Comparative Analysis of Cooperative and Non-cooperative Farmers' access to Farm Inputs in Abuja, Nigeria

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ABSTRACT

Access to farm inputs is one of the major challenges facing rural farmers in Nigeria. To alleviate this problem, government at different levels strongly recommended the formation of cooperative societies to farmers. Against this background, a study was conducted to determine if differential access to farm inputs exists between cooperative and non-cooperative farmers in Abuja, Nigeria. A multi-stage technique was used for sample selection while semi-structured questionnaires were used for data collection. A total of 360 farmers were randomly interviewed in four agricultural zones (180 cooperative and 180 non-cooperative farmers). Data were analyzed using two-way factorial analysis of variance (ANOVA) and mean separation was done at 5% probability level. Results revealed that there was significant difference ($P < 0.01$) in cooperative and non-cooperative farmers' access to farm inputs. Comparatively, the mean perceptions indicated that the cooperative farmers had more access to labour, loan, herbicide, insecticide, rodenticide, fertilizer, tractor services, storage equipment and processing equipment while the non-cooperative farmers had more access to land. The results also indicated that the most accessible farm input to both cooperative and non-cooperative farmers was land while the least accessible farm inputs were loan and tractor services. Based on the findings, the paper concluded that differential access to farm inputs existed between cooperative and non-cooperative farmers in the study area. It was recommended that government and non-governmental agencies should encourage farmers to form and/or join viable cooperative societies.

Key words: cooperative societies, least accessible farm inputs, mean perception, most accessible farm input, small-scale farmers,

1. Introduction

In Nigeria, agriculture is one of the major sectors of the economy and a major contributor to Nigeria's GDP (Rahji and Fakayode, 2009). An estimated 76 percent of Nigeria's population lives in the rural areas and about 90 percent of the rural dwellers are engaged in agricultural production (UNICEF, 2008). The roles of the agricultural sector, according to the Nigerian Agricultural Policy document (FDA/MARD, 2001), include

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the provision of food for the growing population, provision of foreign exchange earnings, employment of a significant labour force, and provision of income for the farming households. The challenges involved in the development of agriculture in Nigeria have resulted in the evolution of intervention programmes and social organizations. Prominent among the social organizations are cooperative societies. By definition, cooperative societies refer to an association of persons who have voluntarily joined together to achieve a common objective through the formation of a democratically controlled organization, making equitable contribution to the capital required and accepting a share of the risk and benefits of the undertaking (World Bank, 1989).

Historically, cooperatives as business forms developed in the late 18th century in England and France as a reaction to and substitute for actual and perceived hardships and disruptions brought with the industrial revolution and consequent "factorization" of labour (James, 2006). The philosophical underpinnings, at least summary definitions of cooperatives as business forms, are traced primarily to the Rochdale Pioneers in England who listed principles of operation in 1844 (James, 2006). Agricultural development efforts have identified cooperatives in Nigeria as a vehicle for the development of agriculture because according to Kehinde *et al.* (2009), it enables farmers to solve agricultural problems such as inadequate capital, inadequate access to loan, and high level of illiteracy which still remain major agricultural development problems.

Some scholars have tried to reveal the impact of cooperative societies on agriculture. In a study conducted by Igwe, Onyebinama and Nwabueze (2009) on the determinants of the women's access to credit in Abia State Nigeria, it was reported that farmers who were members of cooperative societies had more access to credit than non-cooperative farmers. In a similar study in Abia State, Ibezim *et al.* (2010) stated that there was significant difference in the income and output of cooperative and non-cooperative farmers. The mean income and output of the cooperative farmers was found to be higher than that of the non-cooperative farmers. Findings by Agbo (2009) in Enugu State in Nigeria revealed that about 60.5% of the respondents who belonged to cooperative societies got various sums of money as credit through their cooperatives. Specifically, the author stated that 14.52% of the respondents reported that they bought farm inputs at subsidised prices while 25% were assisted by the cooperatives to sell their farm produces. Adeyemo (1994) reported that members of cooperative societies performed better in terms of gross margin than individual farmers who were non-members. This according to Adeyemo (1994) was due largely to the involvement of the government through the provision of financial and technical assistance to cooperative farmers. Holloway *et al.* (2000) studied milk marketing of small-scale farmers in the East-African highlands and concluded that cooperative societies that act as marketing institutions are potential catalysts for reducing transaction costs, stimulating entry into the market and promoting growth in rural communities. The authors concluded that producer cooperatives were useful in overcoming access barriers to assets, information, services and markets for high-value products.

