Indonesian Journal of Education, Social Sciences and Research (IJSSR)
Vol. 6, No. 2, July 2025, pp. 57-65

ARTIFICIAL INTELLIGENCE (AI) IN COMMUNICATION: NAVIGATING THE TOOL-WEAPON SPECTRUM OF ENVIRONMENTAL SUSTAINABILITY IN NIGERIA

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ABSTRACT

This study investigated the multifaceted impact of Artificial Intelligence (AI) technology on environmental sustainability in Abraka Metropolis within Delta State Nigeria. It analyses how AI functions as both a powerful instrument and a potential weapon to impact public comprehension and behavioural participation at the nexus of communication studies and environmental concerns. Rationale by the media ecology theory, a mixed-methods research design necessitates the application of primary and secondary data. The population of the study is Abraka Metropolis residents. A sample of 150 respondents within and around Delta State University, Abraka were tested using a purposive sampling technique to reach experts, while a random sampling technique was used for surveying the public. Data collection methods include the use of questionnaires and interviews. For deeper insight into the subject matter, Key Informant Interviews (KII) were conducted with communication, environmental and AI technology experts within and around Delta State University Abraka. For data analysis, descriptive statistics summarized the analysed data, and the hypothesis was tested with inferential statistics using Spearman Rank on the Software app STATA 15.0 to analyse the data. This study concludes that AI technology creates numerous prospects for environmental sustainability communication, challenges such as deep-fake technology, algorithmic bias, and misleading AI-generated content could undermine public trust in environmental sustainability messages. It is recommended that stakeholders in communication and constituted authorities should strengthen AI literacy, enhance AI regulations, improve AI accessibility, integrate AI with human-led interventions, and encourage ethical AI development to develop both information and engagement regarding the preservation of humanity

Keywords: Artificial Intelligence, Communication, Tool-Weapon Spectrum, Environmental Sustainability, Technology

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1. INTRODUCTION

Artificial intelligence (AI) has started transforming diverse sectors across Nigeria with particular emphasis on the Abraka region. AI-based technology is boosting communication strategies by stimulating environmental conservation awareness and participation from public members. According to Idowu, Agbanu,

Ifeyinwa and Ifeoma (2025), AI applies predictive analysis to waste production patterns and deforestation monitoring which supports environmentalists and politicians to make informed decisions. Regular distribution of educational resources for sustainable practices is managed through automated content generation mechanisms (Okpala & Nzeanorue 2024). Real-time data distribution enables early response through quick environmental threat updates which include pollution monitoring as well as underground forestry activities (Bormane & Blaus 2024). Furthermore, Konan and Balogun (2024) are of the view that developed regions gain more from AI-driven solutions while less developed places struggle with accessibility and implementation, AI has the potential to worsen environmental inequality. Deepfake technology alongside artificial intelligence has become a growing threat to environmental information authenticity because it contributes to false climate change statements (Haldorai, Murugan and Ramu 2020). A combination of deep ecological management battles with the residents of Abraka demonstrates the struggle of this university town in the Niger Delta. Various ecosystems along with abundant natural resources from the town open it up to destructive unsustainable practices. A balanced approach will enable the proper utilization of AI as an instrument. Bormane and Blaus (2024) were successful in determining how AI functions in digital marketing communications, they pointed out both positive and negative outcomes of integrating AI in digital marketing communications. Haldorai, Murugan and Ramu (2020) conducted research to understand both the obstacles and implementation aspects of intelligent ICT education in their study. According to Ayub (2025) and Agbanu, et al. (2025) researchers must take action to establish fresh theoretical approaches in his study about Human-AI Communication in the Digital Era.

This study examines Abraka as a case study to develop overall knowledge about AI applications in environmental sustainability. It is an investigation of the connection between AI, communication and environmental sustainability, which takes place in Abraka, Delta State as part of this study. It also reviews AI application progress in environmental messaging while suggesting proven strategies to use AI for behaviour sustainability and examining how traditional and indigenous communication supports AI-based initiatives. Additionally, the study addresses moral concerns about AI implementation in environmental communication including problems with data protection and computer program biases and digital accessibility limitations.

