

## Gender Perspectives of Action Research for Improved Rice Value Chain in Northern Guinea Savanna, Nigeria

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### Abstract

This paper aimed at determining the gender disparity along the rice value chain in Northern Guinea Savanna of Nigeria. 250 farmers were selected by stratified random technique from five villages in Katsina State of Nigeria. Data obtained by structured interview and focus group discussion methods were analyzed by descriptive statistics and gross margin techniques. Gross margin profit was significant for male farmers (t-statistics = 10.628) but not for female farmers (t-statistics = 1.262) at 5 percent level. The rates of return on capital were 0.847, 0.148 and 0.601 for processing, wholesale market and retail market levels respectively. Socio-cultural factors confining women to indoor activities constrained their access to production inputs, processing facilities and market. Improved access of farmers to inputs, and women in particular to processing facilities and skills would promote production of good quality rice in the study area.

**Keywords:** Gender, Rice value chain, Northern Guinea Savanna, Nigeria

## 1. Introduction

Nigeria is the most populous country in Africa, with a population of over 150 million people (NPC, 2006); with 80 percent poor and food insecure, and women and children being mostly affected (FAO, 2006). The major food crops include cereals such as sorghum, maize, and rice; tubers such as yams and cassava; legume such as groundnut and cowpea, as well as vegetables. Food crop production in Nigeria is mostly at subsistent level from small holding farms, and the observed increases in African food production have been achieved largely through extending the area under cultivation rather than productivity-improving technologies (FAO, 1999).

Domestic production of rice in Nigeria is not meeting the demand; Akande (2003) related the widening demand and supply gap in rice production to the huge import bill on rice. Government's programmes towards national food security in Nigeria include a presidential initiative on rice; which was initiated in 2002 with the objective of attaining food sufficiency in local production of rice in 2005 and targets of 3 million hectare cultivation, 15 million tone of paddy rice or 9 million metric tons of milled rice (FMAWR, 2008). This programme has been associated with increases in yield of rice from 3.5 tons to 7.5 tons per hectare, national output from 3.1 million tons to 4.6 million tons, and cultivated area from 2.2million ha to 2.8million ha (FMAWR, 2008). Despite these developments Nigeria is still the world's largest importer of rice (FAO, 2006).

Women play vital roles in food production processing and marketing in Nigeria; producing about 60-80 percent of total output (Buckland and Haleegoah, 1996; Rahman et al 2004), and contributing about 60-80 percent of agricultural labor force (Mgbada, 2000). They also contribute more than two-thirds of their produce towards household subsistence (Ayoola, 1999; Rahman and Usman, 2004). The invaluable contributions of women farmers in the production and processing of rice in the Northern Guinea Savanna of Nigeria have been undervalued by research and documentation. It has been established that in Sub-Saharan Africa, there is gender inequality in farmers' access to adequate productive resources such as land, credit, agricultural inputs, education, extension services, and appropriate technology; and that this results in relative inefficiencies of male and female farmers. Action Research for Development (AR4D) is based on the principles of participation, inclusiveness, experiential learning, and action; with gender being a critical cross-cutting factor in innovation process to promote equal access of female and male farmers to necessary resources, and enhance their relative production efficiencies. These principles were applied to develop innovations for promoting the efficiency of rice production, processing and marketing in the Northern Guinea Savanna, Nigeria. This necessitated an assessment of the relative involvement of female and male farmers in rice entrepreneurial activities, and their economic performance along rice value chain in the Northern Guinea Savanna of Nigeria. The study applied the Global Commodity Chain (GCC) approach, previously applied to analyze the cotton industry in Nigeria (Kudi et. al., 2007). The GCC was defined by Hopkins and Wallerstein (1986, 1994) as "a network of labor and production processes whose end result is a finished commodity". The hypothetical question explored was that the economic performance of female actors along the rice chain was not significantly different from that of the male actors. The general objective was to assess the entrepreneurship of men and women in the rice value chain. Specifically, the study compared the profitability and the return on variable capital at the different stages of the rice value chain, assessed the relative access of male and female farmers to production inputs, as well as identified the constraints facing them.