Based on some of the available evidence on cooperative societies, there seems to be consensus that cooperative farmers have comparative advantage over non-cooperative farmers in agricultural production. But from documented evidence, access to farm inputs

is one of the major constraints expressed by both cooperative and non-cooperative farmers especially, small-scale farmers and this has been attested to by many scholars (Peter, 2008, Spore, 2008, Oboh, 2001, Dayo *et al.,* 2009). The problem of poor access to farm inputs is not only in Nigeria because Lyne (1996) and Matungul *et al.,* (2001) also reported that small-scale farmers in South Africa had limited access to factors of production, credit and information. In fact, Ortmann and king (2007) stated also that agricultural cooperatives serving smallholders in the less-developed rural areas of South Africa have generally not been successful in promoting agricultural development and members' economic welfare. But on the contrary, Abdelrahman and Smith (1996) reported that some agricultural cooperatives in Sudan have not been successful. They attributed the failure to the lack of members' motivation in collective action.

The problem of access to farm inputs by both cooperative and non-cooperative farmers seems to have persisted and is impacting negatively on the overall agricultural production in Nigeria. Available evidence indicating that cooperative societies have more access to farm inputs seems to be more on credit facilities. Information on access to other farm inputs like land, labour, herbicide, insecticide, rodenticide, fertilizer, tractor services, storage equipment and processing equipment is limited. Apart from credit facilities, the question is do cooperative farmers have access to other farm inputs more than non-cooperative farmers? Providing answer to the above question formed the basis for this study and it is believed that the findings will add to the existing information on cooperative societies. Again, it will clear uncertainties about the impact of cooperative societies on farmers' access to farm inputs. It will also serve as a reference point to national and international agencies who are championing the course of cooperative societies in Nigeria and beyond.

2. Objectives

The broad objective of this study is to determine cooperative and non-cooperative farmers' access to farm inputs in Abuja, Nigeria. The specific objectives are to:

1) Determine if significant difference exists between cooperative and non-cooperative farmers' access to farm inputs,
2) Determine the most accessible farm inputs to both cooperative and non-cooperative farmers
3) Determine the least accessible farm inputs to both cooperative and non-cooperative farmers
4) Determine if there is a significant interaction effect between cooperative membership and access to input types

Hypotheses:

1)   Ho: There is no significant difference in the cooperative and non-cooperative farmers' access to farm inputs in the study area
2)   Ho: There is no significant interaction effect between cooperative membership and access to farm inputs.

3. Research methodology

     This study was conducted in Abuja, Nigeria which is located between latitudes 8°25` and 9°25` N and longitudes 6°45`and 7°45` E. The population for the study comprised all cooperative and non-cooperative small-scale farmers in Abuja. The sampling technique adopted was multi-stage sampling while semi-structured questionnaires were used for data collection. Presently, Abuja Agricultural Development Programme (AADP) has 4 agricultural zones - namely, central, eastern, northern and western with 12 agricultural blocks and 93 cells (AADP, 2009). In the first stage, all the 4 agricultural zones were chosen. In the second stage, all the 12 agricultural extension blocks were chosen. In the third stage, 5 cells were randomly selected from each of the agricultural extension blocks resulting in a total of 60 cells. In each of the cells (fourth stage), 5 cooperative and 5 non-cooperative small-scale farmers were randomly selected and interviewed. From those that were returned, 6 (3 cooperative and 3 non-cooperative farmers) properly completed questionnaires from each cell were used for the analysis. This gave a total of 360 (180 cooperative and 180 non-cooperative farmers) respondents. Equal number (180 from both cooperative and non-cooperative farmers) was used to minimize biasness that may arise as a result of having more respondents from cooperative or non-cooperative farmers. By implication, 90 observations were made in each of the 4 Agricultural Zones. The farm inputs considered are land, labour, loan, herbicide, insecticide, rodenticide, fertilizer, tractor services, storage equipment and processing equipment. The two independent factors are cooperative membership and input types while the dependent variable is access to farm inputs. The cooperative membership has two levels (cooperative farmers and non-cooperative farmers) while the input types has 10 levels (land, labour, loan, herbicide, insecticide, rodenticide, fertilizer, tractor services, storage equipment and processing equipment). The combination gave 2x10 mixed factorial design with 20 treatment levels. This is a repeated measure ANOVA (Andy, 2005) and the model specification for the analysis is:

