

ASSESSMENT OF THE CHALLENGES AND BENEFITS OF ARTIFICIAL INTELLIGENCE IN RADIO BROADCASTING IN NIGERIA

Nwaobasi, Confidence Amogechukwu
Department of Mass Communication
University of Nigeria, Nsukka, Enugu state
Email: confidence.nwaobasi.pg95878@unn.edu.ng

&

Ijeoma DorathyAjaero, PhD
Department of Mass Communication
University of Nigeria, Nsukka, Enugu state
Email: ijeoma.ajaero@unn.edu.ng

Abstract

Radio broadcasting industry in Nigeria has experienced tremendous growth and transformation in recent years. This is made possible by the integration of Artificial Intelligence which plays a major role in the revolution. This study explored the benefits, challenges and future of Artificial Intelligence in radio broadcasting in Nigeria, using a qualitative research method. The study found that Artificial Intelligence has transformed radio broadcasting media production. Also, it has played an essential role in promoting the radio listening experience and has remodeled the way we experience radio broadcasting. The usefulness of Artificial Intelligence in broadcasting cuts across different dimensions both in editing, content creation and content moderation. The study equally found that tendency for bias in AI algorithms, lack of creativity in AI generated contents, and tendency for job displacement were challenges faced in the applications of Artificial Intelligence in radio broadcasting. Moreover, the study found that, as Artificial Intelligence technology continues to advance, more experiences in innovations and transformations are expected within the radio broadcasting industry and beyond.

Keywords: Artificial Intelligence, radio broadcasting, radio broadcasting industry.

Introduction

Change is the only constant, is a statement that shows how life and everything in it is subject to transformation. This transformation is steady and certain in all aspects of human endeavours. Technology itself is synonymous to change. Just as the world is ever revolving, so is technology. Technology is always experiencing series of evolution, revolution, inventions and innovations. Artificial Intelligence is a product of this change. Artificial Intelligence, also known as machine intelligence, is a branch of computer science that focuses on building and managing technology that can learn to autonomously make decisions and carry out actions on behalf of human being (Rouse, 2024). Artificial Intelligence (AI) uses computer systems to imitate human intelligence

faster and more accurate. AI uses processing algorithms to work through a large set of data. It is capable of studying a given, identifying the patterns used, learning from it and evaluating its own performance as it works. The longer it has to process data, the more it can learn and also, the more accurate it can become (Radio today, 2022).

The groundwork for Artificial Intelligence began in the early 1900s. Then, scientists began thinking towards the possibility to create 'artificial brain'. This critical thinking by early scientists led to the release of a science fiction play "Rossum's Universal Robots" by Czech playwright, Karl Capek, in 1921. These robots were referred to as 'artificial people'. Japanese professor, Makoto Nishimura, built the first Japanese robot named 'Gakatenso' in 1928

(Tableau, 2024). However, the history of AI took a new shape in 1950, when Alan Turing published a paper titled 'computer machinery and intelligence'. This publication proposed a test of machine intelligence called 'the imitation camera' (Smith, McGuire, Huang and Yang; 2006). By and by, John McCarthy held a workshop at Dartmouth in 1955 on 'artificial intelligence', which was the first use of the word (Tableau, 2024).

According to Tableau (2024), Artificial Intelligence came to maturation between 1957-1979. Those periods saw rapid growth and struggle for AI research, ranging from program languages that are still useful today, to books and films that explored the idea of robots. The era of AI maturation was notable for major breakthroughs such as, the creation of List Procession (LISP), the first programming language by John McCarthy in 1958. Auth Samuel created the term 'machine learning' during a speech on teaching machine to play chess. Subsequently, James L. Adams also created the first example of autonomous vehicle called 'the standard card' in 1961. In 1965, the first 'expert system', a form of AI programmed to copy the thinking and a decision making ability of human experts was developed by Edward Feigenbaum and Joshua Lederberg.

