

The Contributing role of the media in educating farmers in riverine areas on the choice of suitable crops and the use of technologies for farming in Bayelsa State, Nigeria

Jammy Seigha Guanah*

Department of Mass Communication
University of Benin, Benin City, Nigeria

Stanley Leader

Department of Mass Communication
University of Africa, Toru-Orua, Bayelsa State, Nigeria
and

Ikaderinyo Furomfate

Department of Mass Communication

*Corresponding author: Email: jammyguanah@yahoo.com

Abstract

Background: Farmers in riverine areas face the dual challenge of determining the most suitable crop to cultivate and the appropriate technologies to use. The media could be helpful in assisting farmers to address these challenges.

Objectives: The aim of this study was to examine the contributing role of the media in educating farmers in riverine areas on the choice of suitable crops and the use of technologies for farming in Bayelsa State, Nigeria.

Methodology: The descriptive survey research design was used to conduct the study. Data were collected through the questionnaire and presented in frequency tables and percentages.

Results: The study found that newspapers, interpersonal communication, radio, town criers, and social media were the major sources of information on the most suitable crops for farmers in Bayelsa state. rRadio was found to be the commonest source of information on new farming technologies among farmers in Bayelsa State. Likewise, the study revealed that the challenges Bayelsa State farmers encounter in accessing farming information include electricity supply, extension officers` roles, illiteracy, broadcast time, costs of information gadgets, and ambiguous media contents.

Conclusion: The media have a big role to play in creating awareness about up-to-the-date farming technologies through their reportage. This can attract more people to farming, and invariably increase food production and income among farmers.

Unique contribution: This study has offered information on the role that the media play in guiding farmers in their agricultural activities with particular referenmce to farmers in riverine areas. This information could guide policy and influence the future debate in the literature.

Key Recommendations: It was recommended that the Bayelsa State government should deploy various media in disseminating agricultural information, and in creating awareness about the existence of modern technologies for the production of the most suitable crops for farmers in the state.

Keywords: farmers; education; information; media; riverine; technology

Introduction

The indispensability of agriculture to developing nations and society is enormous and obvious. The advantages gleanable from it are not limited to the food supply, they include the provision of employment for a teeming number of people and the provision of raw materials for various industries.

The agricultural sector in Nigeria has grown consistently over the past few years. Agriculture accounts for a significant portion of Nigeria's Gross Domestic Product (GDP) as a key activity for the country's economy after oil. According to Mohammad Abubakar, Nigeria's Minister of Agriculture and Rural Development (FMARD), the agricultural sector contributed 23% to the country's GDP in the first half of 2022. (News Agency of Nigeria- NAN, as cited in *The Guardian*, 2022). According to the Minister, agriculture alone contributed 23.3 percent to GDP (Half Year 2022), which supports the upward trend of the performance in the preceding years, which were 25.88 percent (2021), 26.21 percent (2020), 25.16 percent (2019), 25.13 percent (2018), 25.08 percent (2017), 24.45 percent (2016), and 23.11 percent (2015).

The importance of agriculture has led to numerous researches being carried out on how to improve the sector and intensify the commodity value chain development process, among others. The new framework of the National Agricultural Technology and Innovation Policy (NATIP), 2022–2027, introduced in August 2022, was influenced by this connection between research, agriculture, and industry. Relevantly, technology has changed general agriculture into precision agriculture, where farmers are now assisted with daily decisions on when and how much to irrigate, fertilize, and apply pesticides to their crops by real-time weather predictions. There are some automated smart greenhouses available. They are controlled by algorithms that alter inputs such as roof ventilation, artificial lighting, and warmth to ensure the best circumstances for plant development (Lim, 2022).

Efforts by various individuals, organisations, and governments to achieve food security are taking a new shape. With new numerous technologies being introduced into the field of agriculture, conversations are beginning anew on how they can be used to boost food production. However, the realisation of food sufficiency through the multiplication of food production and food supply, enabled by technology, cannot be achieved if the media do not make agriculture stakeholders know about the availability of technologies that could ease their work, and attract more profit to them in their businesses.