$$Y_{ij} = \mu + T_i + C_j + TC_{ij} + e_{ij}$$

Where:

Y_{ij} = Individual cooperative or non-cooperative farmers' responses regarding access to each of the farm inputs

μ = General mean

T_i = Refers to the effects of the input types (we have 10 different farm inputs)

C_j = Refers to the effects of cooperative membership on access to farm inputs.

TC_{ij} = interaction effect of cooperative membership and inputs types

e_{ij} = error term

By interpretation, the model states that access to each of the different farm inputs (Y_{ij}) is influenced by the type of farm (input types) (T_i); cooperative membership, that is, being a cooperative or non-cooperative member (C_j) and the interaction effect of cooperative membership and the input types (TC_{ij}). The μ is a constant while e_{ij} is the error term. The level of access to each of the 10 farm inputs by both the cooperative and non-cooperative farmers was verified using: very highly accessible = 4; highly accessible = 3; fairly accessible = 2; very low access =1 and not accessible at all = 0. The above scores were used for data analysis in line with the method adopted by David (2004), Fredrick

and Wallnau (2004), Shah and Madden (2004), Andy (2005) and Colin and Paul (2011) SPSS 15.00 was used to run the analysis and mean separation was done using Bonferroni model (Andy, 2005). It was tested at 5% probability level. The socioeconomic characteristics of the respondents captured during data collection include: age (years), years of farming experience (years), gender (male or female), household size defined by NPC (2006) as a person or group of persons living together usually under the same roof or in the same building/compound, who share the same source of food and recognize themselves as a social unit with a head of household) and literacy level which also include: no formal education, primary school education, secondary school education, Ordinary National Diploma (OND)/Higher School Certificate (HSC), Nigerian Certificate of Education (NCE), Higher National Diploma (HND) or B. Sc and above.

4. Results and Discussion
The results of the analysis are presented in tables 1-3 below.

Table 1 ANOVA result on cooperative and non-cooperative farmers' access to farm inputs

Sources of Variation	Df	SS	MS	F-cal	*P*-value	Sig
Input types	9	1903	211.5	2349	0.00	S
Cooperative* Input types	9	30.37	3.37	37.44	0.00	S
Error (within factor)	3222	302.8	0.09			
Cooperative membership	1	3.08	3.08	8.56	0.00	S
Error (between factor)	358	127	0.36			
Total	**3599**	**2366.25**				

Source: *Survey data, 2012*

Table 1 shows the analysis of variance (ANOVA) results of the cooperative and non-cooperative farmers' access to farm inputs in Abuja, Nigeria. The "input types" row shows the farmers' perception of their access to each of the farm inputs (the main effects of input types) without regard to cooperative membership. That is, regardless of whether the farmer is a member of cooperative society or not. The result indicated that the main effects of the input types was significant, $F (9, 3222) = 2349$, $p = 0.00$, implying that the farmers access to some of the farm inputs significantly ($p < 0.01$) differed. The differential access to the farm inputs by the farmers is in line with the apriori expectation because some of the farm inputs like tractor services and processing equipment are costly to purchase while input like loan requires that the farmer should provide collateral before being considered. The "cooperative*input types" row of the ANOVA table contains the results of the interaction effect of cooperative membership and access to farm inputs. The result, $F (9, 3222) = 37.44$, $p = 0.00$, indicated that there was significant ($p < 0.01$) interaction effect of cooperative membership and access to farm inputs. This implies that access to some of the farm inputs significantly differed ($p < 0.01$) between the cooperative farmers and the non-cooperative farmers. Furthermore, the "cooperative membership" row of the ANOVA table contains the main effects of cooperative membership. The result, $F (1, 358) = 8.56$, $p = 0.00$, revealed that there was significant difference ($p < 0.01$) between cooperative and non-cooperative farmers' access to all the farm inputs. This agrees with the observation of Valentinov (2003) who claimed that the