Continuing, Tableau (2024) observed that Artificial Intelligence experienced a great boom in the 1980s both from breakthroughs in research and gaining government funding to support the research. However, there was 'winter period' for AI between 1987- 1993 due to the decline in consumer, public and private interest in Artificial Intelligence (Lewis, 2014). Nevertheless, AI continued to gain expressive strides from early 90's to present. This ranges from development of chatterbox in 1996 by Joseph Lyeizenbaun, 'Deep Blue' by IBM in 1997, and speech recognition software developed by Dragon Systems in 1997. Also in the year 2000, Prof. Cynthia Breazeal developed 'Kismet'. This robot has the ability to stimulate human emotions. Microsoft also launched the first gaming hardware 'Xbox 360 Kinect' which track body movement and translate it into gaming directions. Going forward, in 2011, first popular useful assistant by Apple called 'Siri' was released. From 2012 to present, we have experienced an inrush in AI tools such as virtual assistants, search engines, etc. The latest of them was DAL-E, developed

by Open-AI in 2021 (Tableau, 2024). This AI tool can process and understand images enough to produce captions.

As Artificial Intelligence advanced, it was being applied in different sectors and radio broadcasting is not left behind. Artificial Intelligence plays essential role in enhancing smooth and fast radio broadcast production. AI has transformed radio broadcasting and has remodeled the way we experience radio broadcasting. Also, AI has been criticized for its shot comings in radio broadcasting production. Thus, this paper aimed at assessing the merger Artificial Intelligence and radio broadcasting in Nigeria. Specifically, the study sought to:

1. Examine the usefulness of Artificial Intelligence in broadcasting.
2. Analyze the benefits of Artificial Intelligence in radio broadcasting.
3. Examine the challenges faced in the application of Artificial Intelligence in radio broadcasting.
4. Explore the future of Artificial Intelligence in radio broadcasting.

Conceptual Review and Review of Literature

In other to better understand the merger of Artificial Intelligence and radio broadcasting, it is eminent to give a deeper insight on several concepts used in this study. These concepts are explored in the following sub themes;

Concept of Radio broadcasting

In order to have a clearer knowledge on the concept of radio broadcasting, it is pertinent to explain what radio is all about. According to Sambe (2008) in Oberiri (2017), radio is an audio device of passing messages to a large audience. Radio involves the process by which messages are sent through electrical waves. It is an instrument through which signals are transmitted through electromagnetic waves via a transmitter to a scattered audience who receive it through the antenna on a receiving set (Ugo, 1987). Radio is also referred to as the process of sending and receiving messages through the air using electromagnetic waves (Idebi, 2008). In other words, we can view radio from two perspectives- as medium of transmitting messages via electromagnetic waves and, as a box through which the

audiences receive messages via the antenna which traps the electronic signals.

Radio broadcasting has been a transformation force in the world of communication. For over a century since its inception, radio had remained a loyal companion in our daily lives as it continues to evolve (Anais, n. d.). According to Menendez (n.d), radio broadcasting refers to using radio waves to send signals to large group of listeners. Radio programmes comprise of speech, music or other sounds. These sounds are transmitted either live or prerecorded. Radio broadcasting takes series of processes. During a radio broadcast, a microphone picks up speech and other live sounds that make up the programme. An electric current in the microphone creates vibration in it that matches the sound waves. Consequently, these electric waves are used to produce radio waves that make up the broadcast. Similarly, the equipment in the radio station converts the prerecorded sounds of a program into electric waves (Oberiri, 2017).

Radio broadcasting can be done using different methods depending on factors such as, coverage areas, audio quality and technological capabilities. These methods of radio broadcasting are as follows;

Amplitude Modulation (A.M): The name Amplitude Modulation was deduced from how it sends out radio waves by manipulating the amplitude of the signal in line with the amplitude of the signal being transmitted (Adeos, n. d). AM radio broadcasting is a way to send sound over the airwaves to radios. It works by modifying the amplitude of the carrier wave to represent the sounds. AM radio has the ability to be transmitted across long distances, especially at night when atmospheric conditions can promote signal propagation. It is however, very sensitive to interference from electrical devices and atmospheric disturbances (Anais, n. d).

