



**AgEcon** SEARCH  
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

*The World's Largest Open Access Agricultural & Applied Economics Digital Library*

**This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.**

**Help ensure our sustainability.**

Give to AgEcon Search

AgEcon Search

<http://ageconsearch.umn.edu>

[aesearch@umn.edu](mailto:aesearch@umn.edu)

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

*No endorsement of AgEcon Search or its fundraising activities by the author(s) of the following work or their employer(s) is intended or implied.*

## COMPARATIVE ANALYSIS OF CONVENTIONAL AND AGGREGATION MARKETING OF MAIZE AMONG RURAL DWELLERS IN KADUNA STATE, NIGERIA

<sup>1</sup>Adam, A. G., <sup>2</sup>Yusuf, R. O. <sup>2</sup>Sawa, B. A. and <sup>1</sup>Abdullahi, Y. M.

<sup>1</sup>National Agricultural Extension and Research Liaison Services, Ahmadu Bello University, Zaria

<sup>2</sup>Department of Geography and Environmental Management, ABU, Zaria

Correspondence contact details: adamaligoni@gmail.com

### ABSTRACT

A robust maize marketing system is expected to be competitive and receptive to rural dwellers as well as improve their livelihoods. The specific objectives of this study were to examine the socio-economic characteristics of the participants in conventional and aggregation maize marketing; assessed the effects of conventional and aggregation maize marketing on income and livelihood and identified the constraints to participation in conventional and aggregation maize marketing. Multistage sampling procedure was employed in selection of 331 conventional maize marketers and 344 aggregation agents. Data were analysed using descriptive statistics and Z-test. Results revealed the mean ages of conventional and aggregation maize marketers were 44.5 years and 34.5 years, respectively. Majority (91.8%) of the conventional and aggregation marketers (83.4%) were male. Majority of aggregation marketers (81.1%) had formal education compared to 72.2% of the conventional marketers. The mean annual income among the conventional and aggregation maize marketers was ₦1,482,941.946 and ₦1,819,901.689 respectively. It was found that income of aggregators was significantly higher from income of the conventional marketers at 5% level of significance, ( $Z=-3.2897$ ;  $p<0.05$ ). The livelihood index parameters used show that about 50% of the aggregation maize marketers were within the range between 1.95 to 4.89 mean indexes compared to 42.6% of the conventional marketers. The major constraints ranked by the conventional marketers were unpredictable price of the maize (84.7%) and insufficient storage facilities (81.6%). While aggregators reported inadequate funds (97.7%) and inadequate government support in terms of maize price (92.7%) as their major constraints. Policy interventions focusing on improving price stability and the promotion of strategic maize grains storage facilities are recommended.

**Keywords:** Marketing; Conventional; Aggregation; Maize

### INTRODUCTION

Rural Nigeria is characterised by agricultural livelihood especially cereal crop farming as well as other post primary production activities, services and marketing activities. However, while the promotion of the cultivation of major crops such as maize, rice, soybean and groundnuts had been growing over the years, the major concern for farmers that has little policy intervention is agricultural marketing. Ineffective agricultural marketing poses a major hindrance to the growth of the rural sector among other challenges (Akanni, 2012; Ahmed, 2014; Nebo and Ejionueme, 2017), and farmers remain frustrated by poor and sometimes non-compensatory marketing systems.

The maize marketing sector is critical to rural development and contributes significantly to the improvement of rural economy, welfare and general livelihood of rural dwellers (Sani, 2015).

According to Kotler and Armstrong (2001), a conventional marketing channel consists of one or more independent producers, wholesalers, and retailers, each operates a separate business seeking to maximize its own profits. The conventional marketing is also termed as the traditional marketing system which is obtainable in the rural periodic or regular market. Marketing of maize in Nigeria is generally limited by constraints such as lack of information and infrastructure, good road networks, storage facilities, capital, and credit provision (Rahman and Awerije, 2014; Asogwa *et al.* 2012;). Adams (2018) also observed that one of

the greatest problems currently being faced by African smallholder farmers is inadequate access to innovative marketing outlets.