agricultural cooperative is the most social capital development organization. The fact that the cooperative farmers had more access to farm inputs more than non-cooperative farmers could be attributed to the fact that cooperatives develop inter-organizational relationships with other cooperatives or the federation through trades, joint project, loans, debts and share holdings. This is possible because Bian (2002) stated that the greater and wider the cooperatives' inter-organizational relationships are, the more business opportunities they will have.

Table 2 Mean separation of cooperative and non-cooperative farmers' access to farm inputs

| Input types | Cooperative Membership | | | |
| | Cooperative farmer | | Non-cooperative farmer | |
	Mean response	Rank	Mean response	Rank
Access to land	3.02	1	3.18	1
Access to labour	2.62	2	2.47	2
Access to herbicides	2.52	3	2.39	3
Access to insecticides	2.48	4	2.43	4
Access to rodenticide	2.44	5	2.12	5
Access to storage equipment	1.67	6	1.56	6
Access to fertilizers	1.59	7	1.44	7
Access to processing equipment	1.51	8	1.31	8
Access to loan	1.10	9	0.53	10
Access to tractor services	1.05	10	0.72	9
grand mean value	**2.00[a]**		**1.82[b]**	

Source: *Survey data, 2012*

Based on the ANOVA results, mean separation was carried out using Bonferroni model at 5% probability level. The mean separation result (see Table 2) indicated that the mean access value (2.00[a]) for farmers who were members of cooperative societies was significantly ($p < 0.01$) higher than the mean access value (1.82[b]) for non-cooperative members. In order words, if you take the average of the sum of the mean access values for all the farm inputs, the cooperative farmers had more access to all the ten farm inputs than the non-cooperative farmers. Looking at the cooperative and non-cooperative farmers' access to each of the farm inputs, the mean access values indicated that cooperative farmers had more access to labour (2.62), loan (1.10), herbicide (2.52), insecticide (2.48), rodenticide (2.44), fertilizer (1.59), tractor services (1.05), storage equipment (1.67) and processing equipment (1.51) while non-cooperative members had more access to land (3.18). This is in agreement with the apriori expectations because one of the reasons why farmers join cooperative societies is to jointly solve problems which ordinarily would be difficult for an individual farmer. Kehinde *et al.* (2009) stated that cooperative societies are vehicles for the development of agriculture in Nigeria because it enables the farmers to solve agricultural problems such as inadequate capital, inadequate access to loan and high level of illiteracy. The fact that non-cooperative farmers had more access to land more than cooperative farmers' calls for further

research because as a member of a cooperative society, it is expected that the farmers would, in addition to other sources of land available for production, have access to land through their cooperative organization

Looking at the mean access values for each of the farm inputs, it is interesting to note that only land, among the ten farm inputs listed for the study, was the most accessible to both cooperative (3.02) and non-cooperative farmers (3.18). Based on the scores assigned to each of the response options in the questionnaires, land ranked number one and the mean value indicated that it was "highly accessible (3)". Also, based on the ranking, the second most accessible farm input to both cooperative and non-cooperative farmers was labour, followed by herbicide, insecticide and rodenticide. By implication, the above farm inputs were "fairly accessible (2)". Furthermore, access to loan, fertilizer, tractor services, storage equipment and processing equipment, was "very low (1)" and connotes poor access to the farm inputs. Based on the ranking, it is clear that both the cooperative and non-cooperative farmers had more access to land and least access to loan and tractor services. This is expected to be so because Central Bank Nigeria (2008) estimated that only 2.5 percent of total Commercial Bank loans and advances were directed at agriculture. A survey conducted in the southwest Nigeria by Dayo *et al.* (2009) indicated that cooperative societies, friends, and family members dominated the sources of farm credit among the rural farmers. This is discouraging because credit, in form of loan, will enable farmers to buy other farm inputs that are needed during production. Poor access to credit in form of loan will affect production decision-making because it is needed to pay for hired labour, reduce the cost of hire purchase, pay for maintenance cost and purchase other farm inputs needed in the production process.