Frequency Modulation: In order to tackle interference issues experienced in AM radio, Frequency Modulation (FM) was invented in the 1930s. FM radios are more commonly used due to its more quality sound. Its ranges are much shorter than AM ranges (Adeos, n.d). In a similar way, FM uses electromagnetic radio waves to transmit information. Instead of changing the amplitude of the carrier signal,

FM radio decreases or increases the frequency of the carrier wave (Rowe, 2023).

Concept of Artificial Intelligence

As stated earlier, Artificial Intelligence is a product of technological advancement. This advancement in technology resulted in rapid growth. Computer started growing smaller in size, consumes less power and has increasingly great processing capabilities (Straw & Straw, 2013). Artificial Intelligence is defined as stimulation of human intelligence processes by machines, especially computer systems. It is the science of making computers to do things that require human intelligence (Axelberg, 2016). In other words, computers are able to think like human beings and perform tasks that human beings do. Educba (2019) presented concise comparison between Artificial Intelligence and human intelligence in the table below:

Comparison factor	Human intelligence	Artificial intelligence
Energy efficiency	25 Watts human brain	2 Watts of modern machine learning machine
Universal	Humans usually learn how to manage hundreds of different skills during life	While consuming kilowatts of energy, this machine is usually designed for a few tasks
Multitasking	Humans have the ability to learn	The time needed to teach system on

	decision making from experience d scenarios	each and every response is considerably high
State	Brains are analogue	Computers are digital

Artificial Intelligence (AI) technology has created opportunities to progress on real-world problems. In some cases, artificial intelligence can do things more efficiently than human intelligence (Coursera, 2023). Artificial intelligence, according to Hintze (2010), is made up of four different types:

Reaction machines: These are AI machines that have no memory. They are reactive in nature. They only respond to present moment. These machines do not have memory of the past. They cannot interactively participate in the world; rather behave exactly the same way every time they encounter the same situation. Example of this type of machine is the Deep Blue, IBM's chess-playing super computer. Deep Blue has the ability to recognize its own pieces on the chess board and that of its opponent, but it lacks the memory capacity to use past mistakes to inform future decisions.

Limited memory machines: This type of machine has the advantage of looking into the past, unlike the reaction machine. They are fashioned to take actions based on past and present memory. However, the memory saved is temporary. It doesn't last long as to be used in the future to avoid reoccurrence of past mistakes.

Theory of mind machines: This type of AI machine could have the ability to understand thoughts and emotions. It could be able to understand intentions and predict behaviour of other agents or entities in the world. However, theory of mind machines is yet to be developed.

Self-awareness machines: This could be the grand finale of the evolution of AI. These systems, if developed, could be aware of themselves, their state of being, and be able to sense or predict other's feelings (Coursera,

2023). This type of AI machine, just like theory of mind, does not exist yet.

Artificial Intelligence can be applied in every sector of human endeavours, including the broadcasting sector. Radio broadcasting, being a type of broadcasting, is not left out. In subsequent sub-themes of this paper, we shall explore AI's applications in radio broadcasting.

Theoretical Framework

This paper is anchored on the technological determinism theory. The technological determinism theory was propounded by Marshall McLuhan in 1962. The theory states that media technology shapes how we, as individuals in a society, think, feel act, and how our society operates as we move from technological age to another (McLuhan, 1962). Karl Marx in Asemah et al (2017) believed that technological progress leads to newer ways of production in a society, and this ultimately influences the cultural, political and economic aspects of a society, thereby inevitably changing society itself. This theory is in tandem with this premise of this work as it deals with how technological growth affects the society. Artificial Intelligence, a product of technological growth, has immense influence on all sectors of the society, including the broadcasting sector as a whole, and radio broadcasting in particular. It is gradually changing the pattern of radio broadcasting as human intelligence is being replaced by artificial/machine intelligence. Its effects are felt in areas like editing, content creation and content moderation. Adoption of AI in radio broadcasting has increased the speed at which radio production is done. It has also reduced imperfections as AI generated radio contents are more accurate.

