Assessment of the Rice Production Challenges Faced under the Rice Value Chain Programme in The Gambia

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***Abstract*: This study on the challenges faced under the rice value chain programme 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 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 narrative to describe the themes with quotations. From the findings it was revealed that, farmers from the study area faced 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.**

***Keywords*: Rice, production, challenges, rice value chain, programme, Gambia**

I. 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 to 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. In Asia, it accounts for 29.3% of caloric intake (Timmer, 2010). A Worldwide paddy (unprocessed) rice production averaged about 706.3 million tons during the period 2009/2011 and grew by about 4% to 736.9 million tons in 2012 (FAO, 2014). In 2012/13 the milled equivalent in a million tons stands at 490.1 and 496.6 in 2013/14; productions have fluctuated in 2014/15 and 2015/16 at 494.3 and 490.3 respectively (FAO, 2016).

It is used in many ways both for food and other purposes. All the parts of rice are of economic importance to man; from rice bran to the grains, leaves, and roots are all of economic value. The grains are quite nutritious when not polished, common or starchy grains are used in various dishes, cakes, soups, pastries, breakfast foods, and starch pastes; glutinous types, containing a sugary material instead of starch, are used in the Orient for special purposes as sweetmeats. Grain is also used to make rice wine, "Saki", much consumed in Japan. In West Africa; countries like Nigeria, Ghana, Senegal, and The Gambia, rice can be prepared in food such as the popular Fried Rice and Jollof Rice. Similarly, in the Senegambia region rice is mixed with groundnut and pounded, then boiled and can also be eaten with sugar and milk. Rice straw is used as cattle feed, used for thatching roofs, filling mattresses, preparation of hats, ropes and as litter material in poultry. The husk is used as animal feed, for paper making and as fuel source. Rice oil is used in soap industry; refined oil can be used as cooling medium like cotton seed oil. Rice bran wax, a byproduct of rice bran is used in industries.

However, 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, 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 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 percent 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 hectares, equivalent to 2.6 and 4.6 percent of the world's total production and rice areas, respectively. In 2001-05, rice production has been expanding at the rate of 6% per annum, with 70% of the production increase due mainly to land expansion and only 30% being attributed to an increase in productivity (Fagade, 2000); (Falusi, 1997); (Center, 2007). African paddy production neared the 30.0-million-ton mark in 2016, sustained by gains in Egypt and West Africa (FAO, 2016) compared to 26.0 million in 2012. However, Africa consumes about 11.6 million tonnes of milled rice per year (FAO, 1996), of which 3.3 million tonnes (33.6 percent) is imported. About 21 of the 39 rice-producing countries in Africa import between 50 and 99 percent 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 percent) and upper (71.7 percent) limits. The average consumption of rice in Africa for 2014 to 2016 amounted to 32, 118 MMT (OECD-FAO, 2016).

Rice production in Sub-Saharan Africa (SSA) is dominated by subsistence, smallholder farmers who have limited access to markets, no equipment other than hand-held tools and limited use of inputs. The average rice yield in the sub-continent is the lowest in the world - 1.4 tonnes per hectare compared to Asia's average of 4 tonnes (more than 6 tonnes in China). Similarly, growth of rice consumption in SSA has been outstripping that of rice production. Between 1961 and 2005, rice consumption in SSA grew at 4.52% annually, compared with growth in production of 3.23% (Center, 2007). Imports increased dramatically to fill the gap, as the self-sufficiency ratio (production/consumption) declined from 112% in 2008 to 60% in 2015. The international market thus supplied 40% of SSA's rice needs, and this share is continuingly increasing.

The West African sub-region is regarded as the biggest rice market in SSA, accounting for two-thirds of the region's rice demand with 50% imports, which represents about 20% of the total volume of rice traded globally (del Villar & Lançon, 2015). In May 2008, world rice prices tripled in just a few months to reach 30-year, inflation adjusted highs. As reported by (Somado, Guei, & Keya, 2008), the total value of rice imports by West African countries alone is estimated at US$1.4 billion per year. According to Country data from the Permanent Interstate Committee for Drought Control in the Sahel (CILSS) meeting and FAS Dakar estimates that rice production has increased in West Africa over the last three years, i.e. 5,100 Million Metric Tons (MMT), 5,978MMT and 6,425 MMT for 2015, 2016 and 2017 respectively. It was also observed that the amount of rice consumed during the same period also increased from 8,714 MMT for 2015 to 9,573 MMT for 2016 and 10, 172 MMT for 2017. All the countries combined intend to import 3.8 million tons in May 2015/16, an 8 percent increase compared to the previous year.

In the Gambia, rice has long been an important food grain and is traditionally cultivated both in upland areas and in the seasonally flooded swamps, which lie adjacent to the river Gambia and its tributaries. Rice production in the country fails to match demand and only some 40-50% of total rice consumption originates from local production, with the balance made up from imports (The National Planning Services Unit [PSU,2013], National Agricultural Sample Survey (NASS) 2013). NASS data revealed that the annual rice imports 2012-2013 rose to 137,000 metric ton and annual consumption in rice was 178,822. In 2014 the country imported 140,000 tons to cover the production deficit (world-grain.com 2017). Thus, the implementation of rice value chain programmes and strategies to combat the importation of rice, the declining yields and the poor living conditions of farmers was necessary.

A value chain is the full range of activities required to bring a product from conception, through the different phases of production and transformation. A value chain is made up of a series of actors (or stakeholders) from input suppliers, producers and processors, to exporters and buyers engaged in the activities required to bring an agricultural product from it's conception to it's end use (Kaplinsky & Morris, 2001). The value chain concept entails the addition of value as the product progresses from input suppliers to producers to consumers. A value chain, therefore, incorporates productive transformation and value addition at each stage of the value chain. At each stage in the value chain, the product changes hands through chain actors, transaction costs are incurred, and generally, some form of value is added. Value addition results from diverse activities including bulking, cleaning, grading, and packaging, transporting, storing and processing (Anandajayasekeram & Gebremedhin, 2009).

