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Social Media Used by Arable Crop Farmers for Communicating Climate Change Adaptation Strategies in Imo State, Nigeria

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Abstract

The study examined social media use by arable crop farmers for climate change adaptation communication in Imo State, Nigeria. Multistage sampling was used to collect data with the aid of structured questionnaire from 285 randomly selected arable crop farmers in the study area. Results showed that arable crop farmers use social media to seek knowledge about climate change ($\bar{x}$=2.71), disseminate information to friends ($\bar{x}$=2.67), and seek climate change adaptation strategies ($\bar{x}$ =2.59) and post-climate change adaptation strategies to farmer groups ($\bar{x}$ =2.72). However, the proportion of arable crop farmers' use of social media types was low. Sex, educational level and age influenced utilization of social media for climate change adaptation communication. Farmers should be encouraged to raise concern, make posts and engage in discussions on social media so as to attract and raise awareness of issues of concern among them, other stakeholders and the public. Government (ADP, Ministry of Agriculture), international organizations (FAO and CTA) and non-governmental organizations should organize training on use of smart phones, social media and information and communication technologies for farmers, and farmer groups.

Keywords: crop farmers, social media, climate change, adaptation strategies

Introduction

Advances in information and communication technology (ICT), alongside breakthrough in transport services led to globalization. Globalization in this 21st century is been greatly accelerated by the development and use of technological advances such as the internet, web 2.0 and social media. The revolution in ICT and social media is changing the way we live our lives due to its ability to provide differing services, especially information across various sectors. The role of social media cannot be over emphasized in this era of digitalization as Nwalieji,

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Ezeakunne, Enwelu, Okeke, Udemezue, & Uzuegbunam (2019) indicated that ICTs are important in the effective transfer of technologies in agriculture.
Social media can be referred to as web/internet based tools that enhance user generated content and campaigns aimed at sharing of information in various forms (Suchiradipta & Saravanan, 2016).Its main goal is to promote interaction among people, their group and community. Social media is also recognized widely due to its special features of disseminating information faster, ability to communicate information through different forms and the portability of the technological devices (mobile phones, tablets and laptops) that support social media use when compared to traditional media tools.

Information is power and agricultural information is pertinent to unlocking the potential of the agricultural sector, especially agricultural information dissemination. The world population is increasing, estimated to grow from 7.7 billion in 2019 to hit a record of 8.5 billion people by 2030, 9.7 billion by 2050 and 10.9 billion by 2100 (United Nations Department of Economic and Social Affair, 2019), with projected increases likely to come from sub-Saharan Africa. Social media provides the platform for effective agricultural information dissemination, communicating measures and practices and to utilize opportunities, address challenges facing agricultural sector in developing countries. Social media is important in the dissemination and creation of awareness on agricultural technologies and development knowledge in real time (Ifejika, Asadu, Enibe, Ifejika & Sule, 2019). However, reaching farmers with only traditional extension system is a big challenge and may continue to prove abortive considering the barriers to effective agricultural extension in developing countries which seeks to create opportunities to connect more farm families with extension agents.

Environmental degradation and climate change are of great importance to crop farmers and their livelihood. Climate change is a global issue affecting a greater percentage of smallholders who depend on rain-fed agriculture for their livelihood.
The use of social media is gaining wide recognition across various fields such as politics, education, sport and even agriculture. Social media provides a quick, portable and convenient means of disseminating information in real time. With the population of Sub Saharan African at 1.07 billion people at 2019, roughly the population of Europe and North America put together (United Nations Department of Economic and Social Affair, 2019). Communicating agricultural innovation and news to the ever increasing farming population is a challenge and needs an approach that is faster, more accurate and effective. Social media promises a great deal of potential to bridge this gap. However, the social media used by arable crop farmers for communicating climate change adaptation strategies in Imo state has not been ascertained. This examined social media used by arable crop farmers for communicating climate change adaptation strategies in Imo state. Specifically, it determined the type of social media used by the respondents, what they use these social media for, and the constraints to the respondents use of social media.

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Methodology

Imo state has three agricultural zones namely Owerri, Orlu and Okigwe. The state lies between latitude $4^0$45N and $5^0$50N, longitude $6^0$35E and $7^0$30E (Amangabara, 2015)

The population figure of Imo state as at 2006 population is 3,927,563 persons, it is blessed with enormous resources and agriculture contributes greatly to the income and livelihood activities of the citizen.

The population of study comprises all arable crop farmers in Imo state. Crop farmers were limited to arable crop farmers who cultivate crop such as cassava, yam, cocoyam and vegetables.