The term aggregation has been used to describe the coming together of farmers in order to strengthen their livelihood to achieve their goals for sustainability (Alliance for Green Revolution in Africa {AGRA}, (2019). Similarly, Place *et al.* (2006) defined aggregation marketing as bringing produce together from multiple sources to create a larger and more consistent supply to meet demand. This arrangement would guarantee provision of services that would ensure the produce to be delivered on time at the required volumes and quality.

Maize (*Zea mays. L.*) is one of the crops being promoted by the AGRA/NAERLS Community based advisors intervention project and widely marketed in Kaduna State. It is one of the main cereal crops of West Africa and the most important cereal crop in Nigeria (International Institutes for Tropical Africa [IITA], 2012), and has been put to a wide range of uses than any other cereal. Maize is used in industries to produce maize flour, custard and used as animal feed, raw material for producing starch among others (IITA, 2012). It is therefore for several reasons needful to compare the two maize marketing approaches to provide policy advice to rural development planners and other partners.

In Kaduna State some innovative practices of maize marketing like aggregation marketing have begun to be established, thus a need to investigate its



effects on rural dwellers. Emphasis is required on both conventional and some other innovative forms of maize marketing in Nigeria to enable smallholder farmers and traders to obtain better prices for their commodities. Both conventional and the aggregation marketing approaches may have ambivalent effects on rural dwellers' income and profit, which would ultimately have effect on socio-economic development of the rural dwellers in Kaduna State. Based on this knowledge gap this study, therefore, focuses on comparing conventional and aggregation marketing of maize among the rural dwellers in Kaduna State. The specific objectives were to:

1. examine the socioeconomic characteristics of the participants in conventional and aggregation maize marketing;
2. assess the effects of conventional and aggregation maize marketing on income and livelihood of maize marketers and
3. identify the constraints to participation in conventional and aggregation maize marketing.

## METHODOLOGY

The area of study is Kaduna State which lies between Latitudes 09° 00' 59" and 11° 19' 30" North of the Equator and Longitudes 06° 45' 0 and 09° 10' 0 E East of the Greenwich Meridian. Kaduna State which is in the Northwestern part of Nigeria's geo-political zone is positioned on the southern end of the high plains of Northern Nigeria. It has a land area of 4.5 million ha with 2.2 million ha under cultivation, representing about 4.6% of the total land area of Nigeria (Kaduna State Official Website, 2018).

Survey research design method was adopted for this study while multi-stage sampling procedure was used in obtaining respondents. The first stage was the purposive sampling of six LGAs (Makafi, Soba, Lere, Igabi, Ikara and Zaria) due to the presence of aggregation marketing. The second stage was a purposive sampling of six aggregators (aggregation centres) involved in the aggregation of maize marketing activities and services as well as presence of major periodic maize markets. Krejcie and Morgan (1970) table was used to select the sample size for the entire population of conventional maize marketers (2,528) and aggregators (3,034), hence a total number of 331 and 344 respondents were used as sample size respectively. Both primary and secondary data were used for this study. Primary data were generated using structured questionnaire which covers socio-economic characteristics of the marketers like age, sex, educational level, and income, market factors such as prices of maize, quantity and types of maize sold (kg).

This study used descriptive statistic such as mean, frequency distribution, percentages to achieve objectives (1) and (3). While Z- test statistics was used to achieve part of objective (2)

This is represented by the formulae:

$$z = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}}$$

Where Z= z value

$X_1$  = sample mean of the income of conventional marketers in the study area

$X_2$  =sample mean of income of aggregation marketers in the study area

$\delta_1$ = sample standard deviation of the conventional marketers

$\delta_2$ = sample standard deviation of the aggregation marketers

$n_1$ = sample size of the conventional marketers

$n_2$ = sample size of the aggregation marketers

**Decision Rule:** If  $Z_{cal} > Z_{tab}$  at ( $P \leq 0.05$ ) we reject the null hypothesis and accept the alternative hypothesis and vice versa.