The media are the megaphones of society. As part of their social responsibility role to society, they are obligated to inform and educate the public about new technologies in the field of agriculture that can help boost food production across the board. It is the importance of the media to society that made Guanah (2014) to declare that every issue remains docile until the media choose to activate it, and cause it to be a matter of national discourse.

This study focused on Bayelsa state. It is a state that is rich in soil and landmass. It has been making exploits in agricultural production over the years. The agricultural resources prevalent in the state include: crops (arable, vegetable, ornamentals & tree crops); fishery (fin &

shellfish in fresh, brackish & salt water); forestry resources (Mangrove Swamp Forest, Timber & Wildlife), and others. However, being a reverine area, not all crops are situable in the state and farmers need information on the most sitatble crop as well as the technologies to use. Therefore, this paper examined the most suitable crop for Bayelsa State`s arable land; the number of farmers engaged in the planting of the crop, and the level of awareness created by the media about the availability of the technologies that farmers can use to boost their productions and reduce hunger in the land.

Objectives of the study

This study sought to achieve the following:

- i. To determine the sources of information on the most suitable crops for farmers in Bayelsa state.
- ii. To determine the source of information on new farming technologies among farmers in Bayelsa State
- iii. To determine the challenges to accessing farming information among farmers in Bayelsa State

Theoretical Standpoint

Uses and Gratification theory was adopted for this study. The theory was postulated by Elihu Katz in 1970. The theory is concerned with how consumers use media to satisfy their demands. It asserts that people choose what they want to read or watch and that various media compete to meet each person's wants (Suresh, 2003). According to Baran (2013), the uses and gratification theory holds that individuals use media rather than the media using the people.

The core proponent of this theory is that it emphasises the fact that people use media for various purposes based on the satisfaction and gratifications they derive from the media content they receive. The theory talks about what people do with varied media content they are exposed to daily, and not what the media do to the people. According to Asemah (2011, p. 169), the theory looks into what people do with communication content rather than what it does to them. Instead of focusing on what media does to people, it focuses on what people do with media.

The theory was applied in this study because the media and their content would determine whether Bayelsa farmers would patronise them. The farmers will only go for the media that their information needs as it concerns agriculture and modern agricultural technologies. This makes the theory relevant to this study.

Agriculture and Technology: The Meeting Point

The contributions of agriculture to the socio-economic stability of society are huge. Virtually every human being relies on agriculture for their daily food supplies. Economically, agriculture is becoming more integrated with the global market (Food and Agriculture Organization- FAO, 2022). Modern agricultural techniques that ensure economic diversification and sustainability are being pursued and put in place. Undoubtedly, technology is revolutionising the face of agriculture worldwide by its contribution to the growth in agricultural production and development.

For instance, agricultural produce can be dried using a Flash Dryer, which reduces its perishability and the amount of food that is wasted by small and medium-sized agribusinesses. According to Akoni (2016), 40% of what is produced in Nigeria is lost to post-harvest wastage due to excessive moisture content, which could have been easily avoided with the Flash Dryer technology. This technology may be utilized to preserve commodities. There will be value-added items if these products are dried so they can last for a long time of six months to a year.

Similarly to this, Walch (2019) writes about agriculture bots that use artificial intelligence (AI). These robots are employed in a variety of ways to supplement human labour. These robots can pick crops more quickly and in greater quantities than human labourers. By having a workforce available around-the-clock, they can more effectively identify and get rid of weeds while also cutting costs for farmers. There is no doubt that science and technology are playing a bigger role in contemporary life, and discoveries are constantly being developed in this field.

