

# Effect of social capital on private adaptation measures to climate change among farmers in Ezinihitte Mbaise, Imo State, Nigeria

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## Abstract

Social capital incorporates those social connections that help people to get along with each other and act more effectively than they could as isolated individuals. Several variables relating to social capital such as years of membership in diverse social groups/organizations, number of meeting attendance, cash contribution of members, labour contribution of members, etc., were identified by the researchers. These identified exogenous variables were subjected to multiple regression analysis. Responses by the 125 sampled farmers' on their specific/private adaptation measures to climate change were analyzed with 4 point Likert rating scale. Mean of the Likert rating scale was set out as the dependent or endogenous variable. The private adaptation measures to climate change advanced by the farmers in Ezinihitte Mbaise were the practice of mixed cropping, involvement in crop rotation, application of mulching techniques and multiple planting dates among other actions. Based on the result from the multiple regression analysis, the significant variables portraying the effects of social capital on private adaptation measures to climate change were farmer's membership status to social groups/organizations, cash contribution index by the members, labour contribution index and access to credit. The major constraints militating against private adaptation measures to climate change were inadequate funds/capital, lack of access to farm inputs, illiteracy of member farmer, lack of external support, disunity among group members and conflict among group members. It is expedient that government provide credit facilities to help farmers within their groups' to adapt favourably to the vagaries of climate change. This will go a long way in reducing the financial constraints faced by group farmers in mitigating the adverse effects of climate change.

**Keywords:** Private Adaptation, Social Capital, Climate Change, Socio-economic characteristics, Ezinihitte Mbaise Imo State

## Introduction

It is predicted that crop yield in Africa may possibly fall by 10 - 20% by 2050 or up to 50% due to the adverse capricious effects of climate change (Jones and Thornton, 2003). This is because African agriculture is predominantly rain-fed and fundamentally dependent on weather. Climate change exerts multiple stresses on the biophysical as well as the social and institutional environments that underpin agricultural production (Intergovernmental Panel on Climate Change - IPCC, 2007). Adaptation to climate change relates to adjustments in ecological, social and economic systems in response to the

effect of climate variations. The Intergovernmental Panel on Climate Change - IPCC (2001) defines climate change adaptation as modification in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities. Adaptation measures are therefore important to help farmers adjust or accommodate extreme weather conditions and associated climatic variations (Temesgen *et al.*, 2009).

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An improved understanding of current adaptation measures to climate change and their determinants is important to inform proficient policy measures for future successful adaptation measures. In order to cushion the effects of climate change in Ezinihitte Mbaise, Imo State, several individualistic or private adaptation strategies were identified by the researchers. These private adaptation measures patronized by the farmers in Ezinihitte Mbaise are practicing mixed cropping, engaging in crop rotation, application of mulching techniques and multiple planting dates. Others are diversification of income generating activities, use of irrigation as water source, alternate fallow/tillage practices, planting of trees and off-farm income generation, among other private adaptation measures'.

Social capital comprises those social relationships that help people to get along with each other and act more effectively than they could as isolated individuals. It embodies the collective action that members of a group/organization can take to achieve their desired objectives. Social capital is also the cumulative capacity of social groups to cooperate and work together for the common good. (Montgomery, 1998).

Several variables relating to social capital such as years of membership in various social group/organization, number of meeting attendance, cash contribution of members, labour contribution of members, etc were identified by the researchers. These identified exogenous variables were subjected to multiple regression analysis. Responses by the sample respondents' on various private adaptation measures to climate change were analysed with the Likert rating scale. Mean of the Likert rating scale was set out as the dependent or endogenous variable.

The findings from this study will be highly advantageous to government and policy makers in understanding the effects of social capital on individualistic/private adaptation approaches to climate change. It is expected that the result will give direction to policy makers in designing suitable public policies that involves the incorporation of social capital variables in order to mitigate the adverse effects of climate change in Nigeria.