Objectives of the Study

Among several areas this study examined, the specific objective of this study is to;

1. analyze the dual role of Artificial Intelligence (AI) in environmental communication within Abraka Metropolis, Delta State.
2. evaluate the real-life applications and implication of AI in environmental sustainability communication within Abraka,

Literature Review

Artificial Intelligence (AI) in environmental communication

Usage of artificial intelligence (AI) enables computers to have the ability to think and act the same way humans do. Mao, et al. (2021) claim that learning, thinking, problem-solving, making decisions, using language and perception are several tasks performed by the brain. In writings about the future, Nishant, Kennedy and Corbett (2020) say that the thought of super AI becoming smarter than humans is commonly explored. It can clearly be seen how important AI has become since industries like healthcare, banking, education and others rely on it. DeepMind makes it possible to predict protein structures, IBM Watson assists in recognising health issues, Erica helps users with their banking inquiries, Duolingo tailors language learning, Tesla's autonomous vehicles navigate and notice any dangers, Netflix and Spotify recommend entertainment for their users based on interests and Global Fishing Watch from Google tracks illicit fishing (Nah, McNealy, Kim & Joo 2020). AI continues to grow and is affecting many different sectors and daily patterns of life. AI is making it easier for new information to be collected, studied and spread in environmental communication. With AI tools, it is now possible to closely monitor changes in the environment and inform the public so that they are motivated to act (Mao et al. 2021). AI is used in environmental activism, education and policy development to achieve more successful results. Because AI can quickly look through vast amounts of data with great accuracy, it has become important in environmental communication. AI software is used to observe air and water quality, detect the loss of forests and project the state of the climate with help from satellite pictures (Ye, Yang, Zhong, Tu, Jia & Wang 2020). They offer support for communities, environmental organisations and governments who make environmental decisions using data.

Additionally, using chatbots and virtual assistants with AI, people can get instant information about environmental issues and take part in sustainability activities more actively (Uche, Nwabudike & Jimoh 2024). Nah, McNealy, Kim and Joo (2020) point out that AI also helps in making and sharing content. Using

technology, automated systems can create reports, summaries and articles about environmental topics to make information clearer for everyone. AI technology on social media helps target users who care about the environment and encourages them to take part in efforts to conserve it. They additionally point out that AI plays a role in sentiment analysis which lets policymakers understand people's opinions about the environment and adapt the way they address these issues. Still, using AI in environmental communication raises certain issues. Lies and deep-fake videos published online may cause people to instead doubt or misunderstand information about environmental matters. Biassed algorithms in AI can influence people's views by favouring some environmental messages and leaving others out (Uche, Ebeze, & Obiora, 2016). Critical ethical issues linked to the use of data privacy and AI in affecting public views should also be dealt with (Kiemde & Kora, 2022).

Applications and Implications of AI in Environmental Sustainability Communication

AI is helping change how environmental sustainability information is gathered, reviewed and disseminated to the community (Huang, et al. 2023). Thanks to AI technology, governments, organisations and communities can keep track of the environment in real time, make predictions and distribute information effectively, helping everyone make wise decisions (Uche, Nwabudike & Jimoh 2024). Still, AI can cause issues that need to be dealt with so that ethical and effective environmental communication remains possible (Nah, et al. 2020). Satellite monitoring systems alongside artificial intelligence (AI) models of WMO and NASA help to predict weather and climatic patterns, notice illegal logging and assist in protecting various environments (Abitova, et al. 2024). With Bin-e, cities can collect recyclables separately and save time on routing which helps them encourage environmental responsibilities (Sheng Islam, et al., 2020). Sensors equipped with AI technology measure pollution in the environment and give real-time feedback to agencies and citizens involved. Through AI, these organisations can follow patterns in conversations about the environment and respond by improving and revising their sustainability messaging. When users ask about sustainable practises, AI chatbots give fast answers. AI recommends better energy practises for smart cities based on its analysis of energy used in the city (Ye, Yang, Zhong, Tu, Jia & Wang 2020). Google and many other companies use AI to reduce how much energy their data centres use, making it clearer how they support sustainability (Rahman, et al. 2020).