The marketers' capabilities in terms of financial, physical, human, social and natural capital were subjected to livelihood index parameters used for the livelihood level based on scale adapted from Sani (2015);

The livelihood index:

Better livelihood (4.90 to 7.90)

Good livelihood (1.95 to 4.89)

Borderline (-1.95 to 1.94)

Worse-off (-1.95 to -3.99)

Extremely Worse-off (-4.00 to -6)

## RESULTS AND DISCUSSION

### Socioeconomic characteristics

Table 1 shows distribution of marketers based on socioeconomic characteristics. The results reveal that the mean ages for both the conventional and aggregation participants were 44.5 years and 34.5 years respectively. The analysis further shows that most of the respondents were in the productive age bracket (40-49 years) for conventional participants (74.9%) as compared with 87.7% of the aggregation participants. This indicates that members of both groups are in their active age and energy that can withstand the stresses of maize marketing to improve their living condition. The implication of this finding is that there are more young marketers in the aggregation as compared to the conventional marketers. This perhaps is because diffusion of innovation is more prominent in motivating those with certain age characteristics as posited by the diffusion of innovation theory. The older people are still sceptical of the aggregation marketing who are likely to be late adopters.

**Table 1: Distribution of marketers based on Socio-Economic Characteristics**

Age (in years)	Conventional (n=331)		Aggregation (n=344)	
	Frequency	Percentage	Frequency	Percentage
Less than 20	24	7.3	17	4.9
20-29	69	20.8	65	18.9
30-39	55	16.6	139	40.4
40-49	100	30.2	81	23.5
50-59	48	14.5	19	5.5
60 and above	35	10.6	23	6.7
Min	19		19	
Max	65		65	
Mean	44.5		34.5	
<b>Sex</b>				
Male	304	91.8	287	83.4
Female	27	8.2	57	16.6
<b>Level of Education</b>				
None	92	27.8	65	18.9
Primary	66	19.9	58	16.8
Adult education	57	17.2	48	14.0
Secondary	73	22.1	93	27.0
Tertiary	13	3.9	44	12.8
Quranic	30	9.1	36	10.5
<b>Marketing Experience (in years)</b>				
1-10	60	18.1	189	55.0
11-20	139	42.0	73	21.2
21-30	84	25.4	59	17.2
31-40	48	14.5	23	6.6

Source: Field Survey, 2021

The study revealed that both categories of maize marketers have one form of education or the other. The result of the analysis also shows that 27.8% of the conventional marketers had no formal education at all compared to 18.9% of the aggregation marketers in the same class (Table 2). More of the aggregation marketers (81.1%) had formal education as compared to 72.2% of the conventional. Formal education tends to stimulate development of cognitive skills and abstract reasoning capability as well as changes in attitudes.

The result of the gender analysis for both the conventional and aggregation maize marketers is that they were mostly male constituting 91.8% and 83.4% respectively. This shows that, maize marketing activities in the study area were mostly engaged in by men who are also believed to be the head of their various household. The dominance of male in grains marketing activities such as maize confirms the findings of Bashir *et al* (2018) who found that males constitute the majority and have stronger interest in partaking in the grains marketing activities than females.

The marketing experience shown on Table 1 is measured based on years of involvement in maize marketing activities prior to 2021 when the survey was done. Also, 42% of the conventional maize marketers have been marketing for between 11-20 years while most (55%) of the aggregation agents have been marketing for between 1-10 years. The mean marketing experience for the participants

in conventional markets was 23 years while for aggregation was almost 20 years.

The marketing experience could influence marketers' income. As an illustration, the development of marketing skills over time by older marketers may strengthen their bargaining skills and understanding of market trends which might lead to higher profitability and improved livelihoods.

**Marketers' income**

To examine the earnings which are fundamental basis for all livelihood options, the marketers' income was divided into three categories: income from sale of maize (primary), earnings from casual employment (secondary) and engaging in other business (tertiary). The income from various sources is given in Table 3. The conventional maize marketers have their income sources from sales of maize (81.3%) as their main source of income. This is different from the aggregation maize marketers who in addition to different income sources have 56.4% of their income sources from sales of maize.

About 29.7% of the aggregation maize marketers' get income from casual employment compared to only 10.3% of the conventional maize marketers who also gain income from similar engagements. The findings are in line with Mahamaa and Nkegbe (2021) who opined that livelihood diversification is a common phenomenon among rural households as they earn their income from multiple sources.