## 2. Methodology

The study was conducted in Katsina State in the Northern Guinea Savanna of Nigeria; located between latitudes 11<sup>0</sup> and 13<sup>0</sup> N and longitude 6<sup>0</sup> and 9<sup>0</sup> E (Anonymous, 1998). The area is bounded in the North by Niger Republic, to the South by Kaduna State, West by Zamfara State and East by Kano State; and covers a land mass of 23 938 square kilometers with a population of 5 792 578 (NPC, 2006). The study covered five villages; namely Dandume, Gazama, Mahuta, Albasu and Dankatari in Dandume Local Government Area. Focus group discussion and personal interview methods were used to collect primary data from 250 male and female rice farmers. Two gender-focal group discussions were held per village involving averagely 25 female and 25 male farmers purposively selected based on their involvement in rice enterprises. Also, structured questionnaires were administered on 100 farmers, selected by stratified random sampling of 10 farmers per focus group.

The data were analyzed using descriptive statistics including percentages, means and gross margin analysis. T-statistics were used to determine the significance of the gross margin profit from rice production by male and female farmers at 95 percent confidence level.

### 2.1 Analytical Technique

Gross Margin (GM) = TR-TVC

Where,

TR= Total Revenue, measured by the revenue (Naira) obtained from sale of output

TVC= Total Variable Cost, measured by the sum of expenses on inputs and labor for farming, processing and marketing operations

The gross margin analysis was done at the farm level for paddy rice production, as well as processing and marketing levels.

### 3. Results and Discussion

#### 3.1 Gender Participation in the Rice Value Chain

Table 1 shows the relative involvement of male and female farmers in the rice value chain. All the male farmers were involved in decision making regarding rice production, while only 44 percent of female farmers took part in decision making about field activities. Women were not actively involved in field activities but delegate their husbands and sons to supervise hired labor on their plots for all field operations. Out-door field activities including land clearing and tilling, sowing and nursery establishment, transplanting, weeding, fertilizer application, bird scaring, harvesting, threshing, and winnowing were exclusive male activities. Similarly, decisions about marketing were taken by 22 percent and 40 percent of male and female farmers respectively, while virtually all marketing functions at the different level (merchant-wholesale, wholesale-retail and retail levels) were exclusive domain of men. Women were usually not directly involved because of the cultural restriction of women from outdoor activities, but their husbands and children were responsible for transportation and market transactions for which they received 10 percent of the total revenue. Women take active part in decision making about household subsistence, about 54 percent of female output accounted for household subsistence while 36 percent provided income for them. On the other hand, the men contributed 20 percent of their rice output for household subsistence and sold 80 percent to generate income. Women were more involved than the men in decision making about rice processing; 43 percent of the women played active roles in home-based processing activities such as sun drying and parboiling, while 22 percent of the men were actively engaged in outdoor aspects of processing such as transportation to mills as well as operation and maintenance of the milling engines. Ajani (2008) reported similar findings in Northern Nigeria, among the Muslim Hausa-Fulanis where seclusion norms dictate that women should be less involved in outside-the-compound farming tasks, except those who have reached menopause or are widowed. In contrast, she reported that women in Southern Nigeria generally carry out most farming operations on the family farms and their own farms; and that rural women were actively involved in post-harvest processing even when in purdah as a store of wealth and "living savings accounts".

#### 3.2 Socio-economic characteristics of rice farmers in study area

Results on table 2 showed that about 97 percent of male farmers and 98 percent of female farmers were married; and their average age was 44 years and 40 years respectively. These results indicated that both categories of respondents were in their productive age, and the women in their active reproductive years. The implication is that the majority of the women have multiple roles; and their reproductive roles do not bring direct economic value to them. Married women within reproductive age were more likely to be constrained by cultural practices that prevented women from direct field production activities, thus limiting the extent of their participation in rice production in the study area. The cultural practice of seclusion of women was previously found to hinder women's access to productive resources; Amaza et al (1999) assessed women's access to needed farm resources to be very low in Borno State of Nigeria due to marital and religious reasons. Ayoola et al (2006) also confirmed that multiple roles of women constrained the productivity of women's time in Benue State, Nigeria, and thus, recommended policies that would encourage the release of women's time from non-entrepreneurial works in order to enhance the productivity of their time and increase the supply of women entrepreneurship in low income households.