Technological determinism theory revolves around examining how AI technologies affect content creation, distribution, advertising and worker dynamics (Carlson, 2014). AI-powered tools may streamline workflows, automate a number of operations and enhance productivity.

Methodology

The study assessed the merger Artificial Intelligence and radio broadcasting in Nigeria. The researchers used secondary sources of data. Secondary sources of data refers to data collected by a party not related to the research study, rather collected for some other purpose

and at different time in the past. These data when used by the researcher, becomes secondary data for the current users. Sources of secondary data includes: government publications, websites, books, journal articles, internal records, etc. (Ajayi, 2017). Another benefit of data gathering is that it is easily accessible, but are not pure as they have undergone thorough or many statistical treatments. It is also economical and takes less of the time of the researcher(s).

Benefits of Artificial Intelligence in radio broadcasting

According to Partil (2008), the benefits of Artificial Intelligence in radio broadcasting are numerous. Firstly, AI enables broadcasters to produce high quality contents at scale, while simultaneously reducing costs. AI can help automate many of the production processes, minimizing the need for human internet, while increasing efficiency and productivity. Radio stations can use AI to robotize content creation processes like news reports, weather updates and DJ-like voice overs. This reduces manual labour and production cost and also ensures accurate delivery of information (Doughty, 2024).

Furthermore, Artificial Intelligence can promote personalized content listening experience by providing personalized content recommendations and improving content discovery. This approach leads to better customer engagement (Partil, 2023). AI content-driven recommendation systems analyze user's listening history, preferences and behaviour to suggest songs, podcasts or talk shows that align with their interests. This personalization keeps listeners engaged enhances deeper connection with other audience (Doughty, 2024).

AI-driven innovation can also benefit advertising in radio broadcasting. With the help of AI-powered algorithms and data analytics, radio broadcasters can offer targeted advertising campaigns, optimizing ad placements and targeting based on listener demographics, interest and behaviour. This enhances the relevance of ads, increasing the chances of higher engagement and conversion for advertisers.

Finally, Artificial Intelligence can assist hearing-impaired individuals and non-native

speakers. With the use of AI-driven transcription and translation tools, live radio content can be converted to written text and even translated into the language of the non-native speaker. As such, it makes radio content more inclusive and accessible (Doughty, 2024).

AI tools used in radio stations

Artificial intelligence tools are quite useful in the business of radio broadcasting. These tools can be used either independently as a single tool or in combination with other existing tools. According to Jane Brown (2023), there are five types of AI tools that can be used for radio. These tools are explained as follows:

Audio production and processing tools: a number of AI tools have been developed to enhance audio quality in radio production and processing. Krisp is an AI tools that can be used to interview someone over zoom. Krisp is a software application that can remove background noises and voices from audio in real-time. The software uses machine learning algorithm to analyze the audio signal and separate the speech from background noise, allowing speech to be output in clear, noise free audio. Krisp can be used independently or integrated into existing audio applications like Skype, Zoom and Slack (Johnson, 2023). Using this tool can ensure broadcast quality in terms of interviewee's speech. Also, podcastle works as a full audio processing suite. Podcastle provides multi-track recording, AI-powered noise cancellation, audio- leveling, automatic fading and other audio effects. This helps to produce a radio segment with ease (Brown, 2023).

AI music generators: AI music generators produce music and audio (like jingles) with a few simple text commands. Soundful is one of the AI music generators that allow creators to generate and monetize royalty-free tracks. Soundful is a website in AI music space that allows the users experiment with and manipulate the outcome of composition. It uses an algorithm to analyze music data from a variety of sources, including tracks that already exist and then generates something new according to your preferences and styles (Burton, 2023).

AI text-to-speech tools: these tools turn text to speech. It provides AI voice from which one can choose from when there is no enough

presenting talent on your station. Murt is an AI voice generator designed for creating studio quality voice overs. It uses AI algorithms to regenerate your speech in the right tone with punctuations like question marks and exclamation points in mind. It also uses audio editor to give user access to change the pitch, punctuation and emphasis. This helps to further communicate your message in a customized way you want to (Jalli, 2022).

