for Agricultural Lending (NIRSAL) an initiative of the Central Bank of Nigeria (CBN), the Bankers Committee (BC) and the Federal Ministry of Agriculture & Rural Development (FMA & RD) provides guarantee in form of Credit Risk Guarantee (CRG) as a comfort for the banks to lend and also incentivize farmers through provision of Interest Drawback Programme (IDP) to be paid quarterly based on the agricultural project.

Processors (Thailand, Cambodia and Nigeria)

The rice mills have become an important intermediate in rice production and marketing units. They involve the paddy buying, processing, packaging, storage, milled rice selling and distribution to the

market (Titapiwatanakun, 2012). Following Makasiri et al. (2011), the rice mill has become the place of integrated services of rice trading. At present, rice mill businesses are highly competitive businesses in rice marketing systems. Moreover, rice millers have also played a powerful role in the speciality rice market (Seemanon et al., 2015). They will contract farmers before planting, through which rice millers may provide the technical assistance, agricultural inputs on credit such as seed, fertilizers, and an assured market for their farmers.

There are two types of rice mills in Cambodia: custom mills and commercial mills. Custom mills, also known as a village or home-based mills are small operations that mill primarily for farmers' own consumption. Commercial mills produce rice primarily for the domestic and export market. Two types of mills are used at the village level: a combined steel huller and polisher system that removes the husk and polishes the rice in a single operation; and a dual system that uses a rubber roller to remove the husk and steel polishers to remove the bran and polish the rice (ADI, March 2015).

In Nigeria, the processing of rice generally takes place away from the farm. Many farmers are able to sell their rice before it is harvested as Igbo traders come to the farms to negotiate prices. The rice processors collect the paddy rice and parboiled to soften the husk before it is milled and marketed. The parboiling is carried out in huge oil drums. Much of the milling is done by co-operatives, the largest of which is in Lafia, in Nassarawa State, where there are around 700 mills; rice milled here is transported to all parts of the country by truck. The millers, though, have noted a downturn in the trade since the restrictions on rice importation were lifted.

Consumers (Thailand, Cambodia and Nigeria)

About 40% of Thailand's overall rice supply is consumed domestically (FAO, 2014). The annual per capita consumption ranges from 80 kg for city households to around 115 kg for rural households and up to 125 kg for low-income households (USDA, 2014). Despite the move towards more meat and horticultural products and a growing wheat consumption (Pingali, 2007); (USDA, 2014) stated that rice is rooted deeply in Thailand's diet and culture and seen as an energy source of high nutritional value.

Many factors have a strong impact on food consumption such as taste, price, convenience and nutrition. Their consumption of higher-value food products has risen in recent years due to more incomes. While changes in income have affected consumption patterns of consumers, changing their behaviour, lifestyle, and attitude toward food preferences are also an essential driver for their food consumption (Jones & Sheats, 2015).

According to Cambodia Socioeconomic Surveys 2004 data, rice consumption in Cambodia accounts for almost two-thirds of the calorie intake, followed by fish (8% average). Cambodians are particular about the colour of the rice they buy. One worry is that Cambodians will pick out grains because it does not resemble traditional rice in colour and feel. In addition, although some Cambodians know that brown rice is healthier, they do not choose to consume it because of its flavor and hard texture.

Rice qualities preference by Nigerian consumers as presented by (Adeyeye, Navesero, Ariyo, & Adeyeye, 2010), stated that Nigerians prefer rice under the following categories; under processing, parboiled rice is most preferred, followed by white polished rice, while fresh from farm gate is the least preferred rice. Under the shape of rice, long and slender rice is most preferred, followed by medium-sized and short and fat rice.

METHODOLOGY

The methodology covered in this study are: research design, the study area, population of the study, sample size determination, sample size and sampling technique, methods of data collection and

techniques of data analysis.

Research Design

A cross-sectional study design was adopted for the study. The cross-sectional study design was used to enable data collection which can be used to investigate the relationship between the Rice Value Chain Programme and rice farmers' production. The cross-sectional study design is considered relevant to the study as it enabled the study to elicit information from many people through a sample after which findings will be generalized to the entire population.

Study Area

The study was conducted in Central River Region North/South (CRR N/S) of The Gambia. Central River Region was the largest of the five administrative divisions of the Gambia until it was divided into Central River Region/ North and South to form six administrative regions (Gazetteer, 2008). The area of study is located on both sides of the Gambia River with 13034'N 14047'W as coordinates, it comprises eleven (11) districts: five (5) districts in the north with its headquarters in Kuntaur; Lower Saloum, Niani, Nianija, Sami and Upper Saloum and six (6) districts in the South with its headquarters in Janjanbureh; the six districts are Janjanbureh, Lower Fuladu West, Upper Fuladu West, Niamina East, Niamina West, Niamina Dankunku. The region has a total land area of 2,894.25 and a total population of 226, 018 at a population density of 156.5 and 20, 559 households (Statistical Abstract, 2017) of which about 80% are agrarian.

The rainy season in the Gambia lasts 5 to 6 months, with 98% of the rainfall occurring between June and October. August is the rainiest month in the year when as much as 37% of the annual rainfall occurs. The average annual rainfall has considerable spatial and temporal variation. Higher rainfall is received in the south-west part of the country with an estimated 1200 mm annually. The lowest annual rainfall is received in the north-northeast part of the country. An average number of rainy days range from 54 days in Banjul, the capital city, to 31 days in Basse Santo Su (Njie, 2007).

Central River Region, the area of study is largely dominated by the Fula, Mandinka and Wolof tribes. Of the entire farming population, only 48.7% are Male. Women are predominantly engaged in farming with a population percentage of 51.9%

<https://www.gbos.gov.gm> > 2013)

The population of the Study

The target population in the study is stakeholders in Rice Value Chain and the rice farmers. The total population for the study is 9,341. This includes nine thousand two hundred and seventeen (9,217) registered rice farmers, two (2) extension agents one for each of the Local Government Area, and two (2) agricultural officials, two value chain project staff, two (2) research institute officials, two (2) investors and eight (8) input dealers, four (4) processors, four (4) rice traders and 100 (100) rice consumers both males and females from Central River Region N/South of the Gambia.