Miller (2022) reports that mapping of GMO genetic material has improved understanding of genetic modifications and cleared the road for crop genes to be enhanced to make them more beneficial for production and human consumption. In areas where climatic circumstances restrict productivity, crops might be modified to tolerate bad weather or yield larger yields. This increases genetic variety in the area.

According to Mustapha Shehuri, the Minister of State for Agriculture of Nigeria, the government will use infrastructure, technology, and entrepreneurship as practical tools for examining agricultural potential. He went on to remark that the administration also intended to use technology and infrastructure to strengthen sectoral and inter-sectoral connections and advance the nation's socioeconomic development (News Agency of Nigeria- NAN, as cited in *The Guardian*, 2022).

Information, Media, and Agricultural Development

Relevant information is important for people to make meaning out of their daily life endeavours. Information is important in all affairs of life, and the quality of information one has access to is considered to be the basis on which most decisions are taken. In light of this, the relevant information farmers have about the happenings in the field of agriculture will go a long way to help them in their endeavours. Farmers must have timely information on new agricultural technologies, including improved forms of seedlings. Although personnel like agriculture extension officers are used in disseminating agriculture information, the media are very effective in doing so. The role of the media in creating awareness about the availability of science and technological equipment that can impact and complement agricultural activities is not in doubt, and are worthy of appreciation (Guanah, et al., 2023).

Media messages, usually, do have effects on their receivers, and for them to have news gatekeepers' pre-determined effects, media gatekeepers ensure media messages are framed in ways that the purpose for their being sent out would be achieved. Hence, the media must be able to frame their messages for them to create awareness on issues of public discourse effectively. They are expected to bring to the knowledge of their audience all they need to know on burning issues. Important matters and issues should not be limited to the straight news reporting format alone, other forms of news reportage like 'features' and 'opinions' should also be utilised in reporting issues that border on citizens and society. In other words, the media must create awareness on issues that has to do with the benefits of society by spreading knowledge about them through education and information, because it is the duty of the media to create awareness, as enshrined in the first stage of the process of diffusion of innovation (Guanah, 2021).

One of the inevitable roles the media play in support of food security in society is by creating awareness of agriculture-related issues by way of promoting the dissemination of information that can enhance massive food production. This is important because information can heavily trigger and enhance farmers' ability to adapt to innovations, especially, new technologies. This supports Nweke's (2010) claim that, because extension is a continuous process of

disseminating useful information to people, it helps farmers develop the knowledge, skills, and attitudes necessary to use this information or technology effectively with the ultimate goal of increasing their productivity and achieving a higher standard of living.

Embedded in the character and trait of the media is the ability to elevate or downgrade people, events, or issues. Without obvious pontification, but most times with a subtle style of reportage employed via framing, they can exact a lot of influence. For instance, through their online platforms, the media can expose farmers to various trending innovations and technologies in the agricultural sector so that they can have varieties to choose from. Media should help to disabuse people's minds that agriculture is meant for the poor; this they can do by bringing to their knowledge the many successful farmers all over the world that make their fortune from agriculture, especially in Israel and America. In Nigeria, there were about 43 million social network users in 2021, and 103 million users are expected in 2026 (Statista Research Department, 2021). Also, Nigeria remains Facebook's biggest market in Africa. Media houses can maintain various social media platforms, particularly Facebook pages, through which they can publish agriculture-based stories, and have a lot of readers 'liking' their pages.

Empirical Review of Literature

Obindah et al. (2023) examined the promotion and marketing of agricultural programs to rural residents in Rivers State, Nigeria, using digital media. Their main focus was the Agric Gist programme on Treasure 98.5 FM Port Harcourt. The study's objective was to determine how the digital radio program affected rural farmers in Rivers State's adoption of agricultural innovation. Using a survey design, the researchers used the questionnaire to collect data from 400 respondents. According to their study's findings, the majority of respondents were aware of the *Agric Gist* programme, comprehended its message, and actively engaged in some of its innovations. The researchers suggested, among other things, that more channels be utilized to spread agricultural messaging and that extension personnel be sent to farming communities to educate farmers about the need of utilising agricultural technologies to promote rural development