**Table 2: Distribution of conventional and aggregation marketers by sources of income**

Income Sources	Conventional % (n=331)			Aggregation% (n=344)		
	Freq.	%	Average Income	Freq.	%	Average Income
Sales of maize (primary)	269	81.3	1,439,698.082	194	56.4	2,077,590.804
casual employment (secondary)	34	10.3	976,735.3	102	29.7	1,325,108.608
Engaging in other business (Tertiary)	28	8.4	2,552,276	48	13.9	1,829,843.479

Source: Field Survey, 2021

**Annual Income of Participants**

Table 3 shows the distribution of participant mean yearly income. The mean annual income was found to be ₦1,482,941.946 with minimum of ₦100,000 and maximum of ₦13,420,000 for the conventional marketers. Similarly, the mean annual income of the aggregation marketers was ₦1,819,901.689 with a minimum of ₦78,390 and maximum of ₦9,295,000.

The difference between the mean value of income for aggregation and conventional maize marketers was ₦336,959.74. The implication is that aggregation marketing had a positive effect on the income of rural dwellers. A positive mean difference in income value indicates the positive effect of the maize marketing on the income of the conventional participants.

**Table 3: Distribution of Annual Income of Participants**

Income categories	Conventional (n=331)		Aggregation (n=344)	
	Frequency	Percentage	Frequency	Percentage
Less than N 200,001	14	4.23	82	23.84
N 200,001 – N 400,000	31	9.37	40	11.63
N 400,001 – N 600,000	52	15.71	15	4.36
N 600,001 – N 800,000	76	22.96	31	9.01
N 800,001- N 1000,000	48	14.50	20	5.81
Greater than N 1000,000	110	33.23	156	45.35
Min	100,000		78,390	
Max	13,420,000		9,295,000	
Mean	1,482,941.946		1,819,901.689	

Source: Field Survey, 2021

**Effect of aggregation marketing on income of marketers**

The result of the effect of the aggregated maize marketing channels on the income of the rural dwellers is presented in Table 4. It was found that the income of the aggregation marketers was significantly different from the income of those in conventional maize marketing at 5% level of significance at ( $z=-3.2897$ ;  $p<0.05$ ). The Z-calculated (3.2897) was greater than the Z-critical

(1.9599) at a two-tail test. Therefore, the null hypothesis was rejected, and the alternate hypothesis accepted that there is a significant difference in the income of the marketers. This may be attributed to the fact that aggregation maize marketers' involvement in different livelihood diversification strategies might have earned them additional income in diverse form and contributed to their overall income gain.

**Table 4: Result of Z-test statistic of the effect of the maize marketing on the income of marketers**

Variables	Conventional Income (₦)	Aggregation Income (₦)
Mean	1482941.946	1819901.689
Standard Deviation	3.9345	4.739
Observations	331	344
Hypothesized mean differences	0	
Z-Stat	3.289707254***	
P(Z<=z) one-tail	0	
Z-Critical one-tail	1.644853627	
P(Z<=z) two-tail	0	
Z-Critical two-tail	1.959963985	

\*\*p&lt;0.05

Source: Field Survey, 2021

**Effects of marketing on the livelihood of maize marketer**

The livelihood index parameters were used to measure the level of livelihood of the marketers. The results are presented in Table 5. The analysis reveals that about 50% of the aggregation maize marketers had values within the range of 1.95 to 4.89 indexes indicating good livelihood level as compared to 42.6% of the conventional marketers in the same measurement level. Furthermore, only 13.1% of the aggregation marketers had better

livelihood ranged between 4.90 to 7.90 indexes relative to the conventional maize marketers. This finding might not be unconnected with the aggregation marketers who have higher sales volume than the conventional marketers which might accrue to them additional income advantage over that of conventional marketers. Overall finding showed that only about 2.1% and 1.2% of the respondents were having low livelihood index with an index range between -4.00 to -6.00 indication of extremely worse-off livelihood.

**Table 5: Comparison of livelihood level between conventional and aggregation marketers**

Livelihood Level	Conventional (n=331)		Aggregation (n=344)	
	Frequency	Percentage	Frequency	Percentage
Better livelihood (4.90 to 7.90)	0	0	45	13.1
Borderline (-1.95 to 1.94)	92	27.8	123	35.7
Good livelihood (1.95 to 4.89)	141	42.6	172	50.0
Worse-off (-1.95 to -3.99)	91	27.5	0	0
Extremely Worse-off (-4.00 to -6.)	7	2.1	4	1.2
<b>Descriptive statistics</b>				
Mean	1.88148E-06			
Minimum	-6.96687			
Maximum	7.90744			
Count	675			
Confidence Level (95.0%)	0.250555396			
Standard Deviation	3.315331625			
Sample Variance	10.99142378			

Source: Field Survey, 2021

**Constraints faced by maize marketers**

Table 6 shows that the conventional maize marketing participants ranked unpredictable price of the maize (84.7%), insufficient storage facilities (81.6%), and inadequate government support in terms of guaranteed maize price (75.2%) as the major challenges confronting maize marketers.