Sampling Technique

Central River Region is divided into eleven (11) districts. Under Kuntaur Local Government Area there are five (5) districts namely: Lower Saloum, Upper Saloum, Niani, Nianija and Sami districts and in Janjanbureh Local Government Area there are six (6) districts; Niamina Dankunku, Niamina West, Niamina East, Lower Fuladu West, Upper Fuladu West and Janjanbureh. The study selected two (2) of the districts from Kuntaur Local Government Area and three (3) from Janjanbureh Local Government Area using purposive sampling technique. The choice of the districts was due to the high production of rice and the intervention of Rice Value Chain Programme in the area. The selected

districts were Niani and Sami of Kuntaur LGA, Niamina East, Niamina Dankunku and Lower Fuladu West of Janjanbureh LGA. The five (5) districts are all made up of villages; three (3) villages were selected in each of the districts using simple random sampling. The names of the villages in each of the districts were placed in a hat and a lucky dip was done, the names of the villages drawn from the hat were used for the study. This brought the total number of villages selected for the study to be fifteen (15).

Table 3.3 selected Districts and Villages for the study

	Local Government Area	Districts	Total number of villages in the study area	Selected districts for the study	Selected villages for the study
	Kuntaur	Niani	87	Niani	Wassu Barajally Suba Kuntaur Fula Kunda
		Sami	71	Sami	Jarumeh Koto Manna Koli Kunda
		Nianija	35		
		Upper Saloum	86		
		Lower Saloum	62		
	Janjanbureh	Niamina Dankunku	27	Niamina Dankunku	Barrow Kunda Dankunku Jakoto
		Niamina West	34		
		Niamina East	52	Niamina East	Kununku Kudang Touba Demba Sama
		Lower Fuladu West	76	Lower West Fuladu	Jahaly Pachari Madina Umfally
		Upper Fuladu west Janjanbureh	130 1		
Total	2	11	661	5	15

Sample Size Determination Formula

For the selection of respondents, the sample size of farmers was determined by using (Yamane, 1967) formula for calculation of sample size using the number of registered rice farmers in CRR as provided by the Registry of the Agribusiness Service as 9,217. Thus:

$$n = \frac{N}{1 + N(e^2)}$$

Where;

n = sample size of the study

N= population of the farmers in the study area

$$\begin{aligned}
 e = \text{Margin of error} &= 0.05 \\
 \text{Therefore sample size} &= 9217/1 + 9217(0.05)^2 \\
 \text{Therefore sample size} &= 9217/1 + 23.04 \\
 &= 383.64 \\
 &= \mathbf{384}
 \end{aligned}$$

The equation shows that 384 rice farmers will be used for the study. In order to determine the farmer respondents per village, the proportional sampling technique was used. The number of respondents per village was determined as:

p/qxr

Where:

p = half of the calculated sample size (192)

q = the calculated sample size (384)

r = total number of members of the registered rice farmers to be surveyed

Table 3.1 Number of respondents from each village

No	Name of village	Population of registered farmers	Calculation of the number of respondents per village	Number of respondents
	Barajally Suba	48	$p = (192/384 \times 48)$	24
	Kuntaur Fula Kunda	100	$p = (192/384 \times 100)$	50
	Wassu	110	$p = (192/384 \times 110)$	55
	Jarumeh koto	82	$p = (192/384 \times 82)$	41
	Manna	30	$p = (192/384 \times 30)$	15
	Koli Kunda	14	$p = (192/384 \times 14)$	7
	Kununku	10	$p = (192/384 \times 10)$	5
	Touba Demba Sama	12	$p = (192/384 \times 12)$	6
	Kudang	40	$p = (192/384 \times 40)$	20
	Madina Umfally	90	$p = (192/384 \times 90)$	45
	Pachari	92	$p = (192/384 \times 92)$	46
	Jahally	80	$p = (192/384 \times 80)$	40
	Barrow Kunda	10	$p = (192/384 \times 10)$	5
	Dankunku	40	$p = (192/384 \times 40)$	20
	Jakoto	10	$p = (192/384 \times 10)$	5
Total	15	384		384

Source: Field Survey, 2018

Sampling Procedure

The number of farmer respondents from each village is shown as in table 3.1 above. These respondents were selected using purposive sampling. The sample for a focus group will have individuals with general characteristics of the overall population and can contribute to helping the research gain a greater understanding of the effects of rice value chain programme on rice farmers' production. Using the number of respondents generate from the sample size calculation formula per village, the number of focus groups were determined as shown in table 3.1. A total number of forty-two (42) Focus Group Discussions were held which took 6 weeks to accomplish. The number of

respondents for each FDG was between 5-10 respondents per group. The groups were formed according to age brackets; 18-35 and 37 and above, this grouping was done where there are more than one FDG. In villages where one FDG was conducted, the groups consisted of all age brackets. Purposive Sampling Procedure was used in selecting one (1) extension agent (focal point) for Local Government Area. This brought the total to two (2) agricultural extension agents. Two (2) government officials were selected; from the Ministry and Department of Agriculture, Two (2) Rice Value Chain Project officials, two (2) researchers were selected from the research institutes; two (2) main investors were selected and eight (8) input dealers; machinery/equipment, seed suppliers, pesticides and herbicides suppliers, fertilizer suppliers (2 from each LGA), four (4) processors two (2) from each of the LGA, four (4) rice traders [two (2) from each of the LGA] and a hundred (100) rice consumers across the country. The total sample size for the survey is 511 rice farmers and key informants.

