

AN ANALYSIS OF ARTIFICIAL INTELLIGENCE IN BROADCASTING: OPPORTUNITIES AND CHALLENGES IN ENUGU STATE BROADCASTING SERVICE (ESBS)

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Abstract

The integration of Artificial Intelligence (AI) into broadcasting is rapidly transforming the broadcasting media landscape, presenting both significant opportunities for innovation and growth, and complex challenges. This study provides an analysis of AI in broadcasting, exploring its applications, benefits, and challenges. The study was anchored on Artificial Theory of Mind a foundational concept in Psychology and Cognitive science, which postulates that a socially intelligent agent could be imbued with the ability to model and engage effectively in human-agent interaction. Through qualitative and literature study approach, the study examined the broadcasting media development and AI-based innovation including automated content creation, distribution, personalization, and audience engagement. Findings highlight the potential of AI to enhance broadcasting efficiency, improve audience engagement and data-driven decision-making. It also highlighted significant challenges such as technical complexity, privacy concerns, resistance to change, skill gaps and job displacements. By understanding these opportunities and obstacles, the broadcast media can better navigate the complexities of AI technology and leverage its capabilities to enhance operations and audience engagement. It is important to note that AI cannot replace human creativity and wisdom, but can be used as a tool to complement human capabilities, making content creation and broadcasting more efficient and successful.

Keywords: Artificial Intelligence, Broadcasting Industry, Technical Complexity, Media Innovation.

Introduction

The broadcasting industry is undergoing a significant transformation, driven by technological advancements, changing audience behaviours, and shifting business models. At the forefront of this transformation is the integration of artificial intelligence (AI) in broadcasting. AI, a technology enabling machines, particularly computer systems, to mimic human intellectual functions, is recognized by manufacturing companies for its potential (Yamamoto et al., 2024). AI systems operate by consuming large amounts of label data, checking for correlations and patterns to predict future conditions. AI technologies have been instrumental in identifying new opportunities in various industries, including healthcare, where they aid in early diagnosis and treatment strategies (Zhang, 2021). Businesses increasingly use AI to assess and solve complex problems (Armenia et al., 2024).

Artificial intelligence (AI) is a theory, method, technology, and application system that uses digital computers or computer-controlled machines to simulate, extend and expand human intelligence, perceive the environment, acquire knowledge, and use the knowledge to obtain the best results (S. M. Chan-Olmsted, 2019). (Adler, P.S., 2006) defines Artificial Intelligence (AI) as the study and engineering of intelligent machines capable of performing the same kinds of functions that characterize human thought. While the nature of intelligence remains elusive, AI capabilities currently have far-reaching applications in such areas as information processing, computer gaming, national security, electronic commerce, and diagnostic systems (Britannica Encyclopaedia 2015). Furthermore, (Detterman, D. K. 2009) defines Artificial Intelligence (AI) as the field of science aimed at providing machines with the capacity of performing functions such as logic, reasoning, planning, learning, and perception and extended to include an interleaved set of capacities, including creativity, emotional knowledge, and self-awareness. The basis of artificial intelligence is the interaction of machines and execution of tasks as a result of programmed instructions.

One of AI's most promising benefits in broadcast media is enhancing audience engagement through personalized experiences. AI technologies enable the creation of interactive content and real-time engagement with audience through chatbots and other interactive tools (Ratten, 2024). This personalization is essential for maintaining audience interest in an age where there is content overload, and attention spans are short. For example, AI can analyze audience data to recommend content tailored to individual preferences, thereby increasing viewer satisfaction and loyalty (Santy et al., 2021).

The effort of AI experts is to create a replication of human intelligence by assigning human voices, actions and reasoning abilities to machines. It is an aspect of robotics in which machines are designed to perform human actions. It is also called machine intelligence because; intelligence is demonstrated by machines in contrast to natural intelligence displayed by humans and other animals (Wisskirchen, et al., 2017). Another area where AI demonstrates significant benefits is in operational efficiency. By automating routine tasks and optimizing resource allocation, AI can reduce operational costs and improve overall efficiency (Kim et al., 2021).