The socioeconomic characteristics of the cooperative and non cooperative farmers are shown in Table 3. Age distribution shows that majority of the cooperative farmers fell within the age limits of 41 -50 years while the non-cooperative farmers fell within the age limits of 31-40 years. The greater percentage of both the cooperative and non-cooperative farmers (70.55%) fell within the age limits of 31-50 years. The mean age of the cooperative farmers was 42.59 years while that of the non-cooperative farmers was 41.19 years. The mean age indicates that the cooperative and non-cooperative farmers were middle-aged farmers who according to Onyenweaku (1991), are at their productive age in life and are likely to adopt innovation faster. This is true because age, as a proxy for experience, can enhance business initiatives and efficient use of scarce resources.

The distribution of the household size shows that majority of the cooperative farmers had more than 8 persons per household while non-cooperative farmers had between 7 to 8 persons per household. It is interesting to note that the greater percentage of the cooperative farmers (72.78%) and non-cooperative farmers (60.55%) had household size greater than 6 persons. The mean household size for cooperative farmers was approximately 9 persons while that of the non-cooperative was 7 persons. The composition of the household plays a crucial role in agricultural production. In Nigeria, a large household (achieved through polygamy or the extended family) is a livelihood strategy that is adopted to ensure that sufficient labour is available to cover peak workloads (Bishop-Sambrook 2005).

Table 3 Socio-economic characteristics of the cooperative and non-cooperative farmers

Socio-economic characteristics	Cooperative farmers		Non-cooperative farmers		Pooled data	
	Freq	%	Freq	%	Freq	%
Age (years)						
≤ 20	0	0.00	0	0.00	0	0.00
21 - 30	23	12.78	32	17.78	55	15.28
31 - 40	61	33.88	64	35.56	125	34.72
41 - 50	66	36.67	48	26.66	114	31.67
> 50	30	16.67	36	20.00	66	18.33
Total	**180**	**100**	**180**	**100**	**360**	**100**
Household size (HHS) (number of persons/household)						
1 – 2	6	3.33	15	8.33	21	5.83
3 – 4	7	3.89	15	8.33	22	6.11
5 – 6	36	20.00	41	22.79	77	21.40
7 - 8	48	36.67	56	31.11	104	28.88
> 8	83	46.11	53	29.44	136	37.78
Total	**180**	**100**	**180**	**100**	**360**	**100**
Years of farming experience (YFE) (years)						
1 – 10	34	18.89	43	23.89	77	21.40
11 – 20	59	32.78	48	26.67	107	29.72
21 – 30	61	33.89	54	30.00	115	31.94
31 – 40	22	12.22	25	13.89	47	13.05
> 40	4	2.22	10	5.56	14	3.89
Total	**180**	**100**	**180**	**100**	**360**	**100**
Gender						
Male	158	87.78	141	78.33	299	83.06
Female	22	12.22	39	21.67	61	16.94
Total	**180**	**100**	**180**	**100**	**360**	**100**
Literacy levels						
No formal Education	53	29.44	60	33.33	113	31.39
Primary school	51	28.33	58	32.22	109	30.28
Secondary school	43	23.89	38	21.11	81	22.50
NCE/OND/HSC	19	10.56	17	9.44	36	10.00
B. Sc/HND	14	7.78	7	7.90	21	5.83
Total	**180**	**100**	**180**	**100**	**360**	**100**

Cooperative farmers' means: Age (42.59yrs), HHS (9 persons), YFE (22.12yrs).
Non-cooperative farmers' means: Age (41.19yrs), HHS (7 persons), YFE (22.12yrs)
Pooled data means: Age (40.51yrs), HHS (8 persons) YFE (21.49yrs)
Source *Field data, 2012*

