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Research Article

Climate Change Adaptation Information Usability Among Maize Farmers in Ido Local Government Area of Oyo State, Nigeria

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Abstract

The availability of climate change information has not always led to more successful adaptation; even when climate change adaptation information is available, there are still obstacles to its efficient use. Furthermore, the tactics required to communicate climate information to end-users for successful adaptation have received less attention. This study focuses on utilization of available climate change adaptation information among maize farmers in the study area. Simple random sampling technique was used to select 203 respondents for data collection. The data were collected using a questionnaire and analysed through the use of the standard statistical package for social sciences. The communication strategies used include inter-personal, audio, visual and social media. The results revealed that the strategies used in communicating climate change adaptation information to maize farmers in the study area yielded great influence in terms of benefits to the farmers such as the increase in income, prevention of yield loss, reduced soil degradation, maintaining good human health status, and improved weed management. The information that is popularly utilised is mixed cropping (61.6%), water management (58.1%), and early warning (58.1%). A significant relationship existed between communication channels ($r=0.8$, $p<.05$) and respondents' climate change adaptation information utilization. Poor understanding of the message and lack of funds to put the information into practice hinders some respondents from utilising adaptation information. Hence, extension agents need to locate these category farmers and link them with service providers that could provide incentives or credit facilities for sustainable utilisation of available information to combat climate change.

Keywords

Communication, Strategies, Climate-Change, Adaptation, Utilization

1. Introduction

The increasing food production risks due to climate change and a projector increase in carbon emissions requires to take more drastic action. severity of extreme weather events in nigeria, such as high temperatures, unpresedented rainfall pattern, severe droughts, and floods across the states have underlined the urgent need for information -centred climate

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action. Oil exploration and the continuous use of fossil fuel in Nigeria constitute to the challenge of reducing greenhouse gas (GHG) emissions that is causing extreme weather events. The occurrences of extreme weather events call for proper adaptation or mitigation process. The adaptation process is impossible without adequate information availability at the disposal of the end users. Timely and adequate information dissemination will not only reduce or avoid the impacts of climate-related hazards but can also protect essential infrastructures from disruptions caused by extreme weather [1] The related Health risks observed by Wong and Huang [2] which arises from anthropogenic or human-induced climate change, and fossil fuel consumption-based CO_2 would have been laid to rest if climate change available information have been well utilized.

Despite this huge upheaval, climatic variability or climate change is widely acknowledged as one of society's most urgent challenges, and it continues to dominate news headlines with widespread reports of extreme or record-breaking weather, as well as anxieties about what the future may hold [3]. Climate change threatens present food security by modifying the spatial and temporal distribution of rainfall and the availability of water as a result of changes in water supply and demand [4]. Adapting to changing climates necessitates a well-functioning communication system.

Communication is the process of transmitting stimuli to influence people's behaviour. Forging and maintaining positive social working relationships, effective communication is critical. Communication is used to displace inaccuracies that hold sway as official truth and to replace erroneous ideas with newly validated hypotheses and truth. Most of the revolutions in agriculture, science, socioeconomics, and politics would have been difficult to achieve without communication [5].

Effective climate change adaptation communication involves getting information from those who know about it to those who need it in a way that they can understand and act on [6]. This indicates that it is the responsibility of extension agents to devise communication mechanisms that will result in positive action. Communication plays important role in national development as well as the agricultural sector, especially among maize farmers who need relevant information to cope with environmental shocks [7]. Coping with environmental stress among farmers necessitates the use of appropriate communication strategies to improve the farmers' knowledge and farming skills.

Extension strategies refer to the different things that extension professionals do or deploy to better deliver desired messages to farmers. This includes being conscious of her body language, maintaining eye contact, requesting and providing feedback, using encouraging small verbal comments, not interrupting farmers when they are speaking, focusing on what the farmer is saying, limiting distractions, participating in a discussion, acknowledging what farmers are expressing, considering tone of voice, using appropriate language or grammar, practicing well before the demonstration, and selecting an appropriate channel. The choice of communication channels through which extension agents communicate to farmers on climate change adaptation is referred to as communication strategies. These strategies are critical to ensuring successful climate change adaptation [8]. Individuals or communities can better comprehend the problem, raise awareness, foster debate, and drive behavioural change when proper strategies are used in the extension system [9].