Table 2 showed that about 44 percent of men and 45 percent of women had formal education, indicating that literacy level was generally low among the respondents. Kebbeh et al. (2003) reported that about 29 percent of rice farmers in Kaduna and Niger States of Nigeria did not have formal education. Amaza et al (1999) also found that lack of awareness due to low literacy rate hindered women's access to farm resources in Borno State of Nigeria. Results also showed that about 85 percent of female farmers and 57 percent of male farmers participated in community-based associations. This suggests that female focus associations could be an entry point into engaging female farmers in an innovation process for increased productivity of rice enterprises towards their livelihood improvement and poverty reduction. Both male and female farmers had long years of

experience in rice enterprises, which represents an advantage for promoting rice enterprises as a livelihood strategy among both farmer categories.

Results also indicated a relative disadvantage of female farmers in terms of access to farm inputs. Table 2 showed that the average farm size of the male respondents was higher than that of the women, probably due to the cultural land tenure that gives the heritage and control of land to men in most parts of the Northern Guinea Savanna in Nigeria. Table 2 also showed that the women utilized less quantities of fertilizers, herbicides and labour, than the male farmers; thus corroborating the findings of Ezedinma (2001) for Southern parts of Nigeria.

### 3.3 Profitability of the rice value chain

#### 3.1.1 Paddy Rice Production

Table 3 showed that the average output of paddy rice was about 3192kg and 4655kg for female and male farmers; corresponding to an average yield of about 2.3 tons paddy/ha and 2.4 tons paddy/ha respectively. These results indicated an increase from the findings of Singh et al (1997) of an average yield of 1.8tons paddy/ha and output of 4.6 tons per year in Kaduna and Niger States of Nigeria; but fell short of the report of FMAWR (2006) which indicated an average increase from 3.5 tons to 7.5 tons per hectare in Nigeria between 2002 and 2007. Results on table3 also showed a gross margin profit of N117 820.00 from male farms and N76 165.00 from female farms, significant for male farmers but not significant for female (t-statistics 10.628 and 1.262 respectively) at 5 percent level. These results indicated that the male farmers were able to maximize profit better than the female rice farmers in the study area. This corroborated Awotide (2006) who found that male rice farmers were more economic and price efficient than female rice farmers in Ogun State of Nigeria; also confirmed the findings of Adesina and Djato (1996) and Ajani (2001) in C'ote d'ivoire and Northern part of Oyo State in Nigeria respectively. Table 3 also showed that the rates of return on capital were 1.090 and 1.194 for male and female farmers respectively; indicating that increased capital investment on production inputs by women could possibly enhance the profitability of the female farms to reduce the gender inequality in paddy rice production.

Focus group discussion revealed that the farmers attributed their low physical productivity (yield) of paddy rice to several factors including poor access to good quality seed, fertilizers and agrochemicals, poor producer prices, lack of mechanized equipments for threshing and winnowing which reduces quality of paddy rice and increases labour cost; as well as lack of access to credit and market information. Improved access of farmers to these resources would likely increase farm productivity and reduce production costs; thereby increase the competitive capacity of rice farmers in the study area. Akpokodje et al (2001) suggested the need to direct efforts towards increasing productivity and reducing production costs of rice.

#### 3.1.2 Processing-level

On table 4, the profitability analysis showed that every 100kg of paddy rice, when processed yielded about 80kg of milled rice and 20kg of rice bran; at selling price of about ₦ 8 000.00 and ₦100.00 respectively; making total revenue of ₦ 8 100.00. The total variable cost was ₦ 4 450.00, which was expended on the functions performed to add value to rice; including parboiling, drying, milling, winnowing, transportation and bagging. The gross margin was ₦3 760.00, and the rate of return on capital for processing paddy rice to milled rice was 0.847. The overall results of the value chain analysis indicated that next to paddy rice production, processing accounted for the highest rate of return to capital. This represents an opportunity for women in the study area, as they participate more actively in rice processing. However, they lacked adequate skills and processing facilities for producing good quality milled rice grains, thus, limiting their capacity to compete and maximize profit from rice enterprise.