## Methodology

### Study Area

The study was carried out in Ezinihitte Mbaise L.G.A Imo State. Ezinihitte Mbaise is a local Government Area in Imo State, Nigeria and lies in the South East of Nigeria. Ezinihitte Mbaise has a land mass of 108 km<sup>2</sup>. It lies between latitude 5°27'0.48"N and longitude 7°14'0.07"E. It has a population of 168,767 as of 2006 population census. The major occupation of the people is subsistent agriculture and trade. Basically, there are 15 communities that make up Ezinihitte which includes; Akpodim, Amaumara, Choko na Eze, Ezi Agbaogu, Ezi Udo, Ife, Ihite, Itu, Obizi, Oboama, Okpuofe, Onicha, Owutu, Udo, and Oboama/Umunama (Agulanna, 2008).

## Sample and Sampling Technique

The respondents were selected through multi-stage random sampling method. In the first stage, five (5) communities namely; Akpodim, Ihite, Itu, Obizi, and Oboama, were randomly selected from the 15 communities in Ezinihitte Mbaise. In the second stage, three (3) villages were randomly selected from the each of the five communities, making it a total of 15 villages. In the third stage 9 farmers were purposively selected from each of the villages, making it a total of 135 farmers (respondents). However, only 125 valid questionnaires were used for the analysis. The sample size was therefore 125 respondents.

## Model Specification

The model was specified as:

$$Y = f(X_1, X_2, X_3, \dots, X_7, \mu) \dots 1$$

$$Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \dots + \beta_7X_7 + \mu \dots 2$$

Y = Adaptation measures to climate change (mean of the Likert scale)

*The explanatory variables specified in the model included:*

X<sub>1</sub> = Membership of farmer based group/organization (1=Yes, 2=No)

X<sub>2</sub> = Years of membership in your group/organization (years)

X<sub>3</sub> = Number of meeting attendance (per month)

X<sub>4</sub> = Decision making index (%)

X<sub>5</sub> = Cash contribution of members (%)

X<sub>6</sub> = Labour contribution of members (%)

X<sub>7</sub> = Access to credit (no access = 0, have access = 1).

β<sub>0</sub> = regression intercept; which measured the effects of the dependent variable, assuming other exogenous variables were held constants

β<sub>1-7</sub> = regression slopes/coefficients; which captures the effects of the dependent variable on the specified explanatory variables (X's) and μ = Stochastic error term.

The adaptation measures employed in this research were based on the farmers responses on their perceptions of past climate change induced natural shocks and the actions they take to countervail the adverse consequences of these shocks. The adaptation measures were rated on a 4-point Likert scale and used as endogenous variable.

## Results and Discussion:

### Socio – Economic Characteristics of Respondents

The socio economic characteristics of the farmers were presented in Table 1. There are 135 respondents for the study; however, only 125 questionnaires which were properly filled and valid were employed for the study.

**Table 1.** Socio economic profile of the farmers in Ezinihitte Mbaise

	Frequency		Percentage (%)	
<b>Gender</b>	Male	21	16.80	
	Female	104	83.20	
<b>Total</b>		<b>125</b>	<b>100</b>	
<b>Age (Years)</b>	19-29	19	15.20	
Minimum (19)	30-40	29	23.20	
Maximum (60)	41-50	43	34.40	
Mean (41.15)	51-60	34	27.20	
<b>Total</b>		<b>125</b>	<b>100</b>	
<b>Marital Status</b>	Single	17	13.60	
	Married	64	51.20	
	Divorced	12	9.60	
	Widowed	32	25.60	
<b>Total</b>		<b>125</b>	<b>100</b>	
<b>Educational Level</b>	No Formal Education	15	12.00	
	Primary School Completed	57	45.60	
	Secondary School Completed	45	36.00	
	Tertiary Completed	8	6.40	
<b>Total</b>		<b>125</b>	<b>100</b>	
<b>Household Size (Person)</b>	2-4	21	16.80	
	Minimum (2)	5-7	64	51.20
	Maximum (13)	8-10	31	24.80
	Mean (5.81)	11-13	9	7.20
<b>Total</b>		<b>125</b>	<b>100</b>	