In a study titled "Influence of Delta Broadcasting Service's "Radio Farmer" on Knowledge and Applications of Agricultural Skills in Delta State," Guanah et al. (2018) looked at this topic. The researchers examined the important roles that agriculture plays in every civilization and its many advantages, highlighting the need for persons working in rural regions to be well-informed, particularly through radio, in order to advance their trade. The study aimed to determine whether farmers' knowledge and skills on the best ways to increase their farm yields and productivity were influenced by the "Radio Farmer" program on the Delta Broadcasting Service. The study also sets out to know if farmers were utilising the information they got, especially on the use of modern agricultural technologies.

The chi-square statistical formula was used to evaluate the hypothesis in this study, which used a survey research methodology and was based on the Media Development theory. Among other things, the study discovered that more than two-thirds of the respondents had learned agricultural knowledge from listening to DBS' "Radio Farmer." The majority of farmers, it was discovered, do not employ contemporary agricultural methods. The study came to the conclusion that radio shows a very high value in providing rural communities with useful information, and it advised using simple language(s) that rural farmers could understand when broadcasting "Farmers'" programmes on radio to ensure that good information dissemination was achieved. It also recommended that there should be more programmes on radio to enlighten farmers on how to use modern agricultural technologies.

The "Role of Radio Kogi Ochaja's *Iko Ameluche* Programme in Sensitizing Farmers for Improved Agricultural Productivity" was the subject of Oguche's (2020) study. Due to its accessibility and low cost, he believed radio to be an excellent conventional medium essential for the distribution of agricultural information in rural areas. His research analysed the role of the radio programme *Iko Ameluche* on agricultural development in Kogi State's Dekina Local Government Area. The study's goals were to assess the degree of exposure, the impact of the agricultural knowledge learned from the program, and the difficulties in gaining access to the data. Roger's theory of the dissemination of innovations served as the study's foundation.

A sample size of 367 was taken using the purposive sampling technique from an overall population of 8,151 people in the Agada, Ologba, and Ojikpadala locations. A descriptive data analysis revealed that the respondents had high exposure to the *Iko Ameluche* programme, which significantly impacted their farming methods. However, they were constrained by issues like low participation in the program and channel noise, among others. In order to expand audience involvement and provide them access to additional information, it was suggested that the *Iko Ameluche* program's duration be extended. This would improve agricultural productivity in Kogi State's Dekina Local Government Area.

Methodology

These researchers adopted a survey research design. Nayak and Narayan (2019) acknowledge that the data collecting process and survey method can be flexible for obtaining sufficient data from study participants. The population of the study was made up of the 9, 442 registered farmers in Bayelsa State (Bayelsa State Ministry of Agriculture, 2022). The sample size was determined using the table from Krejcie and Morgan (1970) for the finite population. The table indicates that the appropriate sample size will be 368 for a population between 9,000 and 9,999. Consequently, 368 people were included in the study's sample.

The eight Local Government Areas (LGAs) of Bayelsa State that form the three Senatorial zones of the State were purposively selected. Sagbama LGA and Ekeremor LGA were selected from the Bayelsa Western Senatorial zone; Kolokumo/Opokuma LGA, Southern Ijaw LGA, and Yenagoa LGA were selected from the Bayelsa Central Senatorial zone, and Ogbia LGA, Brass LGA, and Nembe LGA were selected from Bayelsa East Senatorial zone. Since the Sample Size is 368, the researchers purposively shared 123 to the Bayelsa Central Senatorial zone and Bayelsa East Senatorial zone, which has three LGAs each, and 122 to the Bayelsa West Senatorial zone, which has just two LGAs. In each zone, this was further shared among the LGAs. It is assumed that using the sample chosen from the eight LGAs of Bayelsa State might provide a good degree of representativeness of the study population.