The use of accessible climatic information is critical to the success of a climate-resilient programme and its implementation for effective climate change adaptation [4]. In recent years, great emphasis has been placed on the need to make information both valuable and beneficial to decision-makers [10, 11]. Several research activities have resulted in the availability of climate data at various temporal and regional scales [12], and such data is becoming more widely available [13]. This, however, has not always resulted in more successful adaptation [14]. Even when information is available, there are still barriers to its efficient application in decision-making, which is referred to as a "valley of death" [15] or "usability gap" [14]. Furthermore, little emphasis is placed on the languages required to communicate climate information to end-users for successful adaptation to occur most especially in physical science. Since most of the climatic information suppliers do not always have the skills to understand the right strategies required to pass information to users [10], especially among maize farmers who need the information to transform agricultural production.

Farmers face a lot of climate change challenges including maize growers and their access to information have not translated into effective adaptation which makes most of the farmers vulnerable to extreme events of climate change. Farmers' adaptation to climate change requires the use of information transmitted or communicated to them and good communication depends on the techniques used by the extension agents in reaching out to the farmers. Therefore, the communication techniques used by extension agents in passing information on climate change to farmers in the climate change-sensitive study region among farmers need to be ascertained. Therefore, this study ascertains the following objectives: Determine the socio-economic characteristics of maize farmers in the study area, ascertain the climate change adaptation communication strategies used by maize farmers in the study area, Identify the constraints to climate change adaptation information utilisation among maize farmers in the study area, and identify the climate change adaptation information passed to the maize farmers in the study area.

Literature Review

Efforts have been made in recent years to create useful and useable climate change adaptation data. Because climate information producers are not always prepared with the skills to recognize user needs or engage with users [16], the poor ability of climate information producers to transmit information to end-users create a usability gap. Knowledge generation and innovative partnerships, according to Vogel et al

[17], can assist close the usability gap by informing the creation of content that satisfies user demands and is presented in understandable ways. Vincent et al [10] also address this problem by proposing a conceptual framework that emphasizes enablers that are underappreciated yet necessary to ensure that relevant and usable information is used when demand exists. Vogel et al. [17] also present an analytical methodology that identifies the components that need to be evaluated and addressed for climate services to increase their effectiveness in climate-resilient planning by making these potential enablers explicit. The components include an understanding of decision-making contexts, users' climate information needs, climate metrics that meet those needs, and the ability to deliver identified metrics. This method has been used in a variety of agricultural investigations [18]. The first stage is to understand what informs the decision making of the user of the information, for instance, in the agricultural sector in developing nations, where gender roles determine the particular activities undertaken by men and women, gendered differences are reflected in information needs [19]. Furthermore, farmers' information needs to change over time [20]. Continuous involvement with end-users using a range of methods, including surveys, workshops, interviews, participatory rural assessment, and the use of appropriate communication channels, should be used in the process of identifying and addressing requirements. The next crucial step is to make the valuable agricultural information directly. In the past, much attention has been made to the communication channels and media used to disseminate information [21], with the acknowledgment that gender variations in preferred media and forms of communication [22] and a requirement for timeliness. Usability requires that relevant information be effectively depicted before being delivered promptly to guarantee that it is accessible and intelligible to the target user. The methods by which meteorologists and climatologists disseminate weather and climate information are very technical and, in many cases, inaccessible to non-specialists, rendering it useless to farmers [23]. Making useful information useable requires the building capacity of farmers to access and interpret scientific presentations of information in a local language that will be easily understood. Furthermore, putting in place suitable policy frameworks, supportive institutions, personal ability, and decision-making agencies will remove obstacles to climate change knowledge use. The utilization of meteorological data is limited if land ownership arrangements or gender roles are not taken into account in agricultural planning. To address this, appropriate institutional and regulatory frameworks are required to maximize the possibility of valuable and usable climate data being incorporated into decision-making [24]. This has been acknowledged by the Global Framework for Climate Services, which has helped many countries build National Frameworks for Climate Services [25].