Source: *Field Survey Data, 2018*

Table 1 shows the socio economic profile of the farmers in Ezinihitte Mbaise, Imo State, Nigeria. From Table 1, it was observed that 83.2% of the farmers were females; while 16.8% were males. The result shows that greater percentage of the farmers in the study area were females. The result is contrary to the findings of Onubuogu and Esiobu (2014) who analyzed the 'Trends, perceptions and adaptation options of arable crop farmers to climate change in Imo State, Nigeria' where majority (73.3%) of their sampled respondents was males.

Age distribution of the farmers shows that the age group of 19-29 years comprises 15.2%; while respondents within the age bracket of 30-40 years and 41-50 years represent 23.2% and 34.4% respectively. The matured farmers (51-60 years) comprised 27.2% of the sampled respondents. The minimum and maximum age of the farmers were 19 and 60 years respectively; while their average age was 41.15 years. This result implies that mainstream of the farmers' age ranges from 41-50 years. Similar mean age was obtained by Kanu (2020) among cocoa farmers in Abia State, Nigeria. This result infers that older farmers in Ezinihitte Mbaise were more likely to adapt private methods that will mitigate the harmful effects of climate change. This result is in line with the observations of Deressa *et al.*, (2008) who explained that as age increases, several adaptations measures/coping strategies to climate change increases also.

The marital status of the respondent shows that 13.6% were single, 51.2% were married; while 9.6% and 25.6% were divorced and widowed respectively. This result implies that majority of the sampled farmers in the study area were married. The findings of this project agree with Oluwatayo

(2009) who stated that in rural Nigeria about 63 percent of the respondents are married. The result also agrees with the findings of Ozor and Nnaji (2011) on the adaptation of improved agricultural technologies dissemination in Enugu State.

Educational distribution of farmers in Ezinihitte Mbaise shows that 6.4% had completed their university degree, 45.6% had completed their primary school education; while 36% had finalized their secondary school certificate of education (SSCE). The result suggests that majority of the respondents had primary school certificate. This result is contrary to the findings of Kanu, Obasi and Onwusanya (2020) who observed that greater percentage of the respondents have secondary school certificate of education. Maddison (2006) noted that education increases one's ability to receive, decode and understand information relevant to making innovative decisions. Deressa *et al.*, (2008) associates greater access to climate change information, improved technologies and higher productivity to higher educational attainment. The result agrees with the findings of Nwaru and Onuoha (2010) that a greater percentage of farmers in Imo State, Nigeria, only attended primary school or its equivalent with average of 10 years of schooling.

The household size of the respondents shows that 16.8%, 51.2% and 24.8% of the farmers had household sizes of 2-4 persons, 5-7 persons and 8-10 persons respectively. Only 7.2% of the farmers had household size of 11-13 persons. The minimum and maximum household size was 2 and 13 persons respectively; with an average family size of 5.81 persons (approximately 6 persons). The result depicts that

preponderance of the sampled farmers had family size of 5-7 persons. Nhemachena and Hassan (2007) observed that household size has mixed impacts on farmers' adaptation measure to climate change. Larger family size is expected to enable farmers to take up labour intensive adaptation measures. Alternatively, a large family might be forced to divert part of her labour force into non-farm activities to generate more income and reduce the delimitating impact of adverse climatic condition. Similarly, Deressa *et al.*, (2008)

noted that the tendency of larger households to adapt to climate change is expected to be higher probably due to their higher endowment of family labour. Large family size is assumed to be the source of labour and skills to adapt to the changing climatic situations. Furthermore, family labour is recognized as a major source of labour supply in smallholder food crop production in most part of Africa (Onubuogu and Esiobu, 2014).