Rice value chain describes the roles and relationships of the various actors within and along the chain, and how they are linked to existing market system. It also describes the flows of the rice commodity and value-adding activities between the different actors of value chain to the end users. The rice value chain is also an intrinsic network of public and private interactions and responsibilities. The public responsibilities are often in infrastructure (roads and

irrigation), policies and regulations (seed laws, use of inputs, export policies, tax incentives, etc.), research and development (variety selection, etc.) and agricultural extension. The private responsibilities are concentrated along the supply chain from provision of inputs through production to processing and trade (Nico & Rajam, 2012).

Value Chains are found at the core of high impact and sustainable initiatives focused on improving productivity. Focus has shifted from agricultural production to consumer demand, marketing and the coordination of product flows from producers to consumers. The Value Chain concept acknowledges that production must be linked to demand and the critical role of organizing the flow from farmer to consumer opportunities (Ngambeki et al., 2010; MAAIF, 2012). Due to the rice development potentials of the Gambia, the government in 1951 adopted and pursued a policy of rice self-sufficiency and rice value chain programmes and subsequently implemented two projects, namely; (Taiwanese-Gambian Technical Assistance Agreement in 1966 and the International Bank for Reconstruction and Development – International Development Agency (IBRD-IDA). The government of the Gambia aimed at increasing production of rice to curb the increasing importation of rice annually, attain food security and improve the livelihood of the rice farmers. Similarly, introducing irrigated rice production in the swamp lowlands on the levee of the river has been one of the most explicit strategies to increase food production and by this, solving the self-sufficiency problem in The Gambia (Kinteh, 1988). Thus, the study aims to; examine the effects of rice value chain programme on rice production in Central River Region (CRR) of the Gambia from 2014-2018.

1.1 Statement of the Research Problem

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. Challenges in irrigation schemes were met with high investment and production costs, imposing rigid production systems on farmers who were traditionally following a seasonal farming pattern (Carney, 2008). Despite the recent success in raising local rice production through the introduction of 'Nerica' varieties, there remains 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. In fact, price competitiveness of local rice versus imported rice remains a major question concerning the future of local rice marketing in The Gambia. While at a 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 to answer are what are the rice production challenges faced under the Rice Value Chain Programme in the Gambia and how to improve Rice Value Chain Programme to increase rice production in the study area? The objective of the paper is to assess the rice production challenges faced under the Rice Value Chain Programme in the Gambia and identify ways of improving the Rice Value Chain Programme in increasing rice production in the study area. The assumption is that a well-designed rice value chain programme can help in increasing rice production in The Gambia.

1.2 Research Objectives

The study aims to: assess the challenges faced under the Rice Value Chain Programme in the Gambia

II. 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. 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.

2.1 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 agricultural sector is the most important sector of the Gambian economy, contributing 32% of the gross domestic product, providing employment and income for 80% of the population, and accounting for 70% of the country's foreign exchange earnings. It remains the prime sector to raise income levels, for investments, to improve food security and reduce levels of poverty. About 54% of the land area in The Gambia is good quality arable land (5,500 square kilometers), out of

which about 39% (1,880 sq. km) is currently farmed by the 41,000 subsistence farmers in The Gambia. About 810 sq. km. (81,000 hectares) are irrigable, all in the Central River Region (CRR) (56%) and (URR) Upper River Region (44%). About 2,300 hectares of this potential area are currently under irrigation. Crop production is quite diversified. Cash crops such as cotton and groundnuts are grown in the upland areas and rice in lowland, riverine areas (rain-fed swamps or under irrigation) for both subsistence and cash. Agriculture is communally organized among Gambian farmers. It is therefore important to develop a basic understanding of Gambian rural families in analyzing the farming systems that have developed over the years. The farming community begins from the family and in CRR, a family unit consisting of dwellings and a private yard. Smaller sub-divisions of the compound are the Dabada and Sinkiro. Dabada is defined as the farm production unit in which two or more individuals (within the same compound) cultivate farms, outside the communal farm, for their own individual needs, while Sinkiros refers to the cooking and consumption group within or outside the compound. Sinkiros provide basis for the compound 's organization of storage, processing, and consumption of foods.

2.2 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.

2.3 Sampling Technique

Central River Region is divided in to 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 study. This brought the total number of villages selected for the study to be fifteen (15).

Table 1: 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 Fuladu West	Jahaly
					Pachari
					Madina Umfally
		Upper Fuladu west	130		
		Janjanbureh	1		
Total	2	11	661	5	15

Source: Field Survey, 2019

2.4 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 in Gomez, Akpen-Ageh and Kwaghngu (2022), using the number of registered rice farmers in CRR as provided by the Registry of the Agribusiness Service as 9,217. Thus:

$n = N/1+N(e^2)$

Where;

n = sample size of the study
N= population of the farmers in the study area
e= Margin of error = 0.05

Therefore, sample size = $9217/1+9217\ (0.05)^2$
Therefore, sample size = $9217/1+23.04$
= 383.64
= **384**

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

Table1 shows the number of respondents across selected villages in the study area.

Table 2: 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
1.	Barajally Suba	48	p = (192/384 x 48)	24
2.	Kuntaur Fula Kunda	100	p = (192/384 x 100)	50
3.	Wassu	110	p = (192/384 x 110)	55
4.	Jarumeh koto	82	p = (192/384 x 82)	41
5.	Manna	30	p = (192/384 x 30)	15
6.	Koli Kunda	14	p = (192/384 x 14)	7
7.	Kununku	10	p = (192/384 x 10)	5
8.	Touba Demba Sama	12	p = (192/384 x 12)	6
9.	Kudang	40	p = (192/384 x 40)	20
10.	Madina Umfally	90	p = (192/384 x 90)	45
11.	Pachari	92	p = (192/384 x 92)	46
12.	Jahally	80	p = (192/384 x 80)	40
13.	Barrow Kunda	10	p = (192/384 x 10)	5
14.	Dankunku	40	p = (192/384 x 40)	20
15.	Jakoto	10	p = (192/384 x 10)	5
Total	**15**	**384**		**384**

Source: Field Survey, 2019

2.5 Sampling Procedure

The number of the farmer respondents from each village is shown as in table 2 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 2. 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 were one FGD 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.