The data collection was executed based on dichotomous response questions measurement of constructs. A questionnaire with multi-item options was designed and used to collect data. Convenience sampling technique was used to administer the questionnaire to respondents. Out of the 368 copies of the questionnaire administered to respondents, only 362 (98. 34%) were returned. These were the copies analysed.

Table 1: Demographic Characteristics of Respondents

Characteristics	Frequency	%
Sex		
Male	250	69.06
Female	112	30.94
Age		
18-24	95	26.24
25-34	50	13.82
35-44	111	30.66
45-above	106	29.28
Education		
Primary education	132	36.46
Post Primary education	112	30.94
Tertiary education	64	17.68
Postgraduate education	54	14.92

Source: Field Survey, 2023.

From Table 1, it is seen that most of the farmers are male. Also, the ages of most of the farmers are from 35 years and above. Likewise, the table showed that about 32.8% have tertiary education.

Data Presentation and Analysis

Table 2: Respondents' sources of information on the most suitable crops for farmers in Bayelsa state.

Responses	Frequency	%
Television	60	16.57
Newspapers	59	16.30
Interpersonal Communication	56	15.47
Radio	96	26.52
Town Criers	33	9.12
Social Media	58	16.02
Total	362	100

Source: Field Survey, 2023

The data displayed in Table 2 showed that television, newspapers, interpersonal communication, radio, town criers and social media are the sources of information on the most suitable crops for farmers in Bayelsa state. This implies that their sources are not limited to a single medium of communication.

Table 3: Source of information on new farming technologies among farmers in Bayelsa State

Responses	Frequency	%
Radio	70	19.34
Television	68	18.78
Newspapers	58	16.02
Agric. Extension Workers	35	9.67
Social Media	67	18.51
Interpersonal Communication	64	17.68
Total	362	100

Source: Field Survey, 2023

Data, as presented in Table 3, showed that there are many sources of information on new farming technologies among farmers in Bayelsa State, but the main source is radio (19.34%). The data on the Table imply that the farmers are exposed to various sources, but radio was the most patronised among them because radio signals are being received in every nook and cranny of the state.

Table 4: Challenges to accessing farming information among farmers in Bayelsa State

Responses	Frequency	%
Electricity supply	124	34.25
Extension officers` roles	28	7.73
Illiteracy	58	16.02
Broadcast time	45	12.43
Costs of information gadgets	57	15.75
Ambiguous media contents	50	13.82
Total	362	100

Source: Field Survey, 2023

Table 4 showed that Bayelsa state farmers face a lot of challenges and barriers in accessing various agricultural information, especially those that have to do with the availability of the technologies that farmers can use to boost their production. This can infer that there is a communications gap regarding the goings on in the field of agriculture.

Discussion of Findings

The first finding of this study identified television, newspapers, interpersonal communication, radio, town criers, and social media as the major sources of information on the most suitable crops for farmers in Bayelsa state. This shows the importance of the media when it comes to the dissemination of information, especially when the information has to do with agriculture. This finding is supported by Khan et al. (2020) who attest that the main communication tools that give farmers knowledge and information about agriculture are newspapers, radio, television, smartphones, and the Internet.

The mass media act responsibly in their reportage because the majority of the masses anchor the decisions they make on issues based on what they glean from the media. This goes a long way to prove that it is not enough for the media to just be known and associated with their basic functions of informing, entertaining and educating the public, they go ahead to demonstrate these roles. They bring these functions to reality. They engage their society demanded and expected roles significantly by supplying citizens with the right information that will satisfy their entertainment, education, and sundry other needs.

The media may inform farmers about how to incorporate new knowledge and scientific research into agricultural practices through a variety of channels. Invariably, this will bring about the promotion of agricultural productivity. It will increase food security, improve the status and living standards of farmers, and promote agriculture as the major driver of most societies.