Table 3.2 Sample Size of the Study

S/No.	Main and supportive Value chain actors	Data collection tool	Sample size
	Rice farmers	FGD (42 sessions)	384
	Agricultural Government officials	Key informant interview	2
	Rice Value Chain Project officials	Key informant interview	2
	Agricultural extension agents	Key informant interview	2
	Research institute officials	Key informant interview	2
	Investors	Key Informant interview	2
	Input dealers	Key informant interview	8
	Processors	Key informant interview	4
	Rice traders	Key informant interview	4
	Rice consumers	Key informant interview	100
TOTAL			510

Method of Data Collection

The data for the study was collected through primary and secondary sources which included the use of Focus Group Discussion (FGD) for farmers and key informant interview for government officials, researchers, Rice Value Chain project officials, investors, input suppliers, processors, rice traders and agricultural extension agents.

Focus Group Discussion (FDG)

Focus group interviews with rice farmers at district level were held to collect primary information. Checklists for discussion was developed and used to facilitate the focus-grouped interview. The number of respondents for each FGD was between 6-10 per group, this is based on the number of respondents calculated per village, as the lowest village has five (5) discussants and the highest is seventy-one (71), thus the smallest group consisted of five (5) discussants and the highest ten (10) for easier coordination and control of the FGD. In a village where there is more than one group, then the groups were composed based on gender and age brackets (the discussants were grouped within 18-35 in one group and 36 and above in another group, this was done to allow the younger participants (to contribute more freely) to provide variety of responses. The total number of FGD's held was 42 which took 6 weeks to complete.

Key informant Interview

Key informants (knowledgeable observers of the sub-sector) were also identified and interviewed in order to obtain their views, opinions and suggestions about constraints and opportunities. The key

informants interviewed include Government Officials, Agricultural Extension Agents, researchers, investors, input suppliers processors, rice traders and rice consumers.

Techniques of Data Analysis

The data collected was transcribed for all the focus group comments, the comments were rearranged to have answers grouped together for each interview protocol. The main ideas were organized into themes to generate an idea or ideas and quotations were identified for each theme. The findings were written in a narrative to describe the themes with quotations. Regarding the quantitative analysis, simple descriptive statistics including frequency and percentages were used for the surveyed data collected from the rice farmers and key informants. Statistical Package for Social Science (SPSS) version 20.0) was also employed to analyze the data from the socio-demographic characteristics of respondents and on the inputs received from the rice value chain programme and yield from the rice fields. The data analyzed were also tabulated to highlight the frequency and percentage.

RESULTS AND DISCUSSION

Nature of Rice Value Chain Programme in the Gambia

This section focused on the roles and relationship that exist between rice value chain actors; government, researchers, investors, input suppliers, processors, rice traders and consumers.

Government

The study discovered that the rice sector had enjoyed numerous supports from the government through its numerous policies, strategies and projects in The Gambia. Currently two main policies being implemented are the National Development Plan (2018-2021) which aims to “End hunger, achieve food security and improve nutrition, and promote sustainable agriculture” by 2030 and the Agriculture and Natural Resources (ANR) policy (2017-2026) which base its main principles on decentralization, privatization, divestiture and people’s empowerment. The ANR policy and objectives also aim to achieve an increase in rice production which will improve food security and self-sufficiency, as highlighted by a key informant during the in-depth interview sessions. Thus:

Increasing rice production and productivity in the irrigated lowland, the Nerica-based uplands and swampland ecosystems require the expansion of production..... This can be achieved through rehabilitation of abandoned areas, land development and irrigation infrastructure development, while intensification of production will additionally be aided by the construction of access roads and the cultivation of short-duration rice varieties in the latter. (Monitoring and Evaluation Officer Central Project Coordination Unit/Banjul/18th July 2018)

The implication of the report above is that increasing rice production in the region is still a farfetched achievement as there is lack of necessary infrastructure (technology development and transfer, market infrastructure to enhance market access and reduced transportation costs) to support increasing production.

The findings also indicated that the commitment of the government in increasing rice production is reflected in a series of policy implementation actions in the National Rice Development Strategy (NRDS) such as the five main focal areas [(i) improvement of agricultural land and water management (ii) improved management of other shared resources (iii) development of agricultural chains and market promotion (iv) national food and nutrition security and (v) sustainable farm development of the Gambia National Agricultural Investment Programme (GNAIP); and the commissioning of the West African Agricultural Productivity Programme (WAAPP), National Agricultural Land and Water Management Development Project (NeMa), Food and Agriculture

Systems Development Project (FASDEP) and Gambia Commercial Agriculture and Value Chain Management Project (GCAVMP). The government action in the rice value chain programme is visible in the operations of the rice value chain projects (National Rice Value Chain Strategies, 2014).

NeMa Project operates on two main components under the RVC Programme; Watershed development and Agricultural commercialization. In terms of Watershed development, the project interventions include; rehabilitation of the uplands rice fields, lowlands and the swamps that are geared towards improving the productivity of agricultural land through soil and water conservation. These activities support the Government in tackling difficulties and risks encountered by small-scale farmers during production, through land management and environmentally sustainable irrigation techniques. This aim of the watershed development component of the project was summed up as thus:

The aim of Watershed development is to improve the productivity of scarce agricultural lands to enable poor producers to earn more money from their surplus outputs after meeting household food security (Monitoring and Evaluation Officer NeMa Project/Abuko/19th July, 2018)

Similarly, a key informant also stated that:

The NeMa project empowers communities to undertake integrated water management activities with the objective of enhancing their agricultural production and productivity, participating communities would decide on their priorities for local project investments in agricultural land and water resources within a defined watershed. Typically, the area would include lands in both the flood plain and the purely rainfed lowland and upland areas, as well as human settlements (Assistant Monitoring and Evaluation Officer, NeMa Project/19th July, 2018).