**Table 2.** Additional demographic characteristics of the respondents in the study area

		Frequency		Percentage (%)	
<b>Farming Experience (Years)</b>		1-5	27	21.60	
		6-10	42	33.60	
Minimum (1)		11-15	14	11.20	
Maximum (30)		16-20	21	16.80	
Mean (9.05)		21-25	9	7.20	
		26-30	12	9.60	
<b>Total</b>			<b>125</b>	<b>100</b>	
<b>Access to Extension Agent?</b>		Yes	79	63.20	
		No	46	36.80	
<b>Total</b>			<b>125</b>	<b>100</b>	
<b>Type of Farming System Practiced</b>		Mono cropping	13	10.40	
		Mixed cropping	56	44.80	
		Livestock	29	23.20	
		Poultry	15	12.00	
		Fishery	12	9.60	
<b>Total</b>			<b>125</b>	<b>100</b>	
<b>Fertilizer Application</b>		Yes	115	92.00	
		No	10	8.00	
<b>Total</b>			<b>125</b>	<b>100</b>	

Source: *Field Survey Data, 2018*

Results of additional demographic variables of the sampled farmers were presented in Table 2. The respondents minimum and maximum years of experience was 1 and 30 years respectively; with mean farming experience of 9.05 years. A greater percentage of the respondents (33.6%) had between 6-10 years of farming experience; while the least percentage (7.2%) of the sampled respondents had between 21-25 years of experience. According to Onubuogu and Esiobu (2014) farmers with many years of experience were more likely to be efficient, as well as their chances of adapting to climate change were higher than farmers with little years of experience. The findings support Deressa *et al.*, (2008) who opined that farmers with many years of experience are more efficient, have better knowledge of farming conditions and climatic situations and adapted effectively and efficiently to climate change.

A total of 63.2% of the respondents stated affirmatively that they had contact with agricultural extension personnel's; while the other 36.8% specified otherwise. The result infers that mainstream of the farmers had contact with agricultural extension agents. Access to extension services affords the farmers the opportunity to be better informed about climate change as well as to develop their individualistic/private adaptation measures to the vagaries of climate change. According to Aymone (2009), farmers who had access to extension services were more likely to be aware of changing

climatic conditions and had knowledge of the various management practices that they would employ to adapt to changes in climatic conditions.

The type of farming system practiced by the respondents' shows that 10.4% of the farmers were into mono cropping, 44.8% practiced mixed cropping, 23.2% and 12% of the farmers were involved in livestock and poultry farming; only 9.6% of the respondents were involved in fishery. This result shows that mainstream of the farmers were involved in different forms of crop production or mixed cropping. This agrees with Benhin (2006) who noted that growing a number of different crops in the same plot or in different plots reduced the risk of complete crop failure as different crops were affected differently by climate change events.

In regards to fertilizer application, 92% representing 115 out of the sampled 125 respondents affirms they applied fertilizer in their farms. The other 8% stated otherwise. The result infers that mainstream of the farmers applied fertilizer in their farms.

#### **Private Adaptation Measures to Climate Change among Farmers in Ezinihitte Mbaise, Imo State, Nigeria:**

This section analyzed the various private adaptation measures to climate change among farmers in Ezinihitte Mbaise. In order to cushion the effects of climate change in Ezinihitte Mbaise L.G.A. of Imo State, several adaptation strategies at

farm-level were identified by the researcher. The Likert scale was employed in examining the section. In the use of the Likert scale, the researcher considered the mean score of 2.5 to be the acceptable private adaptation measures to climate change; while any score below 2.5 were rejected. The score of 2.5 was calculated using the weightings attached to the response options of:

Strongly Agree (SA), = 4  
 Agree (A) = 3  
 Disagree (DA) = 2  
 Strongly Disagree (SD) = 1

$$\text{Hence, } \{4+3+2+1\}/4 = 10/4 = 2.5$$

**Table 3.** Likert scale showing private adaptation measures to climate change among farmers in Ezinihitte Mbaise, Imo State, Nigeria