The implication of these constraints is that the sales and income accruing to the marketers will be affected. The desperate need for incomes often forces conventional (producer marketers) to sell their maize when the market is flooded and consequently when prices are low. This is partly because they lack adequate storage facilities. Ironically, these same rural dwellers are often forced to purchase the same crops for their family's consumption later in the season when prices have risen. When marketers have reliable storage facilities, they can gain flexibility to store their maize until they are ready to sell to buyers at fair prices.

This outcome is in line with the findings of Ozor, *et al.* (2019) in their study on performance evaluation of dry white and yellow maize (*Zea mays*) marketing where poor and unstable prices and insufficient storage structures were the most serious marketing problems of the retailers with mean score of 2.71 each.

In comparison, the aggregation maize marketers ranked inadequate funds (97.7%) and inadequate government support in terms of maize price (92.7%) as their major constraints. This implied that the marketers might not be able to commit enough investments to expand their business to meet the quantities required by their target customers and hence inconsistent supply of best quality maize required by the off takers. Inadequate government support in terms of guaranteed price could be attributed to the low level of investment in marketing and the inability of government to come out with clear policies on prices.



**Table 6: Constraints faced by maize marketers**

Constraints	Conventional						Aggregation					
	Severe		Not severe		Mean	Rank	Severe		Not severe		Mean	Rank
	F	%	F	%			F	%	F	%		
High cost of transportation	244	73.7	87	26.3	2.798	5 <sup>th</sup>	186	52.5	168	47.5	2.85	5 <sup>th</sup>
Multiple taxation/levies	78	23.6	253	76.4	2.022	8 <sup>th</sup>	109	30.8	245	69.2	2.274	7 <sup>th</sup>
Inadequate funds/finance to expand business	219	66.2	112	33.8	2.816	4 <sup>th</sup>	346	97.7	8	2.3	3.206	1 <sup>st</sup>
Inadequate market information	72	21.7	259	78.3	2.055	9 <sup>th</sup>	42	11.9	312	88.1	1.40	10 <sup>th</sup>
Unpredictable price of the maize	280	84.7	54	15.3	3.138	1 <sup>st</sup>	278	78.5	76	21.5	2.830	4 <sup>th</sup>
Long distance to marketing centres	23	7.0	308	93.0	1.531	10 <sup>th</sup>	37	10.5	317	89.5	1.525	9 <sup>th</sup>
Inadequate govt. support in terms of guaranteed prices	249	75.2	82	24.8	2.935	3 <sup>rd</sup>	328	92.7	26	7.3	3.087	2 <sup>nd</sup>
Insufficient storage facilities	270	81.6	61	18.4	2.985	2 <sup>nd</sup>	105	29.6	249	70.4	2.070	8 <sup>th</sup>
Poor rural roads networks /nature	210	63.4	121	36.6	2.816	6 <sup>th</sup>	181	51.1	173	48.9	2.774	6 <sup>th</sup>
Erratic supply of maize	100	30.2	231	69.8	2.155	7 <sup>th</sup>	303	85.6	51	14.4	2.98	3 <sup>rd</sup>

Source: Field Survey, 2021

## CONCLUSION AND RECOMMENDATIONS

From this study, it is revealed that participation in both conventional and aggregation maize marketing in the study area has positively improved livelihoods of the rural dwellers. However, aggregation maize marketers had better improvements in terms of income that could support their means of livelihood activities relative to their counterparts in conventional marketing. It can thus be concluded that aggregation marketing has higher tendencies to improve the welfare of participants due to their innovative processes if it is introduced and sustained. The following policy interventions are recommended.