The findings from the study above showed that the government through the projects provides support to the farmers through interventions such as; Construction of contour bunds, bridges, dikes and spillways to control surface water in the rainy season (uplands and lowlands). The project constructed simple but effective surface water control structures of two types, (contour bunds in the uplands, and dikes and spillways in the lowlands), as appropriate to the particular conditions in the target watershed. The lowland soil and water improvement package includes tractor ploughing services to assist water penetration and the application of lime on acid soils for about 3,100 ha. Most of the tractor ploughing services is supplied by existing youth enterprises established with the support of the second component; agricultural commercialization. The works done by the project (construction of bridges, desilting of canals, rehabilitation of tidal irrigation schemes and construction of access roads) are undertaken by contractors (e.g. Green Impact) in close consultation with the National Environment Agency (NEA) from design through implementation to monitoring.

The Agricultural commercialization component of NeMa Project is aimed at increasing the profitable trade in rice and vegetables produced by small-scale farmers by broadening and deepening local and national markets in terms of volume, quality and value addition. The focus is on building up agricultural business capacity to meet the increasing real demand for rice and vegetables by consumers within The Gambia. This was highlighted thus:

The project works with producer organizations to capitalize on Nema's major public infrastructure investments in agricultural water control, irrigation of vegetable gardens, physical access and market structures by promoting both on-farm productivity and enterprise profitability. Interventions address key challenges and priority needs identified by women producers in the rice businesses, in particular;

production efficiency, post-harvest handling, processing and marketing, an example of this component is the provision of improved rice seed with appropriate fertilizer and pesticides to farmers for the first season following Nema infrastructure installations (Monitoring and Evaluation Officer NeMa Project/Abuko/19th July, 2018)

The Ministry of Agriculture (MoA) is the Executing Agency (EA) with Central Project Coordination Unit (CPCU) tasked with overall coordination in line with arrangements for similar projects. IFAD supervises the project directly, with each supervision mission comprising the CPM and consultants according to required expertise that is identified with the project staff. The management of the implementation of the project is vested in a simple, lean and streamlined Project Support Unit (PSU), to be embedded in existing PIWAMP management structure which is responsible for the day-to-day supervision of component activities.

Similarly, FASDEP conducts land management practices which are geared towards improving an estimated 5,000 ha to support the efficient production of staples food crops of which rice is inclusive. The project is also developing 200ha of intensive rice irrigation schemes and the provision of access infrastructure for 500ha of difficult but fertile tidal flood plains and construction of water retention facilities to support the development of 900ha of arable land, the project also supports the development and management of 3,000ha existing developed tidal areas to ensure double cropping for enhanced production and productivity. The government through the project is expanding market access through improved infrastructure by upgrading of existing feeder roads and market infrastructure and by linking producers to markets, this is done by organizing the business for a between micro-enterprises and agribusinesses and conducting regional promotional activities (trade fairs, field and market days). All these activities by the project are geared towards improving the farmers' production capacity.

The West Africa Agricultural Productivity Programme (WAAPP-IC) on the other hand was conceptualized, formulated and operationalised in the Economic Community of West African States (ECOWAS) to address the challenges of low production and substantial post-harvest losses in the agricultural sector. Its Project Development Objective (PDO) is to generate, disseminate and accelerate the adoption of proven technologies in research priority areas aligned with the sub-regions' top agricultural commodity priorities highlighted in ECOWAS Regional Agricultural Policy (ECOWAP). The beneficiaries of the project are agricultural producers and other value chain actors including processors and marketers.

The project supports the Gambian government to finalize and adopt regulations on seeds, fertilizers and pesticides and harmonize them with the ECOWAS regulations on the said items resulting in the increased availability and accessibility of such items to the farming population; coupled with the increased production and productivity of the prioritized research commodities to enhance food, nutrition and income security of beneficiary producers; the effective use of System of Rice Intensification (SRI) and Innovation Platforms (IPs) has not only enhanced the effective economic production of rice for farmers but it has also laid down solid foundation for establishment of autonomous and economically viable primary cooperatives at village level transformed into national apex bodies.

Table 4.2 highlighted the land area developed by projects which have enabled farmers to have access to more farmlands and thus increasing their production output. The government also provides through the Department of Agriculture (DoA) ploughing service to the farmers, through the Regional

Agricultural Directorates (RADs), also provides fertilizer to farmers at a subsidized rate and seeds which are paid back at the end of each rice season. At the regional levels, farmer field schools are created to train contact farmers through project interventions; GCaV Project has trained Water Users Associations (WUAs) on the management and maintenance of tidal irrigation schemes and use of System of Rice Intensification (SRI) to boost production in the study area.

Table 4.2 Land Development by Projects for Rice Production

Activity	NeMa	FASDEP	GCAV	MDG1c	Total
Identify and develop new rice production areas for Tidal Irrigation (Ha)	1,500	200	0	0	1,700
Rehabilitate existing tidal irrigated land (Ha)	500	3,000	2,500	200	6,200
The land opened up by improving access due to the construction of bridges and causeways	12,400	1,400	0	300	14,100
Total	14,400	4,600	2,500	500	22,000

Source: Vision 2016 Project Document

Researchers

Research on rice in the Gambia is mainly conducted by the National Agricultural Research Institute (NARI). The institute is responsible for rice development and seed multiplication, production of the breeder and foundation seeds in the Gambia and collaborates mainly with Africa Rice and International Institute of tropical agriculture (IITA).