S/N	Private Adaptation Measures to Climate Change	SA	A	DA	SD	Mean	Decision
1	Practicing mixed cropping	252	93	36	13	3.15	Accepted
2	Engaging in crop rotation	172	153	42	10	3.01	Accepted
3	Application of mulching techniques	88	81	82	35	2.28	Rejected
4	Multiple planting dates	164	135	54	12	2.92	Accepted
5	Diversification of income generating activities	80	117	80	26	2.42	Rejected
6	Use of irrigation as water source	108	66	86	33	2.34	Rejected
7	Alternate fallow/tillage practices	156	102	56	24	2.71	Accepted
8	Planting of trees	80	75	98	31	2.27	Rejected
9	Off-farm income generation	188	123	40	17	2.94	Accepted
10	Land fragmentation	156	87	68	23	2.67	Accepted
11	Cover cropping	132	141	56	17	2.76	Accepted
12	Change in farm size	84	93	108	19	2.43	Rejected
13	Fertilizer application	232	96	40	15	3.06	Accepted

Source: *Field Survey Data, 2018* Note:  $\geq 2.50$  mean = Accepted,  $\leq 2.49$  mean = Rejected

Adaptation measures to climate change are crucial to help farmers effectively tackle the extreme weather conditions and associated climatic variations. From Table 3, the significant private adaptation measures to climate change in Ezinihitte Mbaise L.G.A., were:

- i. practicing mixed cropping (mean of 3.15 which is > the acceptable 2.5),
- ii. engaging in crop rotation (mean of 3.01 which is > the acceptable 2.5),
- iii. multiple planting dates (mean of 2.92 which is > the acceptable 2.5),
- iv. alternate fallow/tillage practice (mean of 2.71 which is > the acceptable 2.5),
- v. off-farm income generation (mean of 2.94 which is > the acceptable 2.5),
- vi. land fragmentation (mean of 2.67 which is > the acceptable 2.5),
- vii. cover cropping (mean of 2.76 which is > the acceptable 2.5), and
- viii. fertilizer application (mean of 3.06 which is > the acceptable 2.5).

These results are in line with the findings of Orindi and Eriksen (2005) who modified adaptation measures to climate change into two distinct production systems. The first was increased diversification that involves engaging in production activities that are drought tolerant and or resistant to temperature stresses as well as activities that make efficient use of water and temperature conditions. Orindi and Eriksen (2005) further noted that crop diversification serves as insurance against rainfall variability as different crops were affected differently by climatic events. The second strategy according to Orindi

and Eriksen (2005) focuses on crop management practices geared towards ensuring that critical crop growth stages do not coincide with very harsh climatic conditions such as mid-season droughts. Crop management practices in Ezinihitte Mbaise that were employed include modifying the length of the growing period and changing planting and harvesting dates.

The practice of mixed cropping as a private adaptation measure to climate change among the farmers in Ezinihitte Mbaise gave a satisfactory mean score of 3.15, as against the acceptable mean of 2.5. The result shows that the practice of mixed cropping by the respondents in the study area was a remarkable private adaptation measures to climate change in Ezinihitte Mbaise. This support the findings of Otitoju and Enete (2014) who noted that most of the food crop farmers chose multiple crops/varieties as adaptable measures to changing climate conditions. Again, Benhin (2006) pointed out that growing a number of different crops in the same plot or in different plots reduced the risk of complete crop failure as different crops were affected differently by climatic events. Otitoju and Enete (2014) reported that farmers used crop management practices such as irrigation practice, water and soil conservation techniques and varying planting and harvesting dates to ensure that critical, sensitive growth stages did not coincide with very harsh climatic conditions in the season. further, from Table 3, the application of fertilizer as a private adaptable measure to climate change among the farmers in Ezinihitte Mbaise gave a satisfactory mean score of 3.06 as against the acceptable mean of 2.5.

#### Effects of Social-Capital on Private Adaptation Measures to Climate Change in Ezinihitte Mbaise, Imo State, Nigeria

This subsection captures the effects of social capital on private adaptable approaches to ameliorate the hazards of climate change in the study area. The subsection was analyzed with the application of multiple regression model of the Ordinary Least Squares (OLS). The adaptation measures employed in this

research were based on the farmers responses on their perceptions of past climate change induced natural shocks and the actions they take to countervail the adverse consequences of these shocks. The adaptation measures were rated on a 4-point Likert scale and used as endogenous variable.