The integration of AI into broadcast media equally comes with challenges. These challenges range from technical complexities which often requires significant financial investment and high implementation costs to ethical and regulatory concerns (Aleem et al., 2021). Issues related to data security, user consent, and potential data misuse are important considerations for media organizations (Chen et al., 2022). Ensuring that AI systems comply with privacy regulations and ethical standards is essential to maintain public trust and avoid legal repercussions (ÇErÇİ, 2024). Furthermore, the adoption of AI requires a workforce with specialized skills, leading to a significant skill gap hence, the need for continuous training and development (Liu et al., 2021).

The future of broadcast media is greatly intertwined with the advancements in AI technologies. As AI continues to evolve, it will offer new opportunities for innovation and efficiency, while also posing new challenges that must be addressed. The key to successfully integrating AI into broadcast media lies in balancing these opportunities and challenges, ensuring that AI is used responsibly and ethically to enhance the broadcast media (Aleem et

al., 2021). Through a balanced approach that addresses these challenges while leveraging AI's capabilities, the broadcast media industry can harness the full potential of AI to drive innovation and efficiency.

Statement of the Problem

The adoption of artificial Intelligence (AI) in the Enugu State's Broadcast Service is in its nascent stages, with limited integration of advanced technologies into the sector. While AI has the potential to transform the broadcast industry by enhancing content production, audience engagement, and operation efficiency, it seems the adoption of AI in Enugu State Broadcast Service is hindered by several challenges. This study seeks to identify the opportunities and challenges embedded in the integration of AI in broadcast production.

Objectives of the Study

1. To examine the current state of AI adoption in the Enugu State Broadcasting Service.
2. To highlight the opportunities embedded in adopting Artificial Intelligence in the ESBS.
3. To identify challenges affecting the application of Artificial Intelligence in the broadcast operation in ESBS.

Review of Related Literature

The Concept of Intelligence

Intelligence according to Detterman, D. K. (2009) refers to a general mental capability to reason, solve problems, think abstractly, learn and understand new material, and profit from past experience. Intelligence can be measured by many different kinds of tasks. Intelligence draws on a variety of mental processes, including memory, learning, perception, decision-making, thinking, and reasoning. Britannica Encyclopaedia (2015) refers to intelligence as mental quality that consists of the abilities to learn from experience, adapt to new situations, understand and handle abstract concepts, and use knowledge to manipulate one's environment.

Intelligence can be categorized into two types:

- Natural Intelligence which is the cognitive abilities of humans and animals, such as reasoning, problem-solving, and learning.
- Artificial Intelligence which is the development of computer systems that can simulate human-like intelligence, such as machine learning, natural language processing, and robotics.

Human intelligence and machine intelligence are different. Machine intelligence is programmed instructions for a machine to execute a computer task. It is an aspect of robotics in which machines are equipped with artificial intelligence (Chibueze, 2021). Machines possess the ability of a digital computer or computer-controlled robot to perform tasks commonly associated with intelligent beings.

Artificial Intelligence in Broadcast Media: An Overview

The term artificial intelligence broadly refers to applications of technology to perform tasks that resemble human cognitive function and is generally defined as the capability of a machine to imitate intelligent human behaviour. It is otherwise known as machine intelligence – a

variant of computer technology that replicates human intelligence in machine-coded forms. John McCarthy, one of the founders of AI research, “once defined the field as getting a computer to do things which, when done by people, are said to involve intelligence.

While the definitions for AI above provide a general outline of the meaning of the term, there is no single universally agreed upon definition of AI. In practice, AI is used as an umbrella term that encompasses a broad spectrum of different technologies and applications, some of which are:

Machine Learning (ML): Machine learning is a field of computer science that uses algorithms to process large amounts of data and learn from it. Unlike traditional rules-based programming, ML models learn from input data to make predictions or identify meaningful patterns without being explicitly programmed to do so.