Mitigation of and adaptation to climate change requires behaviour change and the development of sustainable solutions on local, national, and global levels by individuals, businesses, scientists, governments, non-government organizations, and other social and economic players in which communication scholars or practitioners play key roles. Much of the research in climate change communication focuses on public understanding of climate change, factors that affect public understanding, media coverage and framing, media effects, and risk perceptions. Less prevalent, growing areas of research include civic engagement and public participation, organizational communication, and persuasive strategies to affect attitudes, beliefs, and behaviours related to the climate [26]. In all of these areas, most of the research on climate change communication has been conducted in the United States, United Kingdom, Australia, Canada, and Western European countries. There is a need to expand the climate change communication research into other regions, particularly in the understanding of public perception in developing countries.

Understanding public perceptions are important for developing educational messages, guiding the development of persuasive messages, and identifying anticipated responses to policy proposals. However, it is also important to recognize that simply attempting to close the gap between public understanding and scientific understanding is insufficient for creating widespread shifts in public understanding and practices. The information deficit model of science communication [27], which tries to bridge the gap between expert and public perceptions of research by providing more and better science information, is an ineffective method to communicating about science [26, 27]. As a result, while research into the public's understanding of climate change identifies significant gaps and misunderstandings, addressing those gaps and misunderstandings requires more sophisticated ways to communicate strategy than simply providing information.

The communication strategy constitutes the medium through which information flows from a sender to one or more receivers. Face-to-face, word-of-mouth is the simplest and yet one of the most widely used and effective means of communication channel, particularly in developing countries requires the use of some communication aids to make communication more effective [28]. The channels of communication may be classified into some ways according to different criteria. As society changes from traditional to modern, the emphasis shifts from oral to media systems of communication [29]. Because of the large number of audience or receivers that are needed to be reached, and the physical distance of the communicator and the receivers of information, it is necessary to use different media of communication strategies due to the socioeconomic status of each receiver [28]. Communication strategy is classified as an interpersonal, group, and mass contact depending on the number of people that can be reached at a time.

Individual contact: The extension agent communicates with the people individually, maintaining the separate identity of each person. Examples are farm and a home visit, farmer’s

call, or writing personal letter farmers.

Group contact: The extension agent communicates with the people in groups and not as individual persons. Examples are group meetings, small group training, field day or farmers' day, study tour.

Mass contact: The extension agent communicates with a mass of people, without taking into consideration their individual or group identity. Examples are mass meetings, campaigns, exhibitions, radio, television.

2. Methodology

This study was carried out in the Ido local government area (LGA) of Oyo State. Ido LGA is situated in Oyo state, southwest Nigeria. The local government area was created from the Akinyele local government area in 1989. Ido LGA borders the Oyo state local government areas of Oluyole, Ibarapa East, Akinyele, Ibadan south-west, and Ibadan north-west.

The national census of 2006 puts the population of Ido at 103,261, the most prominent tribe in the area is the Yoruba ethnic group. Yoruba is commonly spoken in the area while Christianity and Islam are the widely practiced religions.

Ido occupies a total land area of 986 square kilometers and has many rivers flowing through its territory. Ido has large forest reserves and has an average annual temperature of 28 degrees centigrade. The average humidity level of Ido local government are is 59 ℃ while the total precipitation in the area is put at 1950mm of rainfall per annum. The area coordinates of Ido are Longitude: 3 ℉, Latitude: 7 ℕ.

Ido's soil is ideal for agricultural use. Farming is the primary activity of the inhabitants in the area, with maize, rice, and kolanut being farmed in considerable quantities. Crop processing, fishery and livestock complement crop farming activities in the area.