In the view of Uche, et al. (2024), there are both favourable and unfavourable implications of AI for the humanities sector. AI makes it possible to quickly examine a large amount of information which leads to a faster reaction to climate disasters and pollution events (Nah, et al. 2020; Nishant, et al. 2020). Still, it brings up possibilities of incorrect news, issues with ethics and a gap in using technology among various groups. AI systems collect plenty of data and if regulation is not put in place, this data could be abused (Al-Kfairy, et al. 2024). Li, et al. (2024) also explain that depending too much on AI can cause errors in reading environmental data. Under these conditions, AI should aid experts and the public as they take part in making sustainability initiatives successful (Huang et al. 2023).

Theoretical Framework

Media Ecology Theory, developed by Marshall McLuhan and expanded by Neil Postman analysed the effects of communication technology on our view of the world, social lives and cultural customs (Mcluhan 2019). For AI to be part of environmental sustainability communication, we must understand that it acts as a transformative medium for sharing, understanding and acting on data about the environment (Zhang & Mcluhan 2016). AI makes it possible to share environmental information by processing a lot of data, creating reports and speaking with the public through chatbots and prediction systems (Edyburn, et al. 2005). It was stated by Mao, et al. (2021) that through AI-driven tools, some issues in the environment are highlighted more than others which can impact the way the public sees and acts on these issues. Still, AI tools may warp information about the environment which is why ethical AI management is important. It is highlighted in the theory that technological improvements bring a digital divide and are unfair to the environment, as information in this field mainly goes to digital consumers, leaving out rural or marginalised sectors (Zhang & Mcluhan 2016).

Hypothesis

AI-driven communication systems in Abraka Metropolis have a significant impact on public comprehension and behavioural participation in environmental sustainability initiatives, with both positive correlations relating to information access and negative correlations relating to misinformation, demonstrating a complex relationship between AI implementation and environmental engagement.

2. RESEARCH METHOD/MATERIAL AND METHOD/LITERATURE REVIEW

This study investigates the role of Artificial Intelligence (AI) and communication in Environmental Sustainability using a mixed-methods research design necessitating the application of primary and secondary data (Turner, Cardinal & Burton 2017; Battista & Torre 2023). The population of the study is Abraka Metropolis residents. The study includes a sample of 150 respondents including 15 experts in communication and environmental sustainability, 35 AI and technology experts and 100 individuals from the public within and around Delta State University, Abraka. A purposive sampling technique is used to select experts, while a random sampling technique is used for surveying the public. Data collection methods include the use of questionnaires and interviews (López 2022; Andrade 2020). Using a 5-point Likert scale, the study set 3.00 mean score as the decision threshold. Secondly, data collection includes a literature review on AI-generated sustainability reports and digital platforms. For deeper insight into the subject matter, Key Informant Interviews (KII) were conducted with 5 communication experts, 5 environmental sustainability advocates and 5 AI technologists within and around Delta State University Abraka. Validity and reliability are ensured through triangulation and pilot testing of survey instruments and ethical considerations such as informed consent, confidentiality, and bias reduction were acted on (Battista & Torre 2023). Statistics were used to help the study. Descriptive statistics were done and tests about the hypothesis were performed using Spearman Rank in the STATA 15.0 software (Liu, Li, Wanga & Shepherd 2018). Even so, the study has weaknesses, for example, there may be biases in the data collected from surveys, it is hard to generalise findings because of a smaller sample and technology in the field of AI is developing at a fast pace

3. RESULTS AND DISCUSSION

Table 1: Return Rate of the Questionnaire

S/N	Description		%
1	Copies Retrieved and Found Usable	142	95
2	Copies Not Retrieved and Those Found Not Usable	8	5
	Total	150	100

Table1 shows that one hundred fifty copies of the structured questionnaire were administered, of which 142 were properly filled and retrieved making 8 out of the questionnaire representing 5% were not retrieved or found usable. This represents a questionnaire return rate of 95% which is considered significantly accurate for the study.