AI chatbots: a chatbot is a software or computer programme that stimulates human conversation 'chatter' through text or voice interaction (Brush & Scardina, 2021). One of AI chatbot systems is ChatGPT. ChatGPT is an AI model that engages in conversational dialogue. It is trained on a data set of human conversation and can understand context and intent, at is able to have more natural, intuitive conversation (Reiff, 2024).

Voice- cloning AI tools: this technology is available to the public through platforms like Speechify and Elevenlabs. AI voice cloning is a technology that creates synthetic copies of human voices. Elevenlabs is primarily known for its browser- based, AI-assisted text-to-speech software, which can produce lifelike speech by synthesizing vocal emotion and intonation (Wanat, 2023). It uses advanced algorithms to analyze the contextual aspects of text, aiming to design emotions like anger, sadness, happiness or alarm, which enables the system to understand the user's sentiment (Wired, 2023).

Challenges for AI in radio broadcasting in Nigeria

Earlier in this paper, we explored the benefits of AI in radio broadcasting. We found out that AI enables production of high quality content, while reducing cost. It also promotes listening experience by providing personalized content. AI equally enhances advertising, increasing the chances of higher engagement and conversion of advertisers. However, it is needful to x-ray the challenges that needed to be addressed to enable smooth and swift radio broadcasting in this era of artificial intelligence. These challenges are identified as follows:

Bias and fairness: one of the major challenges of AI is its tendency for bias in AI algorithms. AI relies on high quality data to make decisions and where such data is skewed, it will affect the

AI algorithms. This will result in lack of variation in the content recommendation of AI to the audiences (Wenzhang, 2023).

Loss of creativity: over dependence on AI generated content can result in decrease in the creativity and human generated content in the content of radio broadcast. Because AI learns from human experience overtime, it may not be able to carry the same level of creativity when compared to human generated content, despite its speed and cost-effectiveness (Wenzhang, 2023).

Privacy and data security risks: Ai has the advantage of personalized content delivery. This requires delving into user data. Through the use of machine learning method, AI uses human-created contents to generate its own output. This raises concerns about privacy and data security as the copyright of the content owners are infringed where their contents are used to produce AI contents without permission or payment of due royalties (Hall, 2018).

Job displacement: Ai has the ability to perform greater number of tasks within a very short period compared to human beings. This could result to replacing manpower with machine abilities. This is also threatening to the jobs of broadcast personnel who might be laid off when machines are adopted in broadcasting activities. With over dependency on AI, people will be jobless and that will conclude in losing sense of living (Alsedrah, 2017).

Okiyi and Nsude (2019) identified the challenges of deployment of AI in developing countries like Nigeria as follows:

Lack of support and funding by the government to public broadcast stations.

Epileptic power supply.

Lack of training on AI knowledge for media personnel.

Conclusion

The merger of Artificial Intelligence to radio broadcasting has led to tremendous growth and transformation in the world of radio broadcasting. AI has influenced radio broadcasting in areas such as automated programming, speech recognition and transcription, Ad-targeting and personalization, enhanced production and editing. This is made possible through the use of AI tools like AI

audio production and processing tools, AI music generators, AI text-to-speech tools, AI Chatbots and voice cloning tools. However, several challenges threaten the smooth applications of AI to radio broadcasting. Such challenges range from potential for bias and fairness, loss of creativity, privacy and security risks and job displacement among others. If these challenges are addressed, it will influence positively, the future of AI deployment in radio broadcasting in the Nigerian society.

Recommendations

Based on the conclusion above, the following recommendations are giving;

1. There is need to breed young and creative Nigerian broadcasters coupled with the use of AI to increase quality broadcast content.
2. There is also need to develop new journalistic standards to enable users differentiate between machine generated contents and that of humans.
3. Radio broadcasters should strike a delicate balance between technological innovations and human-centric content to maintain relevance and connect effectively with audience.
4. To minimize issues of privacy and security risks, broadcasters should invest in securing data storage and encryption methods.
5. Government should provide support to broadcast stations, both financially and in offering quality training of media personnel, to prepare enabling environment for AI to flourish.

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