There were about 1015 maize farmers registered in Ido LGA. Twenty percent (20%) of the registered farmers were randomly selected. This gave a total of 203 respondents. Structured interviews were used to gather information. To ensure consistency in the measuring instrument, we pre-tested the questionnaire outside of the study area with two groups of maize farmers in Akinyele Village, Akinyele Local Government Area. The pre-test resulted in a reliability coefficient of 0.71. Items included in the questionnaire were information on the socio-economic characteristics of maize farmers in the study area, climate change adaptation communication strategies used by maize farmers, the constraints to climate change adaptation information utilization, and the type of climate change adaptation information communicated to the farmers. The questionnaire was administered in the English language but was interpreted to the respondents in their local language through trained enumerators who were fluent in the local languages. The data collected were analysed using frequencies, percentages, and regression analysis [4] with the use of the Statistical Package of the Social Sciences (SPSS).

3. Results

3.1. Distribution of the Respondents Based on Socio-Economics Characteristics

Table 1 shows the socioeconomic characteristics of the respondents, revealing that 21.7% were between the ages of 36 and 40, 21.7% were between the ages of 21 and 25, and 13.8% were beyond the age of 56. The majority of respondents (74.9%) were male, while 25.1% were female. 52.7% of those polled were married, 29.6% were divorced, 15.3% were widowed, and 2.5% were single. About 54.2% of those polled had a bachelor's degree, 21.2% had a secondary school diploma, and 11.8% had a basic school diploma. The majority of the homes had more than 5 people.

Table 1. *Distribution of the respondents based on Socio-economics characteristics (N=203).*

Variables		Frequency	Percent
Age	21-25 years	44	21.7
	26-30 years	17	8.4
	31-35 years	38	18.7
	36-40 years	44	21.7
	41-45 years	32	15.8
	Above 56 years	28	13.8
Gender	Male	152	74.9
	Female	51	25.1
Marital status	Single	5	2.5

Variables		Frequency	Percent
	Married	107	52.7
	Divorce	60	29.6
	Widowed	31	15.3
	No formal education	26	12.8
Educational qualification	Primary school	24	11.8
	Secondary school	43	21.2
	Tertiary	110	54.2
	1-2 household	56	27.6
Household members	3-4 households	65	32.0
	5-6 households	34	16.7
	Above 6 households	48	23.6
	11-20 years of experience	13	6.4
Farming experiences	21-30 years of experiences	171	84.2
	Above 30 years of experience	19	9.4
	₦ 20000-₦40000	14	6.9
	₦44,000-₦56,000	38	18.7
Income	₦100,000-₦300,000	102	50.2
	₦330,000-₦500,000	21	10.3
	₦570,000-₦150,000	28	13.8
Total		203	100.0

Field survey, 2020

3.2. Communication Strategies Used by Maize Farmers

Table 2 shows the various communication channels available to maize farmers in the study area. These range from interpersonal, mass media and the use of social media. This finding shows that most of the information is always conveyed by friends (64.5%) i.e. co-farmers, extension agents (59.6%), flyers (59.6%) and television (54.7%).

Table 2. *Shows the various communication channels on climate change adaptation available to maize farmers in the study area. (N= 203).*

Communication strategies	Frequency of receiving information on climate change adaptation					
	Always (2 or more times in a month)		Occasionally (once a month)		Not at all	
Interpersonal	Frequency	Percent	Frequency	Percent	Frequency	Percent
Friend	132	65.0%	17	8.4%	54	26.6%
Workshop	102	50.2%	49	24.1%	52	25.6%
Extension agent	121	59.6%	39	19.2%	43	21.2%
Mass media						
Newspaper	102	50.2%	55	27.1%	46	22.7%

Communication strategies	Frequency of receiving information on climate change adaptation					
	Always (2 or more times in a month)		Occasionally (once a month)		Not at all	
Interpersonal	Frequency	Percent	Frequency	Percent	Frequency	Percent
Fliers	121	59.6%	45	22.2%	37	18.2%
Radio	88	43.3%	34	16.7%	81	39.9%
Television	111	54.7%	26	12.8%	66	32.5%
Social media	103	50.7%	52	25.6%	48	23.6%

Field survey, 2020 multiple responses

3.3. Constraints to Climate Change Adaptation

Some of the respondents faced barriers to information utilisation were a lack of adequate early warning information (18.2%, Table 3) and a poor grasp of the message or information given by climate service providers (10.3%).