2.6: 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.

2.7: Research Instruments

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.

2.8: 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 narrative to describe the themes with quotations. Regarding the quantitative analysis, simple descriptive statistics including frequency and percentages was used for the surveyed data collected from the rice farmers and key informants. Statistical Package for Social Science (SPSS) version 26.0) was also employed to analyze the data from the Socio-demographic characteristics of respondents. The data analyzed were also tabulated to highlight the frequency and percentage.

III. RESULTS AND DISCUSSIONS

This chapter presented the data collected in the field, it also discussed and analyzed findings in relation to the study objectives; the nature of the rice value chain programme, the experiences of farmers under the rice value chain programme, the effects of rice value chain programme on rice farmers production, and the challenges faced by farmers under the rice value chain programme.

3.1 Bio-Data of Respondents

Table 3: Socio-Characteristics of Respondents

Attributes of Respondents		Frequency	Percentage
Gender	Male	171	45
	Female	213	55
	Total	**384**	**100**
Age	17-27	39	10
	28-38	98	26
	39-49	89	23
	50 Above	158	41
	Total	**384**	**100**
Educational Level	Non-Formal	311	80
	Primary	41	11
	Secondary	29	8
	Tertiary	3	1
	Total	**384**	**100**
Land Ownership	Rented	48	12
	Self-Owned/Communal	336	88
	Total	**384**	**100**
Area Cultivated	Less Than 0.5ha	101	26
	0.5ha-1ha	206	54
	1ha Above	77	20
	Total	**384**	**100**
Farmer Organization	Non-Member	77	20
	Member	307	80
	Total	**384**	**100**
Sources of Labour	Family	296	77
	Hired	43	11
	Both	45	12
	Total	**384**	**100**

Source: Field survey, 2019

Table 3 highlighted the Socio-demographic characteristics of 384 respondents in the study area. The table showed that there are (171) 45% males and (212) 55% females, which showed that the population of female respondents was higher than that of the male; a clear manifestation that the women are more active in rice farming than their male counterparts, thus, contributed more to the Gross Domestic Production (GDP) in terms of rice production.

The age distribution of respondents indicated that majority (158) 41% of rice farmers in Central River Region of the Gambia are between the ages of 50 and above. As shown in table 4.1, 64% of farmers fall between the ranges of 40-75years. Only 36% were aged between 17-39 years old. It indicated that there is a low level of youth participation in rice production in Central River Region of the Gambia, thus, leaving the aged and feeble to handle the tedious and laborious farming operations.

Due to the low returns from rice farming and poor decentralization policies in terms of development, the youths, who constitute about 65% of the Gambian population, prefer to migrate to urban centers in search of white-collar jobs or to Europe through the Mediterranean Sea. The implications of the age category of 40 years and above being more involved in rice farming may contribute the low levels of production in the study area.

Table 3 showed the educational level of respondents. It showed that (311) 81% had non-formal education, while only 11% received primary education, 8% and 1% received secondary and tertiary education respectively. The level of illiteracy among the respondents was high. The implication of a high illiteracy rate among farmers is that they will find it difficult to read written instructions and apply them to increase rice productivity. Furthermore, only two respondents had a tertiary education, demonstrating that most of the highly educated populace did not actively engage in rice farming.

Those with higher education would have been in the position to operate farming machinery, timely application of fertilizer and conducting good agricultural practices to increase production in the study area. Furthermore, farmers' lack of literacy prevented them from developing effective negotiating skills or using modern communication technologies for price information to support commercial decision-making.

Table 3 further showed that 88% of respondents own their own land or through communal system, where the village head called "Alkalo" shared the farmlands among households according to family sizes. Only 13% of respondents said they rented their rice filed plots for the 2018 farming season. The land owners at times were ready to rent out their lands to other farmers or outsiders for a season or two. Some land owners will not rent out their fields nor allow others to work on them allowing the field uncultivated for that season or the next, either as a result of not having the required inputs or sufficient farm labour.

Again Table 3 also showed that majority of the respondents in the study area (205) 54% cultivated on plots ranging from 0.5-1hectares, followed by (101) 26% of respondents who on plots which were less than 0.5hectares. Others (77) 20% farm on plots which were more than 1hectares. This indicated that majority of farmers were small scale farmers who were limited to little or no credit facilities and donor assistance which would have enabled them to have access to improved seed varieties, fertilizer, pesticides and machinery, thus, leading to the rice farmers producing only for consumption with little or none to sell. This is similar to a national survey of the Cambodia Development Resource Institute (CDRI 2008), which 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.

In terms of membership of farmers' organization (Kafoo), 80% of the respondents in table 3 have acknowledged being a member of a farmer organization (Kafoo), while 20% reported as being non-members. The evidence of farmer organizations in the region highlights the level of preparedness by farmers to work with the government, donor agents and Rice Value Chain Projects in increasing productivity. Farmers in organization readily receive from the rice value chain programme assistance such as improved seed varieties, fertilizer, machinery and credit. However, farmer organizations are constrained by over-involvement of the Government and the failure to transform these farmer groups into producer cooperatives to increase production.

The study further discovered that (296) 77% of respondents reported to have acquired family labor as their main source of labor from family members and relatives, while (43) 11% of respondents stated that they utilize hired labor. (44) 12% used both family and hired labor for their farming operations. Tedious and laborious task such as tillage and transplanting, they hire tractors or power tillers to do the work and other operations such as weeding, fertilizer application, harvesting and threshing are done by family members. Family labor is more reliable than hired labor, this is as a result of inadequate machinery for hire and even after hiring of a tractor or power tiller for tillage or ploughing the machine can breakdown leaving the farmer with days or weeks of waiting before the machine is repaired. On the other hand, family labor takes a longer time to complete, as such can delay all other farm operations.