The data gathered from the field also revealed that television, newspapers, interpersonal communication, radio, agriculture extension officers, and social media were the source of information on new farming technologies among farmers in Bayelsa State. However, radio (19.34%) was mentioned as the highest medium out of the six media listed. Khan et. al. (2020) note that radio is still the most common form of communication in rural areas, and it can transmit a variety of agricultural programmes.

This finding shows that if the media perform their duties effectively by creating awareness and lavishly reporting about agricultural technologies, the likelihood exists that farmers will adopt

the technologies. This assertion is corroborated by Guanah et al. (2018), who found from their study that the DBS' "Radio Farmer" influenced the acquisition of technological information on agriculture. Hitherto most of the rural farmers were not aware of the existence of most of the agricultural technologies that are available to farmers, but they got to know about them through the "Radio Farmer" programme on DBS. Likewise, the study carried out by Obindah et al. (2023) revealed that most of the respondents who tuned to the *Agric Gist* programme on the radio, understood the messages passed across, and practised some of the innovations espoused by the programme. This simply means that the media must intensify their publicity of agricultural issues.

The third finding of this study revealed that the challenges Bayelsa State farmers encounter in accessing farming information include electricity supply, extension officers' roles, illiteracy, broadcast time, costs of information gadgets, ambiguous media contents, among others. Key media like television, online newspapers, radio, and social media are powered by electricity. However, electricity supply is generally epileptic in most parts of Nigeria, including Bayelsa State. For instance, radio that has been considered as one of the major sources being used to disseminate agricultural information to farmers due to easy access is powered by electricity, although some transistors radios use cell batteries. When electricity is in short supply, farmers will be hindered from getting useful information about their trade from the media.

When the broadcast time of agriculture programmes on radio, television, and some aspects of social media (for example, Facebook live streaming) is odd, it becomes a challenge for farmers to access necessary information. This finding is supported by Agwu et al. (2008) who recognised broadcasting time, language barriers and feedback as major limitations that delayed active access to and use of information packaged for farmers.

The broadcast time may fall into the period when the farmers are busy on their farms handling other critical issues, and may not have the luxury of time to tune to broadcast stations running agriculture programmes on the air. According to Agwu et al. (2008), the programmes could be too brief or inappropriately scheduled, which results in poorly designed radio programmes and insufficient feedback that denies farmers the chance to absorb and use the information to increase their knowledge.

The level of education and literacy of farmers in Bayelsa State can be a challenge when it comes to accessing farming information among farmers in Bayelsa State. Farmers' levels of literacy and education is very important. According to United Nations Educational Scientific and Cultural Organisation-UNESCO (2012), the literacy rate of the population of Bayelsa state is 62.0%, and this includes the farmers. When the farmers are well educated, it will be easier for them, not only to have access for useful information but for them to implement the information contents.

A study by Agwu et al. (2008) revealed that farmers' educational attainment substantially impacted their adoption of new technology. They noticed that even reduced technical language broadcasts were difficult for uneducated farmers to understand. This demonstrates how education is essential for raising awareness, which then helps farmers take adaptation steps.

Agriculture Extension Officers play significant roles in passing information to farmers, especially those in the rural areas. They are meant to disseminate accurate information and knowledge on new agricultural technologies to enhance farmers' agricultural production. When these officers are not committed to their duties, the farmers will not get the necessary information they need. The high cost of information gadgets like mobile phone, radio, and television also hinders many farmers from accessing agricultural news and information. Most of them are not

financially buoyant enough to purchase some of these gadgets that will give them easy access to information.

Also, poorly designed content and format of the information disseminated to farmers can pose as a barrier to their accessing information. There is bound to be miscommunication when media content, or message, is ambiguous. When this happens, the information can not be said to have been disseminated effectively. Nisbet (2009) argues that in order for knowledge and communication to be effective, it must be presented in the form of interpretive stories that may be utilised to elicit a shared understanding among various audiences.