Table 3. Constraints to climate change adaptation.

Constraints	More severe	Severe	Not a constraint
Lack of skills to put strategies into use	-	3.9%	81.3%
Poor credit facility	-	5.9%	81.8%
High cost of input	-	25.1%	73.4%
Poor information on early warning	9.7%	18.2%	72.1%
Poor understanding of the message	5.3%	15.3%	79.4%

Field survey, 2020

3.4. Climate Change Adaptation Information Received by Maize Farmers

Farmers strategically sought information on climate change adaptation from the various channel. Climate change adaptation guidance provided for farmers through different sources included tree planting, water management (conservation method), planting timing, pest and disease control. The majority of respondents acquired information on water management through social media, while information on planting dates was largely obtained from radio (35.0%) as well as from neighbour farmers or acquaintances (15.3%; Table 4). End users were also given information on soil fertility management during training or workshop by extension personnel.

Table 4. Climate change adaptation information communicated to maize farmers in the study area.

Communication strategies	Types of information received from each channel						
	Tree planting	Mixed cropping	Soil fertility management	Water management	Planting date	Pest control	Early warning
Interpersonal							
Friend	15.3%	8.4%	10.3%	25.6%	32.0%	2.0%	6.4%

Communication strategies	Types of information received from each channel						
	Tree planting	Mixed cropping	Soil fertility management	Water management	Planting date	Pest control	Early warning
Workshop	9.4%	14.8%	29.6%	12.3%	18.2%	5.9%	9.9%
Extension agent	27.6%	25.1%	13.0%	22.7%	5.4%	2.0%	4.4%
Mass media							
Newspaper	13.8%	2.0%	4.4%	29.1%	31.0%	12.8%	6.9%
Fliers	9.4%	4.9%	26.1%	49.8%	3.4%	6.4%	-
Radio	-	-	13.8%	25.6%	35.0%	16.3%	9.4%
Television	7.4%	1.0%	40.9%	34.0%	3.0%)	6.9%	6.9%
Social media	13.3%	3.9%	12.3%	54.2%	16.3%	-	-

Field survey, 2020

3.5. Benefits Derived from the Climate Change Adaptation Information Communicated

Table 5: shows that 63.5% of the respondents reported that the use of climate change adaptation information prevented yield losses resulting in higher incomes, 56.2% experienced high prevention of soil degradation, and 50.2% reported good human health status, while 58.6% reported improved weed management.

Table 5. *Benefits derived from the climate change adaptation information communicated.*

Benefits derived	Level of benefits derived		
	High	Medium	Low
Increase in income	63.5%	5.9%	30.5%
Prevent yield loss	48.8%	27.6%	23.6%
Reduced soil degradation	56.2%	17.7%	26.1%
Maintain good health status	50.2%	17.7%	32.0%
Improve weed management	58.6%	23.2%	18.2%

Field survey, 2020

3.6. Level of Utilisation of Climate Change Adaptation Information

Table 6: below shows the level of climate change adaptation information utilization by the respondents. The information that is popularly utilised is cropping strategy (mixed cropping) (61.6%), water management (58.1%), and early warning (58.1%). While soil fertility management, planting date adjustment, and pest control were not common among some respondents.

Table 6. Level of utilisation of climate change adaptation information.