NARI conducts screening of improved varieties for IITA, WARDA, AfricaRice and IRRI, these series include Nerica varieties [Nerica 1-8], WAB 56-50, P 163, WAB 105, ITA 212, Sahel 134, WAR 1 (see Appendices 2 for complete list of rice varieties) both in the upland, lowlands, mangroves and rainfed varieties that are tolerant to salinity, iron toxicity, photoperiod, cold, pest and diseases such as rice blast and drought resistant, pleasant aroma and early maturity varieties. The screening was done in collaboration with IITA to determine the suitability of the rice varieties for the climatic conditions of the Gambia. The study also discovered that the screening of each rice variety takes three years in the research stations; Yundum and Sapu, after which the varieties with desirable characteristics are considered for multiplication. The selected rice varieties after screening are sent to the Seeds Secretariat for multiplication on a large scale and the multiplied seeds are then passed down to the Seed Growers Association; mainly farmers specialized in growing seeds, the seeds produced by the Seed Growers Association are inspected and certified by the Seeds Secretariat and only then can they sell to farmers. Rice Value Chain Projects under the Rice Value Chain Programme also buy from the Seed Growers Association and give them to farmers for planting and the farmers pay back at the end of the season. The above view is in line with what was stated during the in-depth interview:

A lot of work has been done with Africa Rice and IITA on screening of rice varieties, they provide planting materials of breeder rice varieties among the west African member states to see if these can do well in the respective countries because some varieties can do well in some countries and fail in

others (Director of Crop Research NARI/ Brikama/4th July, 2018). Similarly, another key informant stated thus:

NARI in collaboration with the National Seeds Secretariat conducted on-field trials on different rice varieties provided by IITA and Africa Rice to test their performance under what is called foundation seeds performance. It is after the performance test that rice varieties with desirable characteristics are given to farmers associations or contact farmers for multiplication (Researcher Sapu NARI Station/Sapu/ June, 2018).

The study also highlighted the role of farmers in collaboration with the research institute in selecting, screen and multiplication of foundation seeds. Farmers were exposed to the new rice varieties through the use of participatory varietal selection and community based seeded systems. It is from this selection of rice varieties that farmers benefit from shorter growth duration and tolerance to drought or salinity while giving them high yield.

A lot of on-farm activities have been done in most of the regions, where farmers were involved in the initial stages to identify good varieties based on desired characteristics. Salt tolerant variety seeds received from Africa rice have been disseminated by NARI to Illiyasa, Kuntaur and Kaiaf communities for screening which have been successful. Farmers are impressed with these varieties as one stand can produce up to 19 tillers..... (Director of Crop Research NARI/ Brikama/4th July, 2018).

The finding above indicates that with greater NARI intervention and assistance to farmers, the latter can increase their yields and income. The farmers can cultivate on abandoned rice fields as a result of salt intrusion and iron toxicity.

NARI also collaborates with other national stakeholders (FAO, NeMa, FASDEP and GCAVMP projects) to provide quality seeds to farmers. FAO in collaboration with NARI provided vulnerable farmers with seeds for the next planting season. Farmers were given coupons during trade fairs and where asked to go round and select from vendors seeds that they prefer and would like to grow in the coming planting season, upon selecting the desire rice variety they can exchange that as the worth of the coupon they have. This will help farmers by growing good varieties that can increase their yield and productivity. This is supported by a key informant when he stated that:

A seed trade fair was organized by FAO in North Bank Region of the Gambia, Agricultural Extension Agents were asked by FAO to identify the most vulnerable famers in their respective regions and those identified where given coupons to buy seeds. The selected farmers selected seeds during the trade fair based on desired characteristics and were asked to use them in the coming planting season. The seeds trade fair is the first of its kind, although NARI went with a limited number of seed varieties..... (Director of Crop Research NARI/ Brikama/4th July, 2018).

The above finding is in line with Chaowagul (2014), who reported that, “the main roles of the Rice Research Centers are: research and development, genetic conservation, inspection, certification, and the production of the breeder and foundation seeds. He also stated that these stations were responsible for the release of registered rice seed varieties. Breeder seed was produced in the laboratory and experimental fields of Rice Research Centers. Likewise, the extension seed is produced by farmers or farmer groups selected by each Rice Seed Centre and is then bought if the seed passes the criteria established by the 2009 Rice Seed Standard”.

Similarly, the NRDS (2014) mentioned a similar strategy, it stated that: “the seed system needs to be

well organized to produce good quality certified seed. In doing this, certified seed producers have to be identified on a commodity-specific basis at different location in the country. The Community Based Seed System will be strengthened to encourage the provision of large quantities of quality seed within easy reach of farmers”.

NARI also collaborates with WAAPP project in seed multiplication and increased farmers’ access to improved seeds varieties. Seed multiplication programme by the National Agricultural Research Institute (NARI) has increased access to quality crop varieties, thus resulted in improved food, nutrition and income security. The project supported NARI by providing rice foundation seeds for 10ha of land in 2014 and in 2016; the project provided similar support by providing foundation seeds for cultivation of 7.1ha of rice. 37 farmers were involved in the multiplication exercise covering all the six agricultural regions in the country. Details of the area cultivated, production and yield for the two years of the programme are provided in tables 4.3 below.

Table 4.3 Seed Distribution by Variety, Yield and Area cultivated by WAAPP

Year	Crop	Class of seed	Area(ha)	Production(ton)	Yield KG
2014	rice	Foundation	10	18,150	1,851
2016	rice	Foundation	7.1	35,500	5,000

Source: NARI reports

Furthermore, the study also discovered that the completion of the entire core civil works by the WAAPP has impacted positively on the improvement of NARI’s agricultural research system and DoA’s extension delivery services; the established seed centers in the three (3) locations: Chamen, Sapu and Giroba Kunda are serving as foundation seed banks, where improved seed multiplication is being encouraged with possible seed certification and availability to minimize seed shortages particularly of research priority commodities at the approach of the rainy season; the rehabilitation and re-equipping of the two engineering workshops in NARI (Yundum and Sapu) are now engaged in innovative engineering which led to the manufacturing and scaling up of the ASI thresher for rice threshing to reduce women’s drudgery involved in traditional processing of rice produce.