Adequate information on the part of farmers about the availability of technologies that can aid their performances are necessary if they must achieve large production of their crops, hence they need timely information on this so that they can make use of them. Rogers (2003) attests that making agricultural information available to farmers plays an integral role in promoting farmers' adoption and usage of innovations.

Conclusion

This study examined the sources of information on the most suitable crops for farmers in Bayelsa state, the source of information on new farming technologies among farmers in Bayelsa State, and the challenges to accessing farming information among farmers in Bayelsa State. Hunger is ravaging the world today due to food insufficiency. As a result, a lot of technologies are being invented and introduced into the agricultural sector to boost food production. Apart from the machines being produced, efforts are also being made in the area of organisms modified genetically to bring about improved seedlings, some of which can resist weeds successfully.

States like Bayelsa should take advantage of the fact that the land is suitable for the planting of rice to go into massive farming while utilising various farming technologies. This can simplify farming and make it more attractive for more people to engage in it, especially the teeming population of unemployed youth. The media have a big role to play in this. By creating awareness about these farming technologies through their reportage, more people can be attracted to farming. When more people go into agriculture, there is every tendency that food production will increase on the land.

Recommendations

- i. Bayelsa State government should deploy various media the more in disseminating agricultural information, and in creating awareness about the existence of modern technologies for the production of the most suitable crops for farmers in the state.
- ii. Since radio is the major source of information on new farming technologies among farmers in Bayelsa State, the government should ensure that radio signals are received throughout the state. More agricultural programmes should also be featured on radio regularly.
- iii. Government should make conscientious efforts in improving electricity supply; extension officers` should be more dedicated to their duties; broadcast stations should fix agriculture programmes when farmers are available to access them while also ensuring that their programme contents are understandable, and not complex. Framers should also improve their education.

References

- Agwu, A. E., Ekwueme, J. N. & Anyanwu, A. C. (2008). Adoption of improved agricultural technologies disseminated via radio farmer programme by farmers in Enugu state, Nigeria. *African Journal of Biotechnology*, 7(9), 1277-1286.

- Akoni, O. (2016). World Bank, food technologists promote preservation tech for agribusiness. Retrieved from <http://www.vanguardngr.com/2016/09/world-bank-food-technologists-promote-preservation-tech-agribusiness/>.
- Asemah, E. S. (2011). *Selected Mass Media Theories*. Jos: University Press.
- Baran, S. (2013). *Introduction to mass communication: Media literacy and culture* (7th ed.). Glasgow: McGraw Hill.
- Bayelsa Ministry of Agriculture (2022). Registered Farmers in Bayelsa State. Yenagoa: Ministry of Agriculture.
- Food and Agriculture Organization- FAO (2022). Agricultural Markets and Development. Retrieved from <https://www.fao.org/markets-and-trade/areas-of-work/emerging-trends-challenges-and-opportunities/agricultural-markets-and-development/en/>.
- Guanah, J. S., Leader, S. & Furomfate, I. (2023). Science and Technological Development in Green Economy and Media Role in Awareness Creation among Farmers in Bayelsa State, Nigeria. Being a Paper presented at the African Council for Communication Education (ACCE Nigeria) 23rd Annual International Conference/AGM Held at the Department of Mass Communication, Nnamdi Azikiwe University, Awka, Anambra State, Nigeria, from January 24-27, 2023.
- Guanah, J. S. (2021). Mainstream media and artificial intelligence awareness amongst residents of Asaba Metropolis, Delta State, Nigeria. *Journal of Contemporary Social Research*, 5 (1): 65-79.
- Guanah, J. S., Ihiaeme, M. C., & Agu, N. G. (2018). Influence of Delta Broadcasting Service's "Radio Farmer" on knowledge and applications of agricultural skills in Delta State. *FUOYE Journal of Communication*, 1 (2): 75-96.
- Guanah, J. S. (2014). Media Buzz and Sources of Exposure to Daddy Freeze's Comments on Tithing: Perceived Influence on Tithers in Select Pentecostal Churches. Unpublished M. Sc. Seminar Paper, Anambra State University, Igbariam Campus, Anambra State, Nigeria.
- Khan, N., Siddiqui, B. N., Khan, N., Ahmad, Z., Ismail, S., Javed, H. H., Ali, S., Kazim, R., Azam, T., Abdullah & Kasi, A. K. (2020). Mass Media Role in Agricultural and Rural Development. *International Journal of Advanced Research in Biological Sciences*, 7 (4): 199-209. DOI: <http://dx.doi.org/10.22192/ijarbs.2020.07.04.025>.
- Krejcie, V. & Morgan, D. (1970). Determining sample size for research activities. *Educational and Psychological Measurement*, vol. 30: 607-610.
- Lim, X. (2022). How technology can help address challenges in agriculture. Retrieved from <https://www.weforum.org/agenda/2022/03/how-technology-can-help-address-challenges-in-agriculture/>.