Adaptation information communicated	Level of the utilisation of climate change adaptation information					
	Always		Occasionally		Never	
	Frequency	%	Frequency	%	Frequency	%
Tree planting	94	46.3	49	24.1	60	29.6
Mixed cropping	125	61.6	42	20.7	36	17.7
Soil fertility management	90	44.3	27	13.3	86	42.4
Water management	118	58.1	25	12.3	60	29.6
Planting date adjustment	101	49.8	47	23.2	55	27.1
Pest control	101	49.8	37	18.2	65	32.0
Early warming	118	58.1	24	11.8	61	30.0

Field survey, 2020

3.7. Relationship Between Climate Change Adaptation Strategies and Information Utilisation

Table 7 depicts that positive relationship existed between strategies used by farmers and their climate change adaptation information $p<0.5\%$.

Table 7. Correlation showing the relationship between the climate change adaptation strategies used by farmers and their climate change adaptation information utilization.

Variables	r-value	Degree of freedom	p-value	Decision
Climate change adaptation strategies	0.8	119	<.05	Significant

Significant level*0.05

4. Discussion

The result indicates that most farmers are middle-aged citizens. Age is a very important factor in agricultural production; it influences an agricultural sector's future; the younger the farming population, the higher their productivity. Inadequate white-collar jobs have also pushed young and middle-aged Nigerians into the farming business. This finding is corroborated by Adigun et al. [30], who postulated that farmer age, knowledge of agricultural practices, and access to credit were important drivers of youth participation in agriculture. Sustainable agricultural production in Nigeria necessitates the replacement of an aging farmer generation with youthful and dynamic youths [30]. Both male and female respondents were involved in maize production, implying that male and female farmers choose maize cultivation as a means of livelihood, despite the fact that most female farmers frequently struggle to acquire means of production, limiting their productivity. Walker [31] supports this by observing that men were not innately better at farming than women, and that women provided about half of all agricultural labour in Africa. However, because women have less access to agricultural labour, tools, extension services, and financing for their farms than males, they receive a lower return on the same investments.

The finding reveals that most of the farmers were married. This may be because farming in the study area relies on family labour, which is in line with the findings of Lawal and Alfred [32] who discovered that family labour was mostly utilised than hired labour by farmers. More than half of the respondents were degree holders. This implies that most respondents had formal education and that a high level of formal education can encourage farmers to seek information on climate change to adapt to climate change.

Most of the households had more than 5 members. This could be because farming in the study area relies on family labour, hence, each family tends to marry and have a large number of

children. The majority of respondents had 21-30 years of farming experience. This suggests that most of the respondents had knowledge of maize farming and could have built a cultural way of coping with environmental change. Almost half of the respondents earned more than ₦300,000 annually from maize production which is an indication that maize production is profitable in the study area. This may allow them to comply with their financial obligations in society and contribute to local, state, and national economic development.

For a good extension programme, extension agents use a variety of communication strategies, such as paying attention to body language, such as facial expressions and other nonverbal indicators, maintaining eye contact demonstrates that you are paying attention to the farmers, and requesting and providing input on the issue being addressed. Using encouraging verbal comments necessitates the usage of proper communication channels. In this study, the various communication channels used to get information on climate change adaptation ranged from interpersonal to mass media and social media use. This finding shows that most of the information is always received from friends i.e. co-farmers which could be due to limited number of field extension personnel in the study area, extension agents, flyers and television. This means that most respondents have access to information on climate change adaptation through various channels that are easily accessible to them. Since they have access to this information they were expected to use it for sustainable maize production. The finding is supported by Olutegbe and Fadairo [33] who reported that farmers in Oyo state have access to information on climate change through various channels of communication. However, Vincent et al [10] observed that the availability of climate change information has not always resulted in more effective adaptation due to some barriers to its utilisation.