Investors

The findings from the study highlighted that the Government of the Gambia, WAAPP, Nema, FASDEP and GCAVMP projects fund most of the interventions which are geared towards rice intensification. Intensive activities like irrigation schemes are additionally funded through cost-sharing mechanisms with beneficiaries (small-scale farmers, private investors), donor assisted irrigation schemes; and public-funded irrigation schemes and a plausible indicative planning figure is estimated at about US\$865.25 million over the 10-year period (2015-2024). The donors include; The United Nations Development Programme (UNDP), World Bank (WB), Islamic Development Bank (IDB), European Union (EU), African Development Bank (ADB), International Fund for Agricultural Development (IFAD), United Nations Capital Development Fund (UNCDF), International Fund for Co-operative Development (IFCD), Food and Agricultural Organization (FAO), the Kredit fur Wiederaufbau/German Technical Agency (KfW/GTZ) of the Federal Republic of Germany and the Republic of China (Agriculture and Natural Resources (ANR) Policy (2017 – 2026)

A key informant agreed that there has been a lot of investment in the rice sector over the years. This was mentioned during an in-depth interview:

... out of a total of 144.78 million USD for invested in 2015; 19% was contributed by AfDB/GAFSP to FASDEP, 9% by AfDB to Programme building resilience against

food and nutritional insecurity in the Sahel (P2RS), 9% by World Bank to West Africa Agricultural Productivity Program (WAAPP), 5% by EU-FAO to MDG 1c, 45% by IFAD-IsDB to National Land and Watershed Management and Development Project (Nema) and 13% by IsDB to Gambia Agricultural Commercialization and Value Chain Management Project (GCAV) all geared towards increasing production... (Monitoring and Evaluation Officer/Central Project Coordination Unit/Banjul, 6th July, 2018).

The table below highlighted the investment in rice production for a ten (10) period. It also shows the project implementation period to its phasing out.

Table 4.4 Rice value chain projects and donor investment

Project	Objective	Duration	Cost	Donor
National Agricultural Land and Water Management Development Project (NEMA)	Reduced poverty of rural women and youth. Increased incomes from improved productivity based on sustainable land and water management practices	2013 - 2019	US\$ 64,900,000	IFAD / AfDB / GLF
Food and Agriculture Sector Development Project (FASDEP)	To enhance household food security status of the poor through increased production, preservation and marketing	2013 – 2018	US\$ 26,600,000	GAFFSP / AfDB
Gambia Agricultural Commercialization and Value Chain Management Project (GCAV)	GCAV is to improve productivity and access to market of targeted agricultural commodities for smallholders in the Project Area	2014 - 2019	US\$ 15,900,000	WB
West African Agricultural Productivity Project (WAAPP)	To generate and accelerate the adoption of improved technologies in the participating countries' top agricultural commodity priority areas as outlined in the ECOWAP	2011-2016	US\$ 12,860,000	WB

EU MDG 1(c) Project	To increase on a 2013 - 2018	€ 7,600,000	European Union
	sustainable basis the production by smallholders in NBR, CRR/N, CRR/S and URR		

Source: Ministry of Agriculture: (including Projects to meet GNAIP Funding Gap) and NEA

The implication of the finding above is that a lot of investment has been put into increasing agricultural productivity in the Gambia over the years, which if utilized effectively can achieve the desired effects. The finding also showed that there has been active donor participation towards the Gambia increasing its rice production and productivity through the Rice Value Chain programme. However, the participation of individuals and the private sectors is yet to be seen on a large scale. The level of participation by the public and individuals in the rice value chain is still lacking a concern raised by most of the key informants during the in-depth interview. A key informant stated that:

The public and private investors within the country have to take part in other components of the rice value chain, the government and donors alone cannot do everything, unless and until the public participate fully, the dream of increasing rice production, productivity and self- sufficiency will never be achieved (Regional Agricultural Director/Sapu/24th June, 2018).

The implication of the finding above is that the government and donor alone cannot contribute to the desired aim of increasing food self-sufficiency and feeding it's populace. The general public and private investors have to contribute by handling aspects of rice production that are still not covered by the government, such aspects includes handling, packing and storage of rice.

According to the financial controller, the donors in 2017 provided \$4,142,387.96 for watershed development activities, \$1,444,405.63 for agricultural commercialization and \$1, 7709,765.71 for project facilitation. The funding was geared towards increasing production and value chain related activities.

The above as reported is in line with the IFAD Nema supervision report in 2017 as shown in the table below.

Input Suppliers

The study revealed that the main input dealers in the local market sell fertilizer, pesticides and herbicides. Most of the dealers own stalls on which they sell their inputs during market days. The input dealers do not specialize in selling one input; instead they sell herbicides, fertilizer, pesticides and vegetable seeds. Commercial input dealers who are based in larger towns and closer to the capital city e.g. Gambia Horticultural Enterprise (GHE) also sells rice seeds; Nerica seed varieties, Sahel 1 and other improved varieties recommended by the Department of Agriculture, insecticides, fungicides, herbicides and fertilizer. Other input dealers who specialize in fertilizer and agrochemicals sales include Agro-Input Limited and Sangol Firms Ltd. The only Government enterprise dealing in fertilizer is Gambia Groundnut Company (GGC).

The supply of pesticides is most vested in the hands of private dealers during market days in the study area. These market days are organized weekly. Although some of the dealers are trained by National Environment Agency (NEA) and Plant Protection Services (PPS) on the hazards, use and handling of rice farming inputs especially agrochemicals, some sell their products without labels and without legal registration as indicated by the Hazardous Chemicals and Pesticides Control and Management Act

(HCPCMA).

This indicates that before selling of inputs to farmers, the latter is made aware of how to use the inputs and how to dispose of leftovers. This was revealed by one of the informants as thus:

... there are government laws and policies one needs to adhere to before you start selling agricultural inputs. ...for example, you are required to get a license and you need to be trained on the hazards, use and disposal of agrochemicals which you explain to farmers before selling to them (A male 30-Year-Old Inputs dealer/Brikamaba, June 2018).