Majority of the cooperative and non-cooperative farmers had between 2-30 years farming experiences. This is a clear indication that both the cooperative and non-cooperative farmers had enough farming experiences that could improve agricultural production in the study area. The mean years of farming experience for cooperative farmers was 22.12 years while that of the non-cooperative farmers was 21.99 years. Okoye *et al.* (2009) stated that the more experienced a farmer is, the more efficient he/she will be in decision-making processes and he/she would be willing to take risks

associated with the adoption of innovations. Similarly, Adah, Olukosi, Ahmed and Balogun (2007) stated that the greater the years of farming experiences, the greater the farmers' ability to manage general and specific factors that affect the farm business.

On literacy status, the distribution is skewed in favour of those who did not have formal education followed by those who attended primary school. In other words, greater percentage of the cooperative farmers (57.77%) and non-cooperative farmers (65.55%) had at most primary school education. The literacy status of the cooperative and non-cooperative farmers was poor and this could pose a lot of problems in accessing and utilizing modern farm inputs. This is possible because Anthony (2007) stated that education does not only create a favorable mental atmosphere for the acceptance of new ideas but positively changes the overall attitude of the individual towards change. The author further added that education has been known to be a powerful instrument that helps to shape life and make the essence of living meaningful even at adult stage. Imonikhe (2010) also added that education enhances farmers' ability to make accurate and meaningful management decisions.

Finally, the gender distribution shows that majority of the cooperative farmers (78.33%) and non-cooperative farmers (87.78%) were males. The implication of this is that it easier to access male farmers than female farmers for data collection. One of the reasons is because, among the Muslims in the Northern part of Nigeria, married women mostly live in seclusion (purdah) and were not expected to leave their homes. The exceptions are the cattle-owning Fulani households, where married women work outside the home primarily to milk the cows and sell the milk, butter, and cheese (Dayo, *et al.* 2009; NARP, 1994).

5. Policy implications of the findings

The policy implications of the findings are multi-dimensional. First, the fact that cooperative members had more access to farm inputs implies that government and non-governmental organizations or agencies interested in agricultural development should encourage the formation of viable cooperative societies by farmers. Legal obstacles to the formation of cooperative societies by farmers should be removed so that no farmer should be denied the opportunity of joining cooperatives. Second, the result also revealed that access to some of the farm inputs like loan, fertilizer, tractor services, storage equipment and processing equipment by both cooperative and non-cooperative farmers was poor. Although some of the farm inputs like tractor and its implements are costly to purchase, every effort should be made by the government and non-governmental organizations to improve farmers' access to them. This can be done through subsidy or through the establishment of input hiring and maintenance agencies in the rural communities.

Conclusion

The role of cooperative societies in agriculture and rural development cannot be over emphasized. There is no doubt that it is a ladder through which farmers reap the benefits of collective action. As a social organization which aims at improving the life of

the members, the extent of its impact on farmers' access to farm inputs was verified. This was done by comparing cooperative and non-cooperative farmers' access to ten different farm inputs in Abuja, Nigeria. The main objective was to determine if significant difference exists between cooperative and non-cooperative farmers' access to farm inputs like land, labour, loan, herbicide, insecticide, rodenticide, fertilizer, tractor services, storage equipment and processing equipment. The findings indicated that cooperative farmers' access to the farm inputs was significantly higher than that of the non-cooperative farmers. The mean values revealed that cooperative farmers had more access to all the farm inputs except land. But, among the farm inputs, the most accessible to both cooperative and non-cooperative farmers was land while the least were loan and tractor services. The distribution of some of the socioeconomic variables like age, household size, years of farming experience, literacy status and gender showed that the cooperative and non-cooperative farmers shared similar characteristics Based on the findings, the paper concluded that significant differences exist between cooperative and non-cooperative farmers' access to farm inputs. It was, therefore, recommended that government and non-governmental organizations should encourage farmers to join and/or form viable cooperative societies.

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