3.2: Challenges under Rice Value Chain Programme

The challenges under the rice value change programme includes the challenges of the rice value chain programme, rice farmers, researchers, input dealers, processors and rice traders

3.2.1 Challenges Faced by Rice Value Chain Programme

The rate in which the projects under the rice value chain programme are implementing their interventions is very slow. Most projects have a delay of one year before implementation commence. This is stated as thus:

> The rate of Project Implementation largely depends on Implementing of key procurement activities as some of these procurement activities have a direct bearing on the PDOs. Despite the progress made in most of the project sites and site meetings with the contractors, the project team at the Central project Coordination Unit (CPCU) has to always engage and consistently follow up on contractors to respect their core contractual mandates (Monitoring and Evaluation Officer CPCU/Banjul/19th July, 2020).

The findings above highlight the problems faced by projects with regards to contractors, delay in such implementations also cost the project more money and fields not ready for use.

One of the challenges highlighted by the rice value chain programme is that of the exchange rate. The conversion of money from one currency to the other reduces the actual cost of money intended for an intervention. This was highlighted by a key informant as thus:

> Huge exchange rate loss from SDR Unit of Account {UA) to US Dollar and from US Dollar to Gambian Dalasi decreases the actual amount intended for an intended specific intervention. This is evident in the sub component two of component one of the GCAV (Monitoring and Evaluation Officer CPCU/Banjul/19th July, 2020).

The sub component two of component one of GCAV refers to the Support for Development of Irrigation and Key Productive Infrastructure in which changes in the exchange rate caused inferior equipment to be bought.

Another challenge is that of procurement. Executive orders have caused some ongoing works to have stopped or the entire design of the work to be changed. An example is the

change from wooden bridges in the rice fields to concrete ones. This challenge is highlighted as thus:

> Executive directives issued to all agricultural projects engaged in land development to change from wooden bridge to cement bridge as a result causes a considerable delay in the rice rehabilitation works (Assistant Monitoring and Evaluation Officer CPCU/Banjul/19th July, 2019).

The above finding is corroborated in GCAV 2017 report which stated thus; "the political impasse during which all civil works were stop as majority of the workers have to re-locate to the Republic of Senegal" (GCAV 2017 Annual Draft Report)

The perennial flash flood experienced in the month of August 2017 affected most of the rice fields in the rice value chain programme intervention areas in CRR/South and CRR/North. This caused a decline in total product for the year ending. The finding above was stated as thus:

> The perennial flash flood experienced in the month of August & September in 2016 and 2017, has affected most of the rice fields in CRR/South and CRR/North leading to a decline in yield. (Regional Agricultural Director/Sapu/ June, 2019).

This decline in rice yield can be seen from a decline from 5.09 in 2016 to 5.02 in 2017. The floods have caused some communities not to have harvest at all, which project interventions such as rehabilitation of rice fields had to be stopped because the fields were flooded.

The rice value chain also faced challenges with regards to inadequate maintenance of the rehabilitated irrigated rice infrastructures (Canals). The canals were filled with sediments and grasses. This problem was highlighted as thus:

> Despite the training provided to the Water User Associations in targeted rice peri-meters by the SWMU coupled with sensitization conducted by DCD, the key irrigation infrastructures are rarely maintained. This is peculiar with main, secondary and tertiary canals**.** Tall grasses are found in most of the canals that were de-silted thus rendering water management systems difficult resulting low production and productivity (Assistant Monitoring and Evaluation Officer CPCU/Banjul/19th July, 2019).

As an implementing partner, the SWMS implemented the training of 120 participants of Water User Associations (WUAs), 120 participants (58 Women and 62 men) from 3 namely Wassu, Sapu and Kudang clusters. From the findings above, it implied that the WUA's needs to be strengthened in order to provide better water supply to the fields, this will allow efficient production and an increase in yield.

3.2.2 Challenges Rice Farmers Faced under the Rice Value Chain Programme

The challenges faced by farmers under the rice value chain programme includes; wild life invasion, termite infestation, inadequate tillage machinery, inadequate threshing machines, inadequate fertilizer, inadequate seeds, inadequate seeds, poor causeways, leveling of plots, desilting of canals, flooding and poor market infrastructure.

Table 4: Factors affecting rice farmers' production in the study area

	Variable	Frequency	Percentage
1.	Wild Life Invasion	238	62
2.	Termites Infestation	30	8
3.	Inadequate Machinery	383	100
4.	Inadequate Threshing Machines	383	100
5.	Inadequate Fertilizer	334	87
6.	Inadequate Seeds	219	57
7.	Poor Causeways	322	84
8.	Leveling of Plots	184	48
9.	Desilting of Canals	209	54
10.	Flooding	154	40
11.	Poor Market Infrastructure	275	71.8

Source: Field Survey 2020

Findings from table 4 indicate that one of the challenges faced by the rice farmers in the study is that of wild life (wild hogs, hippos and quelea birds). Majority of the discussants (238) 62% reported that their produce has been greatly affected by the invasion of wild animals which have reduced their productivity. The attacks of hippos and quelea birds were reported to be more severe as they can destroy a large number of rice plots in a matter of minutes. This was reported by one of the discussants as thus:

> Last year hippos descended on our rice fields and eat almost all. Then grasshoppers came during flowering stage of the rice and sucked all the juice from it. The quelea birds arrived during maturity of the rice and also gave us trouble too (A 50-Year-Old Female Rice Farmer/Manna/Sami District, 27th June, 2019)

Another respondent emphasized the damages caused by wild life as thus:

> They project need to increase the height of the fence, Hippos, their own challenge is a huge one, the wild hogs and baboons…... wild animals are a menace to our rice fields. In our rice fields, wild animals are in huge numbers…. wild hogs are better because we can kill them but we cannot kill hippos as the law prevents that (A 27-year-old Male Rice Farmer/Touba Demba Sama/Niamina District, 25th June, 2019).