#### 3.1.3 Marketing level

The market component of the value chain analysis for rice was carried out at three levels: merchandize-wholesale, wholesale-retail and retail levels (Table4). The wholesale-merchandize level involved bulking about 10 tons of paddy at the purchase price of about N4 000.00 per 100kg, and selling price of about ₦4 750.00 per 100kg paddy rice. The total variable cost was about ₦4 300.00 per 100kg paddy rice; spent on wholesale-merchandise functions including transportation, loading and off-loading, storage and payment of market levies. The gross margin profit accruing to merchandize-wholesaling was about ₦ 450.00 per 100kg of paddy rice, and the rate of return was 0.105; indicating that every Naira invested in wholesale trade of rice would yield an incremental benefit of about ₦0.105.

At wholesale-retail level, paddy rice was bought at farm gate price of ₦4 000.00 per 100kg during the harvest season, and sold during the off-season period at about ₦4 800.00 per 100kg. The total variable cost was ₦4180.00; incurred on activities to create time utility and take advantage of seasonal price variation. The gross

margin was ₦620.00 per 100kg paddy rice and a rate of return of about 0.148; indicating that every Naira invested by wholesale-retail traders to add time utility to rice would yield an incremental benefit of about ₦0.148.

At retail level, 80kg of milled rice was purchased at ₦8 000.00 and sold at ₦170.00 per kg to derive total revenue of ₦13 600.00. The total variable cost was ₦8 455.00; and the gross margin on retailing operations was about ₦5 145.00. The rate of return was about 0.601, indicating the incremental benefit accruing to every Naira invested in retail marketing of milled rice. At the market level, retailing accounted for the maximum return to capital, while merchandize-wholesaling had the minimum.

#### 4. Conclusion and Recommendation

The results showed that in relation to the male farmers, the female farmers were more constrained by socio-economic factors that prevented them from direct involvement in outdoor field production of rice except by proxy. Women owned relatively smaller plots, used smaller quantities of farm inputs, and obtained smaller rice outputs; hence, they earned lower profit margin from paddy rice production. The t-statistics for the gross margin estimate indicated that gross margin for male farmers was significant at 5 percent level, while the gross margin estimate for female respondents was not significant. The conclusion was that policies that would enhance timely access of rice farmers to adequate farm inputs including land, fertilizers, improved seeds, herbicides and labor at affordable price; would likely increase the profitability of rice production and reduce gender inequality in the rice value chain. Improved skill and facilities for processing rice might stimulate greater demand for paddy rice by processors who were mostly women, and thereby stimulate innovativeness for greater paddy output and quality improvement. Strategies that strengthen linkage of farmers to research, extension, inputs and outputs markets, as well as financial institutions; are also likely to enhance their access to improved techniques and machinery for harvesting, threshing and processing; thereby, increasing the productivity of paddy and milled rice in the study area. Entry strategies that involve female community associations could promote female participation in research and development programmes that could enhance their potential for increased productivity and profitability of rice enterprises.

It is therefore suggested that action research into improving rice value chain in the Northern Guinea Savanna of Nigeria should evolve gender strategies for mobilizing women's participation and targeting them especially with improved access to land, fertilizers, agrochemicals, credit and improved processing techniques.

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Table 1. Distribution of Respondents Based on their Involvement in Rice Production, Processing and Marketing