**Table 4:** Multiple regression coefficient of the effects of social-capital on private adaptation measures to climate change in Ezinihitte, Imo State, Nigeria

Variables	Coefficient	Standard error	t – ratio	p-value
( $\beta_0$ ) Constant	-1.2837	0.1714	-7.4893**	0.002
(X <sub>1</sub> ) Membership status	0.6544	0.3035	<b>2.1561*</b>	0.033
(X <sub>2</sub> ) Years of membership in organization	0.8321	0.8416	0.9887	0.574
(X <sub>3</sub> ) Number of meeting attendance	0.5448	0.6522	0.8352	0.621
(X <sub>4</sub> ) Decision making index	0.7829	0.7556	1.0361	0.226
(X <sub>5</sub> ) Cash contribution index	2.7632	1.2005	<b>2.3017*</b>	0.026
(X <sub>6</sub> ) Labour contribution index	0.6298	0.0907	<b>6.9436**</b>	0.006
(X <sub>7</sub> ) Access to credit	0.4462	0.2013	<b>2.2166*</b>	0.018
R	0.7240			
R <sup>2</sup>	0.5241	0.000		
F – Statistics	26.84***			

Legend: \*\* Significance at 1%, \* Significance at 5%: *Source: Field Survey Data, 2018*

The multiple regression coefficients showing the effects of social capital on private adaptation measures to climate change was presented in Table 4. The regression model has a multiple determination (R<sup>2</sup>) of 0.5241, implying that 52.41% of the variation in the dependent variable was explained by the variation in the exogenous variables (X<sub>1</sub>-X<sub>7</sub>). The F-ratio was 26.84 and statistically significant at 1% level; which implies that the model has a good fit. The constant term ( $\beta_0$ ) which is the autonomous adaptation measures to climate change was negative and statistically significant at 5% level with a coefficient of -1.2837. This implies that the adaptation measures to climate change will decrease by 1.28 assuming other exogenous variables were held constant.

From Table 4, it was observed that four out of the seven independent variables employed in the model statistically affected the adaptation measures to climate change among the farmers in the study area. The significant variables were membership status (X<sub>1</sub>), cash contribution index (X<sub>5</sub>), labour contribution index (X<sub>6</sub>) and access to credit (X<sub>7</sub>). Membership of the farmers in their respective social organization/group was statistically significant at 5% level; with a positive coefficient of 0.6544; indicating that adaptation measures to climate change will increase as farmers are members to various social organizations/groups.

Cash contribution index significantly affected the farmer's adaptation measures to climate change in Ezinihitte Mbaise Local Government Area of Imo State, Nigeria. Cash contribution index is the records of payment of membership dues and other contributions made by the farmers in their respective social organization/group. The cash contribution index of the farmers was positive and statistically significant at 5% level with a coefficient of 2.7632. This implies that a unit increase in the cash contributed among the farmers in their various social organization or group; will increase their climate change adaptation strategies by 2.76 units. The result infers that the higher the cash contributed by the farmers in their various organizations/groups, the greater their climate change adaptation measures.

Labour contribution in the context of social capital is defined as the number of days that each farmer belonging to her/his social groups' has worked for her/his group. This represents the total number of weeks worked by the farmer for their respective social groups/associations. The labour contribution index was found to influence the farmer's climate change adaptation measures. The labour contribution index of the farmers was positive and statistically significant at 1% level with a coefficient of 0.6298. This implies that, a unit increase in labour resource contributed by the farmers in their various social groups/associations will improve their climate change adaptation strategies by 0.62 units.