Demographic Data

Table 2: Respondent Gender, Age, Educational Level and Specific Description

Gender	**Male**	**Female**			
	91(64%)	51 (36%)			
Age	**18-24**	**25-34**	**35-44**	**45-54**	**55+**
	29 (20%)	63 (44%)	35 (25%)	11 (8%)	4 (3%)
Educational Level	**Primary**	**Secondary**	**Tertiary**	**Others**	
	19(13%)	31(22%)	79(56%)	13(9%)	
Description	**Public**	**Communicator**	**Environmentalist**	**AI Technologist**	
	97 (67%)	8 (6%)	5 (4%)	33 (23%)	

Table 2 present that more men than women were involved in the study at a ratio of 64%. These statistics, however, do not affect the quality of the study's findings. There is a broad mix of age groups, and most people are in the 25-44 age range. The number of younger and older adults is lower, but they are still important to discuss. The data clearly shows that more than half of the people surveyed (56%) hold a tertiary education. Secondary education levels were seen in 31% of cases, primary education levels in 19% and the rest at 13% in other educational levels. Since AI is a complex subject, having academic diversity matters a lot due to the connexon between higher education and being more literate and logical. The makeup of the sample accurately shows what the future holds for AI in Nigeria.

Thematic Data

Table 3: Survey Output on the dual role of Artificial Intelligence (AI) in environmental communication within Abraka Metropolis, Delta State

AI improves environmental awareness by providing accurate and timely information on climate change, pollution, and conservation efforts							
	142	SA (5)	D (4)	N (3)	DA (2)	SD (1)	Mean Score	Decision
		24	67	30	11	10	3.75	Accept
the use of AI in environmental communication increases the risk of misinformation, deepfakes, and biased narratives that can mislead the public							
	142	SA (5)	D (4)	N (3)	DA (2)	SD (1)	Mean Score	Decision
		23	44	51	12	12	3.38	Accept
AI enhances environmental monitoring and communication by providing accurate, data-driven insights into climate change and conservation efforts							
	142	SA (5)	D (4)	N (3)	DA (2)	SD (1)	Mean Score	Decision
		59	31	29	8	15	3.08	Accept
AI-Powered tools, such as chatbots and automated reports, make environmental communication more engaging and accessible to the public							
	142	SA (5)	D (4)	N (3)	DA (2)	SD (1)	Mean Score	Decision
		26	75	32	6	3	3.81	Accept

Table 3 survey finds out what people think about AI's impact on environmental communication. The factors investigated showed that individuals had mean scores indicating they perceived benefits of 3.75 and risks of 3.38, 3.08 and 3.81 in AI. A mean score of 3.75 suggests AI-driven tools like real-time data analytics, automated content generation, and digital platforms have enhanced climate monitoring, pollution tracking, and conservation efforts. However, concerns about accessibility and effectiveness of AI-driven tools in rural areas suggest skepticism, a mean score of 3.38, respondents moderately agree that AI-powered chatbots, social media algorithms, and interactive platforms effectively engage the public on environmental issues. Otherwise, the score of 3.08 suggests that AI is almost agreed to be involved in creating misinformation, for example, deep-fake videos and biassed algorithm results. The mean score shows that AI plays a major role in forming people's perception of environmental sustainability. People taking part in the survey agree that AI helps communication on the environment, yet there are still worries about misleading messages and ethics. An even strategy is required to maintain accuracy, improve how everyone can access these efforts and gain people's trust in AI for sustainability.

Table 4: Survey Output real-life applications and implication of AI in environmental sustainability communication within Abraka

AI reliance in environmental communication may reduce the role of human expertise in message framing and audience connection							
	142	SA (5)	D (4)	N (3)	DA (2)	SD (1)	Mean Score	Decision
		55	47	30	9	1	4.03	Accept
It enhances the ability to disseminate accurate and timely environmental information to the public							
	142	SA (5)	D (4)	N (3)	DA (2)	SD (1)	Mean Score	Decision
		29	45	51	17	0	3.61	Accept
AI-Powered social media campaigns and digital platforms effectively engage the public in environmental sustainability efforts							
	142	SA (5)	D (4)	N (3)	DA (2)	SD (1)	Mean Score	Decision
		11	24	34	38	35	2.56	Reject
AI-Driven technologies, such as predictive models and smart sensors, help improve decision-making in environmental management							
	142	SA (5)	D (4)	N (3)	DA (2)	SD (1)	Mean Score	Decision