A total of 7.3% of respondents reported that termites are a main challenge they face in their fields. The termites are

usually prevalent after the transplanting of seedlings in the lowlands. They damage the roots and stems of the plants causing the plants to die thus reducing the plant population and yield. Such was emphasized by one of the discussants during the FGD sessions:

> Termite infestation is common in our fields, we have tried to eradicate them by burning rice straw before tillage and conducting deep ploughing and harrowing of the fields but they still damage the seedlings. Other have used insecticides to no avail, this is reducing our yield (A 49-Year-Old Female Farmer/Manna/Sami District, 27th June, 2019).

From the findings in table 3 above (383), 100% of the respondents highlighted that they lack farm machinery to conduct tillage and ploughing of their fields. In the Gambia, most of the rice grown is in the low lands, which require power tillers and tractors to till or plough the fields before transplanting of seedlings. The finding indicates that for 2018 there is inadequate machinery for ploughing in the study area. This was stated as thus:

> The most pressing need of our community is a power tiller or tractor; right now, it is the only thing delaying farming operations. Most of the machines we have are all damaged; maintenance is the problem (A 28-Year-Old Female Farmer/Touba Demba Sama/Niamina District, 25th June, 2019).

Another respondent described the challenge as:

> For us the shortage of ploughing machines is our major constraint, the delay in farming in our fields is just because of inadequate machines, for these fields to be cultivated in the way they should be, we need machines… (A 35-Year-old Male Rice Farmer/Pachari/Lower Fuladu West District, 2019).

The above finding is in line with Saïdou & Kossou, (2009), who reported that: "In Uganda, Senegal and Egypt the challenges to boosting rice production is hampered by pests and diseases, limited mechanization, inadequate storage facilities leading to huge post-harvest losses, unfavorable weather conditions, limited local demand for improved rice seed, emergence of stubborn weeds and low soil fertility".

Another challenge stated by the discussants during the FGD sessions is the lack of adequate threshing machines, (383) 100% discussants across the study area reported that most of their produce is lost during threshing because they use barrels to thresh or spread mats on the floor and the rice placed on the mats is threshed by hitting with long sticks. This causes some grains to fly into the bushes. This accounts for a reduction of their produce. The finding was highlighted during one of the FGD sessions as thus:

> ...and threshing machines too, we do not have threshing machines, we normal have to wait for our neighbouring villages like Sinchu Alhajie and Sambel Kunda to finish threshing and milling before we use theirs and if we can't wait then we do it manually, we are really facing problems when it comes to availability of machines… (A 55-Year-Old Male Rice Farmer/Kununku/Niamina, 25th June, 2019).

This finding is in line with other discussants view in a different district in the study area who stated thus:

> We don't have a threshing machine and after harvesting your rice you need to thresh it instead of leaving it in the fields (A 27-Year-Old Female Rice

Farmer/Barajally/Suba/Niani District, 29th June, 2019).

The respondents reported that since the implementation of RVC programme, inadequate fertilizer in their rice fields has been one of the factors affecting rice production in the study area. The respondents, however, stated that rice growing seasons that they receive fertilizer from the RVC programme; they tend to have an increase in yield.

> the fertilizer we receive from the projects have assisted us but it is not enough, when you are farming rice, you need sufficient fertilizer that can increase your production, the fertilizer we receive; one bag of fertilizer is shared among every three farmers which is not sufficient… (A 57-Year-Old Male Rice Farmer/Barajally Suba/Niani, 29th June, 2019).

Similarly, another discussant stated thus:

> ….in other to harvest and think of having a good yield, you need fertilizer to increase your yield. Without fertilizer the yield will just be like other yields……fertilizer is expensive to buy in the market and after spending a fortune you might not get correct fertilizer (A 49-Year-Old Female Rice Farmer/Pachari/Lower Fuladu West District, 26th June, 2019).

The finding above is line with Kula and Dormon (2009), who reported that high cost of inputs, especially fertilizer, due to global price increases and local transport costs, is one of the major challenges and obstacles faced by developing countries.

Regarding the challenges faced in accessing quality and improved seeds varieties, it was revealed that, (219) 57% of the farmers highlighted that they lack quality seeds. They explained that they receive seeds from the RVC programme but it is never sufficient. They also receive seeds on credit from the projects which are repaid after harvesting and threshing. This shortage of seeds makes it difficult to cultivate all their plots, thus, reducing the yield for that season. This challenge was mentioned during an FGD:

> Our major challenge in rice farming is the lack of quality seeds, sometimes after harvesting because we don't have threshing machines, the harvested rice is left in the fields and water from the canals can leak and soak the rice, thus, we are deprived of seeds for the next planting season, in short, we have enough land for rice cultivation

> but less seeds (A 52-Year-Old Male Rice Farmer/Jarumeh Koto/Sami District, 27th June, 2019).

The implication of the finding above is that, farmers are made to use local cultivars as planting materials in their fields which will not produce high yields, thus, reducing productivity. They also buy seeds from other farmers or neighbouring villages and sometimes the seeds are mixed seeds; contains different seed varieties.

The study also revealed that 84% the discussants reported that, poor causeways in the rice fields are another challenge they face under the rice value chain programme. This indicates that most of the farmers find it difficult to transport inputs and outputs in the rice fields. Although in most of the villages in the study area, there has been rehabilitation in the tidal irrigation schemes, the causeways are not in good shape and thus a major challenge for the farmers. According to one of the discussants:

> ... and the ways …. yes causeways … sometimes it happens to us when we are ploughing, you don't want to waste fuel, before moving from one plot to another you have to round and round and that is a waste of fuel, but if the causeways are good, you can just plough there and cross to the other one (A 38-Year-Old Male Rice Farmer/Touba Demba Sama/Niamina District, 25th June, 2019).

Similarly, another discussant stated thus:

> …the cause ways, within the rice fields you can have three plots sharing the same causeway, assuming I own the last plot at the end of the causeway and I am the last to plough my plot, bringing a tractor won't help because the tractor will have to enter the two fields before mine which are already transplanted with seedlings causing damages to other farmers plots which is usually a big issue in our rice fields (A 57 Year Old Male Rice Farmer/Pachari/Lower Fuladu West District, 26th June, 2019).