Table 4.5 Summary of 2017 AWPB Planned Against Actual from January to March 2017

Summary of Planned 2017 AWPB Planned Against Actual from January to March 2017 Component	Planned budget (US\$)	Planned Activities	Completed activities	% achievement	Cumulative Expenditure (US\$)	% budget execution
Watershed Development	4,142,387.96	42	7	17	250,975	6
Agricultural Commercialization	1,444,405.63	22	11	50	191,048	14
Project Facilitation	1,709,765.71	26	15	58	178,228	10
Total	7,296,559.30	90	33	36	620,251	9

Supervision report, 2017

The implication of the finding above is that there is the need for a good control mechanism and testing facilities to ensure quality inputs are sold, weekly monitoring of input dealers will enable the dealers to sell the best products to the farmers.

Processors

The study highlighted that the millers acquire their milling machines through the rice value chain programme. According to some of the key informants, milling is one of the important processes in the rice value chain because it brings out the finish products and it is from milled grains that consumers choose the grain quality they want. They stated that the region has two major milling machines in Wellingara and Medina Umfally which mills the entire paddy in the region. The mills were established by the Republic of China-Agricultural Technical Mission (ROC-ATM) and they worked with the farmers directly. The nature of the relationship between the ROC-ATM and farmers is that of contract farming. This was emphasized by one of the key informants who stated:

... the mill is not given as a loan to the farmers, it was given to the farmers by ROC-ATM, ROC-ATM operatives worked with the farmers for a good five year period, they selected plots in the rice fields and gave the farmers who own those plots fertilizer, seeds and other required inputs and ask the farmers to work, after harvesting ROC operatives will take a percentage which amounts to 15 bags of paddy; they will subtract from the yield the cost of fertilizer, seeds and other inputs given and the rest is given to the rice farmer to be milled ... (Manager of Medina Umfally Rice

mill/Medina Umfally/, 26th June, 2018).

A key informant also revealed that there is a growing increase of private millers in the region which is a challenge to the main mills in the region. The main public mills charge less than the private mills. They highlighted that the private can mill smaller quantities of rice for the rice farmers. As indicated in the in-depth interview in Medina Umfally:

We mill 100 bags (50kg) per every milling session starting from seven or eight o'clock in the morning if the paddy is not dirty and it is well dried then by four O'clock in the evening the operation will be completed. The cost of milling is for every 100kg milled we receive 13% which is usually equated to that day's market selling price of milled rice..., there are a lot of private milling machines in town and in the villages now and this is affecting the operation of the mill. Before we gather rice farmers with 200 bags of paddy, even 100bags it takes time. The private millers can mill two to three bags of paddy ... (Manager of Medina Umfally Rice Mill/Medina Umfally/, 26th June, 2018).

The above finding is line with Ekasingh *et al.*, (2007) who reported that in local areas, farmers mill their paddy from services of village mills or small commercial mills located near their farms, and then stored milled rice for their own consumption.

Similarly, another key informant highlighted that it is easier to mill with the private millers if the amount of paddy is small although it is more expensive than milling with the public mills. He stated thus:

I can only mill about ½ bag of rice at once, after milling every D100.00 worth of the milled rice, I will receive D25.00 and then the cost of fuel used in milling will also be deducted too and the remaining milled rice is given to the rice farmer/trader. The money paid by the farmers for fuel during milling is what is kept for maintenance (Private Mill Operator/Barajally Suba, 29th June, 2018).

The finding from the study indicated that all milling charges stipulated by both public and private mills are equated to the market price of milled rice for that day. The finding is also in line with what was reported by Ekasingh *et al.*, (2007) that rice millers played a significant role in price formation. They are intermediaries who have good connections about rice prices gathering information from brokers, exporters and among themselves to calculate the purchase and sale prices. Therefore, the price information from the rice millers and other sources such as brokers and exporters also set the price for rice in the market. The finding is also in line with Ekasingh *et al.*, (2007) who reported that “in local areas, farmers’ mill their paddy from services of village mills or small commercial mills located near their farms, and then stored milled rice for their own consumption”.

4.2.6 Rice Traders (Local)

The study discovered that trading networks for imported and local rice are distinct from each other and involve different actors. While imported rice is brought into the country by large trading companies and distributed to the urban consumer market as well as to daily provincial and weekly rural markets (lumos) throughout the country, local rice is only traded in very limited quantities. This is due to the fact that a huge chunk of the locally produced rice is retained for household consumption with only the remainder being traded by the producers. Farmers sell hand-milled rice in small quantities (per cup) either to neighbours’ or in the nearest lumos where it is bought directly by consumers or by retailers from other markets. Local rice is mostly available on markets during the post-harvest period from October to January while in other times of the year traded quantities are

small and it can hardly be found in markets outside the rice-producing areas. Importers reported notable drops in demand after the annual harvest of local rice which indicates that at times of wide availability, consumers switch to consuming the local variety.

Most of the local rice traders reported that they are not aware of government laws or policies with regards to rice trading. They buy from farmers and sell to consumers depending on the season and availability of rice. During off-seasons, the price goes down and during the peak period the prices drop to a very low level that selling will be a big loss. As indicated during one of the in-depth interview sessions in Brikamaba Loumo:

There are no laws or policies on selling rice, the rice market here doesn't have system, right now we are in rice season, the paddy in the field has matured and other farmers are harvesting, in the next two or three weeks the cup that is sold for D6.00 or D7.00 will now drop to D2.50 or D3.00. If you come here you will find a lot of milled rice. If I cannot sell my rice, I will have to wait for the rice retailers from the Kombo's who will buy the rice at D3.00 which is not profitable (A 30 year old Female Rice Trader/Brikamaba, June 2018).