	27	22	49	28	16	3.11	Accept

Table 4 above summarises the applications and consequences of AI used in communications for environmental sustainability. The scores of 3.03, 3.61, 2.56 and 3.11 prove that people feel differently about the policies and have varying concerns. The survey reveals that people in Abraka have different opinions about how AI can help with environmental sustainability messaging. Even though AI makes it easier for people to know about the environment using tools like reporting, smart sensors and forecasts, the area of fairness and accessibility appears to be less important as noted in the score of 2.56. People's understanding of technology, the quality of networks and equipment available and public awareness may influence this impression. According to the results, most people agree that AI is very useful for tracking the environment and making important decisions by using satellite images, predictions and machine learning. But, at this point, AI people consider biassed algorithms, misinformation and ethical issues as minor threats. The mean score of 3.11 suggests moderate agreement that AI improves public access to environmental sustainability information, but barriers such as digital access, internet connectivity, and technical expertise might limit AI's full potential. The survey results suggest the need for increased public awareness on AI's ethical risks and strategies to expand AI accessibility in environmental sustainability initiatives.

Testing the Hypothesis

H_0: AI-driven communication systems in Abraka Metropolis have a significant impact on public comprehension and behavioural participation in environmental sustainability initiatives, with both positive correlations relating to information access and negative correlations relating to misinformation, demonstrating a complex relationship between AI implementation and environmental engagement

Table 5: spearman DRAI, RLAI, (0.05) pw

Number of obs	Spearman's rho	Prob > |t|	Decision
142	0.00251	0.0022	Accepted

Table 5 indicates that Dual Role of Artificial Intelligence- DRAI and Real-Life Application and Implication- RLAI were the two variables the researchers tested using data from 142 respondents. Statistically speaking, Abraka's AI-driven communication is very weak but significantly connected to its level of engagement with the environment. Since the p-value is 0.0022 and is less than 0.05, we disprove the null hypothesis and believe the alternative: using AI improves people's involvement in sustainability initiatives.

Key Informant Interview (KII) Analysis: AI in Environmental Sustainability Communication in Abraka

Several experts in communication, environmental studies and AI were interviewed at Delta State University, Abraka and nearby locations to deepen understanding of the dual role and implications of Artificial Intelligence (AI) and its impact on environmental sustainability communication. This section presents an analytical synthesis of their insights.

AI as a Tool for Enhanced Communication and Environmental Monitoring

Acrosst every sector, experts agree that AI is helpful for both communication and monitoring the environment. Specialists in communication notice that AI lets users send out tailored messages through platforms such as social media bots, predictions and chatbots, making things faster and more effective. Experts in environmental protection underline that AI is important for satellite images, pollution detection and forest invasion monitoring which all contribute to making decisions and spreading knowledge. Still, although communication specialists highlight that AI performs very well technically, they also point out that its messages are not always meaningful for people. As oral tradition and collective storytelling are common in Abraka, AI might not catch the key details that would impact the reception of the message.

Structural and Infrastructural Limitations

It is quite common in many interviews to hear about challenges with infrastructure and Internet access. Experts argue that not many residents can benefit from AI technology because their community lacks high rates of digital connexon, awareness about AI and access to smart devices or internet connetions. Innovations

in AI benefit people in urban and academic areas, making rural communities who have problems with pollution feel forgotten. Moreover, technologists mention that local data is frequently missing or outdated and this stops AI from being accurate when making decisions on local matters. It impacts how accurate and reliable AI services are in helping sustainability.

Misinformation, Algorithmic Bias, and Ethical Dilemmas

Many people are concerned about the possibility of AI spreading fake news. Many specialists claim that, without careful control, AI may boost false environmental claims or greenwashing, mainly if it is set to put popularity ahead of correctness. In addition, experts confirm that a lot of AI is trained using worldwide data, meaning it might not capture the local environment of Abraka. On top of that, since AI is mainly programmed in English, it has certain drawbacks in areas that require other languages. AI algorithms rarely consider local expressions and traditional knowledge which makes it harder to include local people in their benefits.