Although the majority of respondents face fewer barriers in getting climate change adaptation information, we must not lose sight of those who confront challenges for sustainable agriculture and national food security. constraints to climate change adaption information utilisation among some of the respondents include lack of capacity or skill to implement strategies, poor access to credit facilities, high input costs, poor early warning information, and poor understanding of the message. This finding implies that farmers in the research area suffer severe obstacles in using climate change adaptation information due to a lack of access to early warning information and low comprehension of the message content. This suggests that farmers could perform better if they had access to clear early warning information. Furthermore, the United Nations Sustainable Development Goals (SDG) seek to produce more effective and sustainable agriculture through the application of technical breakthroughs [34]. Nonetheless, technological constraints, such as limited access to ICT, have hampered many developing countries' efforts to achieve agricultural sustainability in the face of environmental changes.

Farmers strategically sought needed information from different channels to have a better understanding of the subject matter. Information shared among the respondents by climate service providers includes tree planting, mixed crop farming, soil fertility management, and water management, planting date change, pest control and early warning. This knowledge is also transmitted via a variety of networks that are easily available to farmers. This implies that farmers did not rely just on information provided by extension organizations, but rather sought information from a variety of sources to improve their climate change adaptation skills. Although extension professionals are more likely to provide information about tree planting, which functions as a windbreak against wind storms, and farmers have been advised to use mixed cropping to avoid total crop loss, some farmers still obtained it from other sources. Information on soil fertility management to avoid soil erosion and increase soil nutrients and quality has been sought mostly from television programmes by the respondents. Information on water resources is mostly provided by social media and flyers. Planting date adjustment is mostly communicated via radio programs that monitor rainfall pattern forecasts. On the other hand, information on insect control is also mostly received to avoid crop losses caused by pest infestation through radio. Early warning information was primarily received through a workshop for farmers to prepare for the season. social media also plays an important role in accessing climate change adaptation information among farmers but not all farmers can operate the tools or have access to internet facilities, this may hinder its utilisation, a finding that is consistent with Khanal et al [34], who also noted that not everyone has the same internet access, communication tools, level of information approach, or takes advantage of available digital gadgets.

The use of climate change adaptation information prevented yield losses resulting in high incomes, experienced high prevention of soil degradation, the health status of a crop planted, and improved weed management. This indicates that respondents gained significantly from listening to climate change adaptation information, which was conveyed to them through the different communication methods used to convey the knowledge to them.

Benefits derived depend on the level of climate change adaptation information utilisation by the respondents. Most of the respondents usually utilise available information such as mixed cropping practices, water management, and early warning information. However, we should not lose sight of the respondents who could not practice the information due to constraints faced for sustainable agricultural production. Constraints such as poor understanding of the information from respondents who could not seek clarification and lack of funds to purchase the necessary instruments hinder some farmers from utilising the information. There was a strong association between channels of communication available and information use for climate change adaptation. This indicates that if farmers are reached using appropriate communication channels, the information offered will be applied to their fields.

5. Conclusion

Climate service providers have offered farmers in the study area the information that could help them manage the harmful effects of climate change. Farmers, on the other hand, did not rely solely on the information provided by extension professionals; instead, they strategically sought information that could increase adaptation skills from a variety of sources. The information sought improved their adaptation skills on their farming business, resulting in a sustainable yield due to some resilience; however, some of the respondents were unable to use the information due to difficulties faced, such as a poor understanding of the message and a lack of funds to put the information into practice. Hence, extension personnel must locate the remaining farmers and connect them with service providers who can give incentives or credit facilities for long-term use of available information to combat climate change. In addition, facilitators of climate change adaptation knowledge communication should explore various communication methods and provide realistic sessions to ensure that information is well understood and clear when transmitting information on adaptation to climate change to farmers so that they can develop farmers' skills in the use of adaptation information.

Abbreviations

GHG	Greenhouse Gas
CO_2	Carbon (IV) Oxide
LGA	Local Government Area
SDG	Sustainable Development Goals
ICT	Information Communication Technology

Author Contributions

Arimi Kayode: Conceptualization, Data curation, Formal Analysis, Investigation, Methodology, Resources, Supervision, Validation, Writing – original draft, Writing – review & editing

Adebayo Olubunmi Christiana: Data curation, Investigation, Methodology, Writing – review & editing

Conflicts of Interest

The authors declare no conflicts of interest.

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