The implication from the finding above is that farming operations in the study area need to be conducted at the same time so as to prevent damages to seedlings and ripened a grain which is a major cause in decreasing rice productivity in the study area.

The uneven distribution of water in the plots within the rice fields as a result of the poor leveling was another challenge highlighted. The discussants reported that some of their fields do not have water for them to till, as such those fields are abandoned, and other fields are also flooded to an extent that cultivation of rice is also impossible. The finding from the study area indicates that 48% of the discussants highlighted this challenge. This was stated as thus:

> The rice fields are not level, some are on top and other are below, those fields at the top do not have water, while those in a depression have a lot of water, this creates a lot of problems with us farmers…my plot have water whiles my neighbouring farmer's plot doesn't have water and for him to have water, I have to break the bund between us. Only a machine can level those plots, if you do not have the machine then you have to abandon the plot and concentrate on those with water but if the plots where all leveled, they will all have water and this can increase our yield. (A 55-Year-Old Female Rice Farmer/Pachari/Lower Fuladu West District, 26th June, 2019).

In addition to the above-mentioned challenges faced by the farmers under the rice value chain programme, (209) 55% of the discussants in the study area revealed that levels of production is determined by the flow of water from the canals to the rice fields. They explained that the flow of water is impeded by grasses, weeds and sand in the canals. This has posed a lot of problems as some plots do not have water. For rice cultivation to take place, there must be water for other farming operations to take place. This was reinforced by one of the farmers during the FGD sessions:

> The canals are blocked. The primary and secondary canals are all blocked; water is not reaching plots for rice cultivation. We do not have the money or the machines to desilt the canals (A 38-Year-Old Female Rice Farmer/Pachari/Lower Fuladu West District, 26th June, 2019).

Another respondent describes the challenge as thus:

> For rice production to improve, we need water, our water ways are not good, the canals are blocked… (A 52-Year-Old Female Rice Farmer/Pachari/Lower Fuladu West District, 26th June, 2019).

The above findings is in line with Saïdou and Kossou (2009), who reported that: "In Benin, the non-maintenance of irrigation canals is one of the main factors causing problems at the level of the rice plots managed under gravity irrigation for farmers under Rice Value Chain Programmes. The implication is that without water in all the rice fields, farmers will have less area to cultivate, thus, reducing their yield and levels of production".

Similarly, the finding from a key informant is consistent with the above assessment;

> Despite the training provided to the Water User Associations in targeted rice perimeters by the SWMU coupled with sensitization conducted by DCD, the key irrigation infrastructures are rarely maintained. This is peculiar with the main, secondary and tertiary canals. Tall grasses are found in most of the canals that were de-silted thus rendering water management systems difficult resulting low production and productivity (Monitoring and Evaluation Officer/Central Project Coordination Unit/Banjul, 6th July, 2019).

Table 4 also showed that 40% of the discussants have experienced flood in their rice fields and this they revealed have caused a decrease in their productivity. Villages affected

in the study area highlighted that some farmers didn't harvest anything as the rice was either submerged or washed away. Such was emphasized by one of the respondents during one of the FGD sessions:

> My production had decreased last year because of flooding, I lost almost everything that I cultivated, rising sea levels and water from the upland and run-offs covered our rice fields and destroyed our rice (A 60-Year-Old Female Rice Farmer/Kudang/Niamina District, 24th June, 2019).

Similarly, another discussant stated thus:

> The rice field belt that was constructed is no more there, so water coming from the uplands is causing flooding in the fields (A 27-Year-Old Male Rice Farmer/Pachari/Lower Fuladu West, 26th June, 2019)

The above finding is in line with the views of a key informant who stated that:

> The sector needs to act now to ameliorate the perennial floods that do not only affects rice production and productivity but cause economic loss to target beneficiaries. Both production and productivity has dwindled drastically which is assumed to be the impact of the floods (Director of Crop Research/Abuko, 4th July, 2019).

Large volumes of rice have been produced for the past three years in the study but marketing has been one of the pitfalls of the rice value chain programme. Farmers, processors and traders complained of rice marketing in the region. The discussants stated that there are no fixed prices; it is based on the agreement between the buyer and the farmer.

> There is no fixed price for locally milled rice; it is all based on bargain, what the farmer agrees with the buyer that is it (A 45-Year-Old Female Rice Farmer/Kudang/Niamina, 24th June, 2019).

The above finding is in line with what was stated by the key informants who stated that:

> Despite the large volumes of production achieved, percentage or quantity marketed is still low. The reason advanced is insufficient market information and unorganized farmer organization; some of the rice farmer cooperatives were highly politicized with their leadership frequently arrested by the former regime (Monitoring and Evaluation Officer, Central Project and Coordination Unit/Banjul/July, 2019).

Only a few of the discussants reported salt intrusion as a challenge in the study area. This challenge has led to farmers abandoning their fields and has thus affected their productivity. This was stated as thus:

> We have abandoned most of our rice fields in the lowlands as a result of salt, salt is intruding in to the fields and we can no more grow rice there, our fields are growing smaller every year (A 27-Year-Old Male Rice Farmer/Dankunku/Niamina Dankunku District, 24th June, 2019).

Similarly, another discussant highlighted the challenge as thus:

> Our yield is increasing as a result of projects intervention but we are facing a challenge with salt intrusion, it has already affected some fields and more will follow soon (A 50-Year-Old Male Rice Farmer/Kudang/Niamina District, 24th June, 2019).

This finding is consistent with the findings of key informants, who stated that; Due to poor drainage system created by the project activities over time, there was salt accumulation thus subjecting the areas to poor soil conditions and eventually abandoned by farmers.

3.2.3: Challenges Faced by Researchers

Regarding challenges faced by the research institute, the finding revealed that the institute face challenges in seed multiplication and distribution which includes, mixing of seed varieties by farmers during harvesting, the proximity of one plot to another in the rice cultivation allows mixing of rice seed varieties during harvesting, threshing, especially when one threshing machine is used by a community. The non-documentation of the achievements of the research institute was also highlighted. Funding has been the most pressing constraint in terms of research.