Table 1: Population of arable crop farmers in Imo State

Agricultural zones	Block	Cell	Number of arable crop farmers
Owerri ADP Zone	18(9)	127 (45)	11,712 (135)
Orlu ADP Zone	10 (5)	114 (25)	8,448 (75)
Okigwe ADP Zone	10 (5)	87 (25)	7,296 (75)
Total	38 (19)	328 (95)	27,456 (285)

Source: Agricultural Development Programme Headquarters Owerri, Imo state, 2018
Values in parenthesis represent the sample.

Multistage sampling was adopted for the study. To give a representation based on available data from Agricultural Development Programme (ADP) in Imo state.

The three agricultural zones were used for the study. Proportionate sampling was used and 50% of the blocks were selected randomly, giving us 19 blocks. Five (5) cells were selected randomly from each of the 19 blocks giving a total of 95 cells and three farmers were also selected randomly from each of the cells. A total of 285 arable crop farmers were selected for the study. Two hundred and fifty (250) properly filled questionnaires were used for the study.

Primary data were collected from the respondents with the use of interview schedule and analysed using Factor Analysis. Regression analysis was used to examine the relationship between the socioeconomic characteristics of respondents and the social media used for communicating climate change adaptation strategies.

Model specification

The independent variables are the socio-economic characteristics of arable crop farmers while the dependent variable is utilization of social media by arable crop farmers. The equation was stated in the linear, exponential, double log and semi-log forms. The variables comprise education, age, farming experience, house hold size, income, gender, occupation, marital status and size of farm.

The implicit form of the linear regression model is

$Z = f((X_1, X_2, X_3, X_4, X_{5,\ldots} Xn) + e$

Where

Z represents the use of social media by arable crop farmers in Imo State (aggregate score of use of social media)

X_1 represents the age of the respondents (in years),

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X_2 represents the gender of the respondents (male = 1, or female = 2),
X_3 represents the level of education of the respondents (in years spent in school),
X_4 represents the household size (number of persons), while
X_5 represents the monthly income of the respondents (in Naira).
X_6 represents farming experience of arable crop farmers (in years)
X_7 represents major occupation of the respondents (Farming = 1, or Non Farming = 2)
X_8 represents marital status of the respondents (Single = 1, or Married = 2)
e is the error term

The relationship between the dependent and the independent variable(s) was examined using the four functional forms: Linear, semi-log, exponential and double log functions.

Linear function

$$Z = a_0 + a_1X_1 + a_2X_2 + a_3X_3 + a_4X_4 + a_5X_5 + e$$

Semi-log function

$$Z = a_0 + a_1 \log X_1 + a_2 \log X_2 + a_3 \log X_3 + a_4 \log X_4 + a_5 \log X_5 + e$$

Exponential function

$$\text{Log } Z = a_0 + a_1X_1 + a_2X_2 + a_3X_3 + a_4X_4 + a_5X_5 + e$$

Double log function

$$\text{Log } Z = a_0 + a_1 \log X_1 + a_2 \log X_2 + a_3 \log X_3 + a_4 \log X_4 + a_5 \log X_5 + e$$

Where, a_0 represents the intercept
a_1 to a_5 represents the estimated coefficients.

The criteria used in selecting the functional equation that is best fit for regression, is equation with the highest R^2 value, highest number of significant variables, and conformity to the *a priori* expectations.

Results and Discussion

Use of Social Media by Arable Crop Farmers

Table 2 shows that most of the social media platforms recorded usage below average, with twitter (32.4%) been the most used social media platform by the respondents. Facebook (9.2%) Email (7.6%), Whatsapp (2.8%) and Messenger (0.8%) were also recorded. This implies that arable crop farmers use less of Facebook, Email, Whatsapp, and Mesenger. The use of Pinterest, Instagram and Flickr were prominent among arable crop farmers in the study area. The social media used mainly by the respondents have a rich share of visual display in communication. Ifejika, Asadu, Enibe, Ifejika, &Sule, (2019) pointed out that as at July 2017 the global social media login users was 2 billion people for Facebook, 1.5 billion for Youtube and 1.2 billion for Whatsapp and Facebook messenger. Twitter recorded 328 million monthly users in the globe, the authors pointed out; however, the use of Twitter by the respondents was more, as indicated by the data.
Evidence shows that social media is been used by extension agents and farmers and also beneficial to them. Suchiradipta and Saravanan (2016) observed that

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agricultural actors preferred Facebook, Whatsapp, Google+ and Youtube. Umunnakwe, Madukwe, Ozor, Nnadi, & Ani, (2018) reportedthat Facebook (88.4%), Whatsapp (74.7%), and Twitter (67.4%) were the most used social media by agricultural students in Federal University of Technology Owerri. However, twitter have been shown to be a home of most professional organizations involved in dissemination of information, events, programmes and learning opportunities. No doubt, these organizations give a comprehensive explanation to their activities and events, which may be a reason to the farmers perceived preferential use of twitter for communicating climate change adaptation strategies.