1. Insufficient storage facilities might reduce the efficiencies of the maize marketing business. There should be interventions by both government and NGOs through projects, the advancement of deliberate improved, affordable and reliable maize grains storage facilities such as Purdue Improved Crops Storage (PICS) bags should be popularized among rural dwellers.
2. There should be policy interventions in the maize marketing sub sector focusing on price stability that is likely to guaranteed minimum price which would significantly lower the competitiveness among conventional and aggregation maize marketing marketers.

## REFERENCES

- Adams, O. K. (2018). Economic analysis of maize production in Kano State: *Journal of Poverty, Investment and Development*, 44: 53-56
- AGRA. (2019). Africa Agriculture Status Report: The Business of Smallholder Agriculture in Sub-Saharan Africa (Issue 5). Nairobi, Kenya: Alliance for a Green Revolution in Africa (AGRA). Issue No. 5
- Ahmed, F. F. (2014). Economics of wheat marketing in Maiduguri Metropolis Borno State, Nigeria: *The International Journal of Social Science and Humanities Invention*. 1(1):1-10.
- Akanni K.A. (2012). Economics of marketing of food grains in Southwestern Nigeria: *Economía Mexicana nueva época*, 21 (2): 373-390.
- Asogwa B.C and Okwoche V.A (2012). Marketing of agricultural produce among rural farm households in Nigeria: The case of sorghum marketing in Benue State. *International Journal of Business and Social Science*, 3(13): 269-277.
- Asogwa, B. C., Ezihe, J.A.C., and Ogebe, F.O (2012). Agricultural marketing information usage among soybean farmers in Nigeria. *International Journal of Innovation and Applied*, 1 (2): 160-170. [www.issr-journals.org/ijias](http://www.issr-journals.org/ijias)
- Bashir, A. B., Dominic, A. A., and Ali, G. A. (2018). Improved seed technologies and traditional farm setting: A study on factors influencing adoption of improved pearl millet varieties in Borno, Bauchi and Yobe States, Nigeria. *International Journal of Applied Research and Technology*, 2(12): 31 – 37.
- International Institutes for Tropical Africa IITA (2012). Nigeria food consumption and nutrition survey 2009-2011. Report Submitted to the Canadian International Development Agency (CIDA) and the World Bank, October 2011. 1-126
- Kaduna State Government (2018). Kaduna State Information Manual. The Kaduna State Government, Federal Republic of Nigeria. <http://www.kadunaState.gov.n>
- Kotler, P. and Armstrong, G. (2001), Principles of Marketing, Prentice Hall, publishers, USA
- Krejcie, R.V. and Morgan, D.W. (1970). Determining Sampling Size for Research Activities Education and Physiological Measurement 30, 60-610.
- Mahamaa, T.A. K. and Nkegbe, P. K. (2021). Impact of household livelihood diversification on welfare in Ghana. *Scientific African*, 13 (1): 1-13 <https://doi.org/10.1016/j.sciaf.2021.e00858>
- Nebo, G. N. and Ejionueme, N. (2017). Adopting Agricultural Marketing Approach for Improving Agricultural Sector Performance in Nigeria: *Journal of Business and Management (IOSR-JBM)* e-ISSN: 2278-487X, p-ISSN: 2319-7668. Volume 19, Issue 4 PP 04-17 DOI: 10.9790/487X-1904030417
- Ozor, M., Uche, N., Darlington C., and Chiekezie, N. R. (2019). Performance Evaluation of Dry White and Yellow Maize (zea mays) Marketing, Implication for Employment and Poverty Alleviation in Anambra State, Nigeria. *International Journal of Applied Science and Research*, 2(5): 80-90.
- Place, F., Pender, J. and Ehui, S. (2006). Storage, transportation and aggregation of agricultural products for smallholder farmers in sub-saharan Africa: Publishers: *International Food Policy Research Institute (IFPRI)* 400- 483
- Rahman, S and Awerije, B. O. (2014) Marketing efficiency of cassava products in Delta State, Nigeria: A stochastic profit frontier approach. *International Journal of Agricultural Management*, 4 (1): 28-37.
- Sani, U. (2015). Analysis of the efficiency and competitiveness of rice production systems





in three States of northern, Nigeria.  
Unpublished Ph.D. Thesis. Department of

Economics and Rural Sociology, ABU,  
Zaria.