> Even today we had a lengthy discussion about that, … you know the problem is that every year we submit our proposal for approval by the cabinet but once it's approved to get that fund…, even to get half of that fund is a problem and when you complain they will say you know the country is this, the country is that, up till now the whole research institute in NARI and Sapu Station, we do not have even a single tractor. We need more staff too but we can't recruit them because of funding……, at times we even have problem to pay salaries. The allocation alone for one region; West Coast Region is more than that of that of NARI (Researcher NARI, Sapu Station /Sapu, 2019).

The finding above indicates that without adequate funding, there will be a weak linkage between the research institute and the farmers, which is decrease production and productivity in the region. The dissemination of breeder materials and research finding from institute will be delayed in reaching the target populace. This finding of the study is contrary to what Fan, Omilola and lambert (2009) reported that of the crop researches, the rice research continuously received the highest priority.

Similarly, an overall increase in production is reported to be focused on land area expansion and all year-round cultivation of rice by farmers but all that will require investment from both the private and public sectors. This was in line with a view from the in-depth interview:

> The expansion of double-cropping of irrigated rice and the provision of controlled drainage facilities for year-round production of rice in the short and long-term will call for further public and private investments (In-depth interview/Banjul, 2018).

This implies that an increase in rice production should not be based on the land area increase but rather on the yield per plot or hectare.

3.2.4 Challenges Faced by Input Dealers

With reference to constraints encountered by input suppliers in the region, some of the key informants lamented the lack of sufficient capital to buy enough inputs and the availability of some inputs like fertilizers and herbicides. This was revealed by one of the key informants as thus:

> The main challenge I have in this business is that, I don't have enough capital to order for inputs I want from Senegal, three quarter of the inputs you see here are from Senegal and the foreign exchange is high, thus, making it difficult to make profit (A 45-year-old input dealer/Wassu, 2019).

The above finding regarding the non-availability of inputs is in line with (the Coalition for African Rice Development (CARD), 2014) reported that: "In The Gambia, there is no local manufacturing of fertilizer. The implication of the finding is that all fertilizer used in rice farming in the study area is imported and a times, it is expired, before reaching the farmers which will not induce any increase in yield".

The finding also showed that the private sector is the dominant force in the input supply chain. The major suppliers are located in the largest urban centres close to the city, which makes it difficult to transport inputs to the study area.

Similarly, a key informant also reported that the interest rates charged by bank to secure loans are very high and this discourages them from borrowing to buy inputs for the farming season. They discussed that even after taking the risk of borrowing from banks, they face another challenge when the government subsidies on farm inputs.

> Although we have collaboration with the rice value chain projects, government subsidies on rice inputs is slowing down our business and participation in the rice value chain……., the price of government inputs are lower than what we charge and sometimes farmers are given the inputs for free making our business stagnant (Manager of Gambia Horticultural Enterprise/Old Jeswhang, 2019).

The above finding implies that, although rice value chain programme collaborates with input dealers, there is still room for improvement in the collaboration to improve their effectiveness and efficiency.

3.2.5 Challenges Faced by Processors

Regarding the challenges faced by rice processors, the study revealed that the main challenge is the availability of spare parts and this has hindered the milling process. This challenge was thus mentioned during the in-depth interview:

> Currently the machine has breakdown, what holds the belt has a problem, so am scared to do any milling process (Private Mill Operator/Barajally Suba, 29th June, 2019).

Similarly, the findings from the study highlighted the same issue, he stated thus:

> We had a breakdown and the milling machine spare part (dynamo) was not available in Sapu, it was not even available in the Kombo's, so the Ministry of Agriculture had to order it from Senegal which took sometime… (Manager of Medina Umfally Rice mill/Medina Umfally, 26th June, 2019).

Other challenges reported includes, dust and smoke from the machine during milling and heat generate from the machine is unbearable. Some informants highlighted that they were not paid regularly and this was making life difficult for them as they had families to feed.

3.2.6 Challenges Faced by Rice Traders

In terms of challenges faced by the rice traders, a key informant highlighted that the rice value chain programme concentrated on farmers and traders who belong to a farming organization. Thus, the do not directly benefit from the programme. Another challenge stated by the informants is the lack of ready markets and market infrastructure for the rice sold and transporting the rice from their homes to market daily or during "loumo's" is laborious.

> We do not have ready markets; we only sell our rice during market days, this occurs once a week and if we can't sell, we have to keep the rice till the following market day again (A 45-Year-Old Rice Trader/Wassu/Niani District/27June, 2019).

The finding above was also mentioned by another rice trader, who stated thus:

> I have to transport my rice bags after every market day to the house because there are no stores for us to keep our rice and since we cannot sell all our rice at once, we are forced to sell at a low price rather than carry the rice bags home (A 37-Year-Old Rice Trader/Brikamaba/22 June, 2019)

The above constraint is in line with what a key informant highlighted during the in-depth interview session, thus:

> Out of the quantity of rice produced in 2017 i.e., 25,132.95mts only 6,534.47 Metric tons was marketed, this volume accounts for 26%. This can be attributed to low prices and in some cases, uncertainty of having buyers, lack of market information or weak farmer/producer, organization/cooperatives and

unorganized markets along the rice value chain (Monitoring and Evaluation Officer, Central Project Coordinating Unit/Banjul/July, 2019).

IV. CONCLUSION AND RECOMMENDATIONS

However, there were certain challenges confronting the realization of the vision of the rice value chain programme, these challenges include; inadequate inputs (fertilizer, improved seeds, tillage implements and machinery; tractors and power tillers), inadequate machinery for tillage, ploughing and processing, invasion of wild life on the rice fields and lack of marketing infrastructure and information. Researchers, input suppliers and processors have been strained by the lack of capital and funding to contribute fully in increasing rice production.

Rice value chain programme focal points of projects should follow-up with the rice farming communities to rehabilitate the damaged anti hippo dykes around the perimeter of the rice fields, this will reduce the incidences of wild life invasion and destruction of rice crop.