Table 2: Use of social media applications

Social media applications	Percentage (n=250)	Rank
Twitter	32.4	1st
Pinterest	12.8	2nd
Instagram	10.8	3rd
Flickr	10.8	3rd
Google drive	10.8	3rd
Facebook	9.2	6th
Chat On	8.8	7th
Google +	8.4	8th
Email	7.6	9th
Operamini	4.8	10th
Whatsapp	2.8	11th
Youtube	2.4	12th
LinkedIn	2.4	13th
Skype	2.0	14th
Online professional group	0.8	15th
Messenger	0.8	15th
Palmchat	0.8	15th

Source: Field survey 2018; Multiple response recorded

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Use of Social Media by Crop Farmers for Communicating Climate Change Adaptation Strategies

Respondents indicated that they post climate change adaptation strategies to their farmer group using social media ($\bar{x}$=2.72), social media helps them seek knowledge about climate change ($\bar{x}$=2.71), they seek information on climate change adaptation strategies on social media ($\bar{x}$ =2.59), access climate change information on social media ($\bar{x}$=2.58) and post relevant agricultural information to their farmer group ($\bar{x}$ =2.52). The above findings reveal that the use of social media is gradually gaining ground in its use for communicating climate change. Ifejika, Asadu, Enibe, Ifejika, & Sule, (2019) indicated that farmers have been advised to cling to their phones and laptops to be able to meet their information needs. Umunnakwe, et al., (2018) in their study shows that agricultural students use social media mainly to upload pictures (83.7%), to find news and events on agriculture (77.3%), and to connect with friends and relatives (76.1%). Social media makes learning and communicating climate change adaptation strategies impressive since it allows for the posting of videos, audios and several multimedia, which engages the farmers and enhance comprehension. Among the benefits derived from social media, agricultural students indicated that social media facilitates research and learning (78.7%), encourages virtual meeting and learning among colleagues (75.6%) (Umunnakwe, *et al*., 2018). The use of social media by arable crop farmers for climate change research and learning would no doubt improve the knowledge level of farmers and help them better monitor and adapt to changes in climate.

Table 3: Social media use by crop farmers for the purpose of communicating climate change adaptation

Statement	Mean (Standard deviation)
I post climate change adaptation strategies to my farmer groups	2.72 (0.94)
Social media helps me to seek knowledge about climate change	2.71(0.92)
I use social media to search for credit facilities	2.70 (0.98)
I use social media to disseminate information to my friends	2.67(0.97)
I share information to fellow farmers using social media	2.64(0.96)
I seek information on climate change adaptation strategies	2.59 (0.96)
The use of social media have been of great help in my farming activities	2.58 (0.97)
I access climate change information on social media	2.58 (0.96)
I search for loan opportunities using social media	2.58 (0.98)
I post relevant agricultural information to my farmer group	2.52 (0.94)

Source: Field survey 2018; Mean ≥ 2.5 indicates agreement. Overall mean = 2.63

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Constraints to Social Media Used by Arable Crop Farmers in Communicating Climate Change Adaptation Strategies

Knowledge factors accounted for 11.39% variance to the use of social media by arable crop farmers. This implies that the knowledge of the respondents on use of social media (on how to navigate on social media, how to use the internet, site to use for information seeking and the knowledge of role of social media in crop farming) will influence about 11% of their attitude to the use of social media. Utilization factors (time control on social media, readiness to use social media and so on) accounted for 11.12% of constraints to use social media.

This implies that an understanding of the utilization factors surrounding social media can improve social media use by about 11% among the respondents. While physical and infrastructural factors accounted for 6.7% of the constraints to the use of social media. Knowledge, utilization and infrastructural factors accounts for 29.211 per cent of the constraints to use of social media by arable crop farmers in Imo state and form only a small portion of constraints to use of social media by arable crop farmers. Kipkurgat, Onyiego & Chemwaina (2016) noted that poor network access, power outage and costly charges limited access to social media in their study area. These factors relate to infrastructural and use constraint to social media use. Umunnakwe, et al., (2018) in their study observed that high cost of devices (66.7%), and limited income (64.4%) were the major barriers faced by agricultural students in their use of social media.