Similarly, another informant stated thus:

In order for me to maximize profit, I hoard my rice till there is scarcity. Every year after harvest we mill the rice at home, we have a milling machine. We mill and hoard it till Ramadan (Muslim period of fasting), at that time it will mean that the Muslims have finished their rice and one can sell a cup at D7.00 which is equivalent to the selling a bag of 50kg at D1000.00 (in-depth interview/Wassu, 2018).

The informants reported that they benefit from the rice trade and if they had assistance from the RVC programme they will be better off. Some of the benefits were highlighted by the informants during the in-depth interview sessions are as follows:

From the trading of rice, I have been able to pay for my younger brother to travel to Spain and year before last I bought a new milling machine at a tune of D150,000 (in-depth interview/Brikamaba/June, 2018).

Another trader stated thus:

Rice trading is a lucrative business, I have been paying my children's school fees and buying of school materials from rice trading (A 47 Year Old Female Rice Trader/Wassu/June, 2018).

The benefits of rice trading have helped in improving the socio-economic status of most family in the study area. The implication is that with a better rice pricing scheme, the traders and rice farmers will be better off.

Consumers

The study highlighted the preference of rice bought or consumed by different age categories in the Gambia. The findings indicate that majority of the respondents prefer American rice, while only a few key informants prefer Sadaam rice. The reason for their preference of American rice to other rice varieties is a result of swelling potential. The findings also indicate that most of the respondents claim to buy American rice because it swells when cooked and some stated that they prefer it because it is palatable compared to the other rice varieties, while just a few of the respondents stated that because of its cheap price. Such concerns were raised during the in-depth interview session thus:

I prefer American rice because it expands when you cook it and after it, I prefer Sadaam because of its nice aroma (A 46 Year Old Rice Consumer/Bakau, 16th July,

2018).

Similarly, another informant stated that:

I prefer American rice because it is clean (has fewer impurities) and it increases greatly when cooked (A 28 Year Old Rice Consumer/Farato, 17th July, 2018).

The implication of the findings is that, in order for local or homegrown rice to be fully accepted by the consumers, the research institutes need to improve on the local varieties to have a better aroma, palatability and most importantly a swelling factor. As most families are extended families in the Gambia, the swelling factor helps when it comes to feeding a large family.

The study also assessed other types of rice bought by consumers other than their first choices indicated that majority of consumers choose local rice varieties as their second choice after American rice, while some of the key informants stated that they prefer Sadaam and only a few of them indicated that any other variety apart from local rice and Sadaam rice.

The findings from the study indicated that the non-availability of local rice throughout the year make the respondents buy or consume other rice bran. The implication of this finding is that, for the local rice varieties to be able to compete with other rice bran in the market, production needs to be increased and rice made available all-year-round. The above finding is in consent with that of a key informant who stated as thus:

Apart from American rice, I prefer local rice varieties as they are healthier and have more nutrients; the only problem is that it is not always available in the market (A 55 Year Old Rice Consumer/Mbollet, 18th July, 2018).

Similarly, the findings indicated that majority of informants prefer long and slender grain rice, followed by medium 20% and none of the informants opted for short and medium-grained rice which they said is difficult to swallow. The reason for consumers not preferring short and fat rice grains is highlighted by one of the informants during the in-depth interview as thus:

I don't like short and fat grain rice, it is not tasty and it is too big. The size of the rice should be reduced and the quantity of the bag should be increased (A 37 Year Old Rice Consumer/Fajikunda, 17th July, 2018).

The implication of the report above is that, if rice farmer produces varieties which are short and fat grained, it will not be highly accepted in the market, thus, leading to losses for the farmer. Research institutes should then shift their focus from breed rice grains which are drought resistant, salt-tolerant to varieties that are palatable, having sweet aroma and long-grained in size.

CONCLUSION AND RECOMMENDATIONS

The nature of the rice value chain programme showed that there were various actors are all working towards increasing rice production, processing and marketing in the country. Farmers have reported that they have received support in form of improved seeds, fertilizer, rehabilitation of rice fields, construction of anti-hippo dikes, construction of access roads and causeways, retention dikes and spillways, training of farmers on rice planting techniques and water management in the fields from the rice value chain programme.

Conclusion

From the research findings, it was concluded that the rice value chain programme in the Gambia have positive effects on rice production. The effects of the rice value chain programme on rice production according to findings range from the availability of inputs (fertilizer, improved seeds, tillage

implements and machinery; tractors and power tillers) processing (threshing and milling machines), rehabilitation of rice fields that caused an increase in production.

In that vein, the government of the Gambia in its endeavours to increase production and thus reduce importation of rice has engaged in implementing policies and strategies to this effect. Projects have also drawn up strategies to rehabilitate key irrigation infrastructures which could be attributed to the increase in production and organized forum between the rice importers and rice producers to discuss and bring a solution to the marketing price.

Recommendations

Based on the findings, the study recommended the following:

The Rice Value Chain programme and government should provide farm machinery/ equipment (power tillers, tractors, threshers, milling machines) to the rice farmers in order to meet the timeliness of operation which can induce an increase in production.

The government should formulate a rice pricing programme which will provide rice farmers with a guaranteed price for their produce. This will help farmers to quickly sell their produce to pay for expenses or debts and avoid selling to middlemen or rice traders at a loss.

The Rice Value Chain programme and investors should strengthen the linkages between farmer groups/cooperatives with buyers (Producer-Buyer linkage) for easy market access.

The government should endeavour to attract rice investors into the country, especially in setting up a contract farming system to enable rice farmers acquire inputs, implements and increase production.

Both local and international investors should provide more funding for NARI to conduct more research on rice varieties that are acceptable to the rice consumers, tolerant to drought, pest and diseases.

Consumers are the vital end actors where finance is generated in the value chains. In this regard, the perception of the consumer on local rice should be improved. It is important to promote local rice from nutrition and health benefit aspects.

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