- Miller, K. (2022). 10 Advantages and Disadvantages of GMOs. Retrieved from <https://futureofworking.com/>.
- Nayak, M. S. D. P., & Narayan, K. A. (2019). Strengths and weaknesses of online surveys. *Technology*, 6(7). Retrieved from https://www.researchgate.net/profile/Mudavath-Nayak/publication/333207786_Strengths_and_Weakness_of_Online_Surveys/links/61176e5a0c2bfa282a42253b/Strengths-and-Weakness-of-Online-Surveys.pdf.
- Nisbet, M. C. (2009). Communicating climate change: why frames matter for specific engagement in environment. *Science and Policy for Sustainable Development*. 51(2), 12-23.
- Nweke, F. I. (2010). Farm labour problems of smallholder cropping systems. *Nigeria Quarterly Journal of International Agriculture*, 19: 257-288.
- Obindah, O., Peace, N. V. & Cletus, P. Z. (2023). Using Digital Media to Advertise and Market Agricultural Development in Rivers State. *GVU Journal of Management and Social Sciences*, Vol. 8: 140-148.
- Oguche. I. (2020). Role of Radio Kogi Ochaja's *Iko Amelu* Programme in Sensitizing Farmers for Improved Agricultural Productivity. *International Journal of Current Research in the Humanities*, No. 24: 121-132.
- Rogers, E. M. (2003). *Diffusion of innovations*. 5th ed. New York: Free Press.
- Suresh, K. (2003). Mass communication theories. Retrieved from www.peoi.org/couresen/mass/fram2.html.
- Statista Research Department (2021). Nigeria: number of social media users 2017-2026. Retrieved from <https://www.statista.com/markets/424/internet/>.
- The Guardian* (2022). Agriculture contributes 23% to GDP in 2022- Minister. Retrieved from <https://guardian.ng/news/agriculture-contributes-23-to-gdp-in-2022-minister/>
- United Nations Educational Scientific and Cultural Organization- UNESCO (2012). List of Nigerian states by literacy rate. Retrieved from https://www.wikiwand.com/en/List_of_Nigerian_states_by_literacy_rate.
- Walch, K. (2019). How AI Is Transforming Agriculture. Retrieved from https://www-forbes-com.cdn.ampproject.org/v/s/www.forbes.com/sites/cognitiveworld/2019/07/05/how-ai-is-transforming-agriculture/amp/?amp_js_v=a6&_gsa=1&usqp=mq331AQFKAGwASA%3D#aoh=16020986886160&referrer=https%3A%2F%2Fwww.google.com&_tf=From%20%251%24s&share=https%3A%2F%2Fwww.forbes.com%2Fsites%2Fcognitiveworld%2F2019%2F07%2F05%2Fhow-ai-is-transforming-agriculture%2F.