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Table 4: Constraints to social media used by arable crop farmers

Constraints	Knowledge Factor	Utilization Factor	Infrastructural/ physical/ cost Factor	Communalities
Lack of trust on information from social media	.718			.564
Lack of awareness of role of social media in crop farming	.644			.463
I do not know the social media site to use for crop farming information seeking	.523	.355		.412
I don't know how to use the internet	.487	.451		.445
I prefer other communication channels	.456			.280
There is no encouragement to use android phone for agricultural purpose	.325			.181
Data subscription is high	.302			.116
I don't trust information on social media				.163
Extension agents have not taught us to us social media				.125
I cannot control the time I spend on social media		.651		.470
I am not ready to use social media		.639		.445
There is no cyber café in my area		.505		.337
There is no network connection in my community		.478		.296
I don't understand the language used in social media	.316	.421		.292
No farmer group to communicate climate change adaptation with		.389	.323	.286
I have nobody to teach me how to use social media to access information				.138
High cost of telephone services			.581	.365
High cost of alternative power supply			.519	.278
Data subscription is high			.420	.182
No training opportunities on social media use for communication			.400	.283
Erratic and unstable power supply			.313	.120
No money to get a laptop			.308	.185
Eigen value	2.51	2.44	1.48	
Percentage variance	11.388	11.108	6.715	
Cumulative	11.388	22.496	29.211	

Loadings less than [.30] were considered low and were suppressed. However, loadings of [0.5] or greater were considered high.

Relationship between socioeconomic characteristics and use of social media for communicating climate change adaptation strategies

The lead equation for the regression result was the exponential function as it met the criteria; having a high R^2 value and the highest number of significant values at 5% level.

The model (independent variables) used accounted for below 23% of the variability of the dependent variable. From the table it can be seen that educational level and farming experience were significant at 1%, however, farming experience is negative.

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This implies that as educational level of the respondents' increases, their use of social media for communicating climate change is likely to increase, on the other hand, as the farming experience of the respondents' increases, their use of social media decreases. Thus, old farmers with more farm experience are likely to use less of social media for communicating climate change adaptation strategies.
The age and sex of the respondents were significant at 5%, the age of the respondents was negative, while the sex was positive. Thus, the use of social media by the respondents decreases as they get older. In addition, with regards to sex, this implies that male arable crop farmers are likely to adopt social media for climate change adaptation communication compared to their female counterparts. This agrees with the findings of Umunnakwe, et al., (2018), their study observed that the sex of students was significantly associated with the use of social media. Thus, attention should be paid to female farmers and they should be encouraged to use social media in communicating climate change adaptation strategies.

Table 5: Relationship between socioeconomic characteristics and use of social media for communicating climate change adaptation strategies

Variables	Exponential	Double log	Semi-log	Linear
Constant	1.708 (38.802)	1.577 (12.802)	38.134 (2.453)	53.516 (9.652)
Sex	0.026 (2.220) **	0.078 (1.912)***	10.806 (2.094)**	3.476 (2.388)**
Age	-0.014 (-2.266)**	-0.053 (-1.139)	- 6.308 (-1.066)	-1.660 (-2.135)**
Farming experience	-0.007 (-1.942)*	-0.055 (-1.791)***	-5.710 (-1.476)	-0.680 (-1.567)
Educational level	0.024 (4.001)*	0.182 (4.831)*	20.331 (4.282)*	2.743 (3.579)*
Marital status	-0.011 (-1.287)	-0.033 (-0.653)	- 5.030 (-0.789)	-1.358 (-1.254)
Household size	0.001 (0.160)	-0.045 (-1.052)	-5.855 (-1.095)	-0.084 (-0.072)
Farm size	0.007 (0.861)	0.043 (1.207)	2.995 (0.670)	0.391 (0.387)
Major occupation	0.016 (1.260)	0.065 (1.462)	8.404 (1.499)	1.991 (1.281)
Income	2.243E-8(1.312)	0.028 (1.462)	3.281 (1.152)	2.497E-6 (1.160)
R^2	0.22	0.23	0.20	0.19
f-ratio	7.729	8.300	6.869	6.455

Figures in parenthesis are t-ratio; **** P≤0.05 *P≤0.01**

Conclusion and Recommendations

Social media use for communicating climate change among arable crop farmers was low and below average. Twitter was the most used social media platform followed by Facebook, email, Whatsapp and Messenger. In addition, arable crop farmers' use of social media for communicating climate change adaptation strategies was observed. Hence, arable crop farmers should be trained by information and technology experts on the use of social media for communicating climate change adaptation strategies.

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In carrying out the training activities for arable crop farmers attention should be paid to female farmers and they should be encouraged to use social media in communicating climate change adaptation strategies. Above all, the cost of digital devices that support social media should be subsidized and made available for arable crop farmers to enhance the use of social media to communicate climate change adaptation strategies.

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