Activities	Percentage Involvement		Gender Responsibility
	Male	Female	
Decision about rice production	100.00	44.00	Male play active roles while female delegate husbands and sons
Land clearing	83.33	-	Men own and operate mills
Tilling	79.16	-	Male, female by proxy through husbands, sons and hired labor
Sowing/Nursery establishment	100.00	-	Male, female by proxy
Transplanting	100.00	-	Male, female by proxy
Weeding	100.00	-	Male, female by proxy
Fertilizer application	75.00	-	Male, female by proxy
Birds scaring	62.50	-	Exclusive male especially youths
Harvesting	91.67	-	Male, female by proxy
Threshing	100.00	-	Male, female by proxy
Winnowing	100.00	-	Male, female by proxy
Sun drying	100.00	-	Male, female by proxy
Decision about rice processing	22.00	43.00	Women play active roles in home-based processing activities while men carry paddy rice to mills
Parboiling	22.00	43.00	Women parboil, men fetch water and firewood
Sun drying	22.00	43.00	Both male and female, especially at the homestead
Transportation	22.00	-	Male, from farm, to the mills and markets
Milling	22.00	-	Men carry paddy rice for milling, operate and maintain mills
Storage	91.67	-	Men, women by proxy
Decision about household subsistence	100.00	44.00	Women contribute 54 percent for subsistence, men contribute 20 percent
Decision about marketing	100.00	40.00	Men sell 80 percent and women sell 36 percent of output. Women sell output by proxy, remit 10 percent of market margin to husbands and sons as marketing charge
Merchant wholesale	20.00	-	Exclusive male, bulking >10 tonnes per trip
Wholesale retail	95.83	-	Exclusive male, female by proxy
Retail	95.83	-	Exclusive male, female by proxy

Source: Field Survey, Katsina State, Northern Guinea Savanna, Nigeria, 2009

Table 2. Socio-economic characteristics of respondents

Variables	Male	Female
	Mean (Percent)	Mean (Percent)
Age (years)	43.70	39.96
Experience (years)	24.75	19.23
Education (%)	(44.2)	(45.3)
Marital Status (%)	(97.4)	(98.1)
Farm size (hectare)	2.00	1.39
Group membership (%)	(57.24)	(84.53)
Fertilizer (bags)	34.04	11.62
Herbicides (litres)	6.17	4.06
Labour (mandays)	77.28	41.76

Source: Field Survey, Katsina State, Northern Guinea Savanna, Nigeria, 2009

Table 3. Gross Margin Analysis Paddy Rice Production in Dandume LGA, Katsina State, Nigeria

Variables	Male			Female		
	Mean	Standard error mean	t- value	Mean	Standard error mean	t-value
Rice outputs (kg)	4 655			3 192		
Total revenue	225 900			139 950		
Total variable cost	108 080			63 785		
Gross margin	117 820	11.086	10.628*	76 165	6.033	1.262
Return on capital	1.090			1.194		

Source: Field Survey, Katsina State, Northern Guinea Savanna, Nigeria, 2009

Table 4. Rice Value Chain Analysis in Dandume LGA

Rice Chain / Functions	Inputs/Outputs	Returns/ costs	Gross margin	Return/Naira Invested
Processing	100kg paddy processed	(4 000)		
Parboiling	Water and firewood	(100.00)		
Drying	Labour	(100.00)		
Milling	Milling service	(100.00)		
Winnowing	20kg rice bran from 100kg paddy rice	100.00		
Transportation		(100.00)		
Bagging		(50.00)		
Farm-gate sale of milled rice	100kg paddy yields about 80kg milled rice grain	8 000		
<i>Total Variable Cost</i>		(4 450)	3 750	0.847
<b>Merchant / wholesalers</b>	Per 100kg of paddy rice sold	4 750		
	Per 100kg paddy rice stock	(4 000)		
Transport		(100.00)		
Bagging		(50.00)		
Loading		(30.00)		
Off loading		(20.00)		
Storage	<i>Rent on store per 100kg rice</i>	(50.00)		
Levies		(50.00)		
<i>Total Variable Cost</i>		(4 300.00)	450.00	0.105
<b>Wholesaler/ Retailer</b>	100kg Paddy rice (sold at off-season price)	4 800		
	100kg Paddy (bought at harvest price)	(4 000)		
Transport		(50.00)		
Loading/ off loading		(30.00)		
Storage		(50.00)		
Levies		(50.00)		
<i>Total Variable Cost</i>		(4 180.00)	620.00	0.148
<b>Retail</b>	80kg milled rice	(8 000)		
Transport		(50.00)		
Storage		(5.00)		
Levies				
Packaging		(400.00)		
Retail sale	80 kg milled rice at ₦170/kg	13 600		
<i>Total Variable Cost</i>		(8 455.00)	5 145	0.609

Source: Field Survey, Katsina State, Northern Guinea Savanna, Nigeria, 2009