Human-AI Synergy: The Need for Complementarity

All informants insist that we should regard AI as support, not as a way to replace regular environmental communication. It is being suggested by environmentalists and communication experts that AI together with community efforts, knowledge building and advocacy make for an effective approach. Although AI takes care of deciding "when" and "what," humans remain in charge of deciding "how" and "why" messages are handled. This perspective matches the previous surveys showing that AI communicators often have a moderate impact on people's participation in groups. While AI can help people become more aware, building a long-term partnership is most successful with interaction and trust among people.

Discussion of Findings

After the study, using AI-based techniques like environmental monitoring and auto-reports raises public awareness about environmental matters. These tools help decision-makers gain important information from data. Currently, AI doesn't work well at influencing how people behave because of various factors like false news, prejudiced systems and mistrust among the public. Instead of providing accurate details, AI can focus on increasing how viral a company's story is which can lead to issues in reporting on sustainability or greenwashing. This could lessen the confidence people have in organisations caring for the environment. Our findings are aligned with the research done by Moa et al. (2021) and Nishant et al. (2020) which states that AI is not alone enough to drive change, and it needs support from human efforts and rules. The research by Uche, et al. 2024 also showed that inequalities in Internet use may contribute to AI's outcome in a community. According to Kiemde and Kora (2022), everyone must focus on possible AI-driven communication strategies, teach literacy about AI, enforce ethical AI guidelines and mix AI solutions with activities managed by humans to improve environmental sustainability. It is seen from the survey that AI helps boost environmental communication by easy information access and encouraging people to express opinions. The use of automated content, chatbots and predictive analytics powered by AI helps provide people with important environmental information in real time. But since the correlation is low, AI, on its own, does not bring about significant behavioural change. Huang et al. (2023) thought that AI technology would assist with targeted messages and give personalised content which would then encourage the public to be involved in sustainability.

Nevertheless, according to the study, many people in Abraka did not trust AI fully because they were not very digitally literate and the community was not sure about its lasting effect on behaviour. It was also noticed in the study that AI may lead to misinformation and biassed narratives, just as Abitova, et al. also reported. With a small p-value, this supports the idea that AI impacts access to helpful information in a positive way and that it decreases exposure to false information, therefore having a big impact on environmental engagement. To echo, Nah, et al. (2020) and Al-Kfairy et al (2024), point out that such problems, like deep-fake technology, biassed algorithms and AI misleading content, may threaten the public's trust in information about environmental sustainability. In agreement with Zhang & Mcluhan (2016), the relationship between AI in the environment and media ecology shows that strong AI regulations are necessary to maximise positive sides and control misleading information. These interviews further highlight that AI has two main sides in the field of environmental sustainability communication. Although AI brings many advantages for data analysis, we should deal with issues related to diversity, equality and ethics. It is important that AI is integrated with care and that local needs and policies are included, so that all people can gain from it.

4. CONCLUSION

By using artificial intelligence, environmental sustainability communication in Nigeria can help to solve its urgent problems in the area. If AI is applied to climate prediction, resource usage, use of clean energy and supporting pollution and biodiversity, Nigeria can advance in being more sustainable. But we need to be careful about using AI like a weapon or tool, as it brings risks, including spreading false content, biases in data processing, privacy issues and problems in regulation of AI. Building an AI policy framework that covers environmental sustainability and includes clear guidelines for ethics are necessary for handling AI in the environmental field. Associations between governments and the private sector, as well as global cooperations, will help increase development by sharing expertise and other resources. Essentially, reliable digital connexions, thriving ecosystems for environmental data and skilled AI developers in Africa are vital to help Nigeria fully benefit from AI for the environment, making the country resilient, prosperous and better for the environment over the years ahead. To get high returns out of AI and protect people from its issues, we need to keep learning, be adaptable and collaborate as the field develops.

5. RECOMMENDATIONS

a. Strengthening AI literacy, enhancing AI regulations, improving AI accessibility, integrating AI with human-led interventions, and encouraging ethical AI development.
b. AI can serve as a reliable and effective medium for promoting environmental sustainability communication in Abraka Metropolis and beyond.

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