The Soil and Water Management Unit (SWMU) in close collaboration with the RVC Focal Points and the Department of Community Development to conduct a refresher training targeting the Water User Association (WUA) members, this will ensure that water conflicts and distributions are minimized. It will also enable canals to be free of grasses and sediments which will allow free flow water to all the plots in the fields.

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

RVC programme should ensure that all works in the rice fields are completed on time and are of standard. There should be a proper monitoring and evaluation committee that will ensure that all works are done in line with RVC Programme specifications.

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.

Local government administrators should change customary land laws which will pave way for women rice farmers to have access to rice fields and increase productivity.

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

REFERENCES

[1] Agrawal, A., Pandey, R. S., & Sharma, B. (2010). Water pollution with special reference to pesticide contamination in India. Journal of Water Resource and Protection, 2(05), 432.

[2] Anandajayasekeram, P., & Gebremedhin, B. (2009). Integrating innovation systems perspective and value chain analysis in agricultural research for development: Implications and challenges, 16: ILRI (aka ILCA and ILRAD)

[3] Bates, J. A., Parkinson, J. R., & Bates, J. (1963). Business economics: B. Blackwell.

[4] Bureau, Y. S. (1998). Yunnan statistical yearbook: Beijing: China Statistics Press.

[5] Center, A. R. (2007). Africa Rice Trends: Overview of recent developments in the sub-Saharan Africa rice sector. Africa Rice Center, Cotonou, Benin.

[6] del Villar, P. M., & Lançon, F. (2015). West African rice development: Beyond protectionism versus liberalization? Global Food Security, 5, 56-61.

[7] Fagade, S. (2000). Yield gaps and productivity decline in rice production in Nigeria. Expert Consultation on yield gap and production decline in rice, 5-7.

[8] Falusi, A. (1997). Agricultural development and food production in Nigeria: problems and prospects. B., Shaid, NO, Adedipe, M. Aliyu and Jir, M.(eds.) Integrated Agricultural Production in Nigeria: Strategies and Mechanism (NARP Monograph No. 5. pp. 151-170.

[9] FAO, U. (2014). FAOstat. Retrieved Feb, 2014.

[10] FaoStat, F. (2013). FAOSTAT. Food and Agriculture Organisation of the United Nations. http://faostat.org/default.aspx. Accessed March 2018.

[11] FAOSTAT, F. (2016). Agriculture Organization of the United Nations Statistics Division. Economic and Social Development Department, Rome, Italy. http://faostat3. fao. org/home/E. Accessed, 12 March 2018.

[12] Gazetteer., W. (2008). "Gambia: Verwaltungsgliederung (Bevölkerung und Fläche)". . Retrieved 2008-08-18.

[13] Gomez, D., Akpen-Ageh, E., & Kwaghngu, H. A. (2022). Effect of Rice Value Chain Programme on Rice Production in the Gambia

[14] Giuliano, P., & Ruiz-Arranz, M. (2009). Remittances, financial development, and growth. Journal of Development Economics, 90(1), 144-152.

[15] Grunert, K. G., Esbjerg, L., Bech-Larsen, T., Brunsø, K., & Jørn Juhl, H. (2006). Consumer preferences for retailer brand architectures: results from a conjoint study. International Journal of Retail & Distribution Management, 34(8), 597-608.

[16] Hazell, P., & Wood, S. (2008). Drivers of change in global agriculture. Philosophical Transactions of the Royal Society B: Biological Sciences, 363(1491), 495-515.

[17] Hazell, P., & Wood, S. (2008). Drivers of change in global agriculture. Philosophical Transactions of the Royal Society B: Biological Sciences, 363(1491), 495-515.

[18] IRRI, A. (2010). CIAT (2010). Global Rice Science Partnership (GRiSP).

[19] Kaplinsky, R., & Morris, M. (2001). A handbook for value chain research, 113: Idrc Ottawa.

[20] Kotler, P., Armstrong, G., Brown, L., & Adam, S. (2006). Marketing. Australia: Pearson Education Australia: Prentice Hall.

[21] Kula, O., & Dormon, E. (2009). Global food security response Ghana rice study. microReport 156. USAID Google Scholar.

[22] Matriz, M. J., Molina, I., Valera, H. G., Mohanty, S., & Jamora, N. (2010). Global rice demand: Is rice really becoming an inferior good. Paper presented at the 28th International Rice Research Conference

[23] Muthayya, S., Sugimoto, J. D., Montgomery, S., & Maberly, G. F. (2014). An overview of global rice production, supply, trade, and consumption. Annals of the New York Academy of Sciences, 1324(1), 7-14.

[24] Njie, M. (2007). The gambia national adaptation programme of action (NAPA) on climate change. Government of The Gambia, Banjul. Journal of Development Economics, 90(1), 144-152.

[25] OECD-FAO, (2008). Agricultural Outlook 2008-2017: OECD-FAO.
[26] Porter, M. E. (1990). New global strategies for competitive advantage. Planning Review, 18(3), 4-14.
[27] Saïdou, A., & Kossou, D. (2009). Water management for enhancing land productivity in Benin: exploring opportunities for enhancing land productivity by smallholder farmers through water management. Paper presented at the Towards Enhancing Innovation System Performance in Smallholder African Agriculture, Proceedings of the First CoS-SIS International Conference, CoS-SiS Programme.
[28] Somado, E., Guei, R., & Keya, S. (2008). NERICA: The new rice for Africa–a compendium. Africa Rice Center (WARDA), 10-14.
[29] Timmer, C. P. (2010). Reflections on food crises past. Food policy, 35(1), 1-11.
[30] Timmer, C. P. (2014). Food security in Asia and the Pacific: the rapidly changing role of rice. Asia & the Pacific Policy Studies, 1(1), 73-90.
[31] Wang, Y., B., Li, J. R., & Lin, J. (2008). Probiotics in aquaculture: challenges and outlook. Aquaculture, 281(1-4), 1-4.