Also, farmers' access to credit facilities was positive and statistically significant at 95% level of confidence; with a coefficient of 0.4462 which implies that adaptable measures to climate change will increase as the farmers have more access to credit facilities. The result suggests that an increase in credit access will increase the farmer's climate change adaptation stratagems by 0.45 units. This result is in agreement with the study carried out by Agboola (2011); who noted that majority of the farmers did not have access to credit. Access to credit is important for farmers to finance their investment in order to achieve higher productivity and sustain the environment. Furthermore, Essien, Arene and Nweze (2013) observed that only 18 percent of farm households in Nigeria made up of mainly small scale farmers had access to financial services.

In a similar result, Ajani and Tijani (2009) found factors such as heterogeneity, meeting attendance, cash and labour contributions and decision making indices as the social capital variables that affected climate change adaption measures. In their study on the 'role of social capital in adaptation to climate change in Ethiopia', Deressa *et al.*, (2009) posited that informal institutions like peer group aid climate change adaptation through sharing experiences of adaptation options and channeling informal financial sources that help on investments in adaptation.

## Constraints Militating against Private Adaptation Measures to Climate Change among the Farmers in Ezinihitte Mbaise, Imo State, Nigeria

This section captures the constraints militating against private adaptation measures to climate change among the farmers in the study area.

**Table 5: Likert Scale showing the Constraints Militating against Private Adaptation to Climate Change among Farmers in the Study Area**

S/N	Constraints	SA	A	DA	SD	Mean	Decision
1	Inadequate funds	208	114	42	14	3.02	Accepted
2	Lack of access to farm inputs	196	135	40	11	3.05	Accepted
3	Poor education	112	78	98	22	2.48	Rejected
4	Illiteracy of member farmer	196	96	56	16	2.91	Accepted
5	Ineffective leadership	76	87	88	33	2.27	Rejected
6	Poor attendance to meetings	104	84	84	29	2.40	Rejected
7	Lack of external support	192	108	50	16	2.92	Accepted
8	Disunity among group members	200	123	44	12	3.03	Accepted
9	Conflicts/disputes among members	276	111	24	7	3.34	Accepted
10	Lack of modern farming technology	80	75	98	31	2.27	Rejected
11	Lack of extension visits/service	100	69	80	37	2.28	Rejected

Source: *Field Survey Data, 2018*

Note:  $\geq 2.50$  = Accepted,  $\leq 2.49$  = Rejected

Table 5 is the Likert scale showing the constraints militating against private adaptation measures to climate change among farmers in Ezinihitte Mbaise, Imo State, Nigeria. From Table 5, the significant constraints militating against private adaptation measures to climate change were inadequate funds, lack of access to farm inputs, illiteracy of member farmer, lack of external support, disunity among group members and conflict among group farmers.

Inadequate funds as a significant constraints militating against private adaptation measures to climate change gave a satisfactory mean score of 3.02 which is greater than the acceptable mean of 2.5. This result agrees with the findings of Benhin (2006) who reported that lack of access to credit or saving and adequate information about climate change were some of the major constraints encountered by farmers in adapting to climate change in Africa.

### Conclusion and Recommendation

Mainstream of the farmers' age ranges from 41-50 years, this infers that older farmers were more likely to adapt private measures that will mitigate the harmful effects of climate change. Also, majority of the sampled farmers were married. More so, majority of the farmers had contact with agricultural extension agents.

The significant private adaptation measures to climate change in Ezinihitte Mbaise, Imo State were practicing mixed cropping, engaging in crop rotation, multiple planting dates, alternate fallow/tillage practice, off-farm income generation, land fragmentation, cover cropping and fertilizer application. The significant variables portraying the effects of social capital on private adaptable measures to climate change were farmer's membership status to social group/organization, cash contribution index by the members, labour contribution index and access to credit. The major constraints militating against private adaptation measures to climate change were inadequate funds, lack of access to farm inputs, illiteracy of

member farmer, lack of external support, disunity among group members and conflict among group farmers.

It is recommended that the government provide credit facilities to help farmers within their groups' adapt favourably to the vagaries of climate change.

### Conflict of Interest

The authors declare that there are no conflicts of interest regarding the publication of this paper.

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