Natural Language Processing (NLP): NLP is a form of AI that enables machines to read or recognize text and voice, extract value from it, and potentially convert information into a desired output format, such as text or voice.

Robotics Process Automation (RPA): RPA refers to the use of preprogrammed software tools that interact with other applications to automate labour-intensive tasks, resulting in increased accuracy, speed, and cost-savings. RPA tools are generally used for high-volume, repetitive processes involving structured data, such as account reconciliation, accounts payable processing, and depositing of checks.

The application of artificial intelligence has numerous advantages (Ogbuoshi, 2021):

- In communication, AI provides support services to digital hardware. A broadcast mast is easily mounted and manipulated through advanced robotics
- It facilitates the automation and use of robotics to save labour and cost.
- It reduces or in some cases, eradicates human involvement in execution of tasks. Monotonous work can be done through automations.
- It executes complex tasks that are beyond physical and intellectual ability. Its accuracy is greater than that of humans because they maintain stability in performance.
- It guarantees high degree of reliability in execution of tasks.

Broadcast media refer to the airborne transmission of electromagnetic audio signals (radio) or audiovisual signals (television) that are accessible to a wide population through standard and readily available receivers. It entails transmitting electromagnetic signals through airwaves over a wide area as in television or radio (Hoffmann, M. 2007). The integration of artificial intelligence in broadcast media often take the shapes of hardware or software approaches. The hardware approach covers all tangible media equipment used in news collection, processing and dissemination, while the software approach covers the programming and signal transmission. The Nigerian broadcast industry is yet to embrace full digitisation migration from analog to digital transmissions and this is attributable to factors such as: bureaucracy in policy implementations, poor funding, lack of technical know-how and other intervening variables (Odufwa, F. 2011).

Challenges affecting the application of artificial intelligence in broadcast media. The use of artificial intelligence in communication requires both capital and human efforts at applying advanced computer programming to execute a task. From a hardware perspective, computer programmers look at tangible devices such as robots and from software perspective, programmers create specific applications that run the devices. Artificial intelligence is capital-intensive and developing economies may not be able to bear the financial burdens of artificial intelligence and advanced media equipment.

There is equally fear of media domination in terms of degree of technology of use between the developed and developing nations. This fear of domination of technology use defines the gap in integration of artificial intelligence in communication. This is because the developed nations are regarded as media creators while the developing countries represent media consumer nations (Rogers, E. 1962). Diffusion of Innovations Theory, recognised five stages of adoption of technology: innovators, early adopters, early majority, late majority and laggards. In terms of artificial intelligence, the developing nations usually fall under the categories of 'late majority' and 'laggards.'

Theoretical Framework

The study was anchored on Artificial Theory of Mind which is a foundational concept in Psychology and Cognitive science, a branch of Social Science. Although the concept of Artificial Theory of Mind is a relatively recent development and has evolve over time, several researchers have contributed to the development of the theory. But for the purpose of this study, Artificial Theory of Mind according to (Breazeal, C. 2002) refers to the development of artificial intelligence (AI) system that can simulate human-like social cognition, including the ability to attribute mental states, such as thoughts, feelings, and intentions, to themselves and others. AI systems can be programmed with the ability to simulate human-like intelligence such as reasoning and problem-solving, and the understanding of how to navigate complex social situations like recognizing and responding to social cues. In broadcast media, Artificial Theory of Mind can be applied in content analysis where AI systems can analyze broadcast media content, such as TV shows or radio programs, to understand the mental states and intentions of the creators and characters. Furthermore, it can personalize broadcast media content for individual viewers or listeners, taking into account their interest, preferences, and mental state. Studies on adopting artificial intelligence in broadcast media in Nigeria is premised on the advantages of the adoption of robotised media equipment and processes that will make efficient broadcasting possible (Odufwa, F. 2011). Although much aspects of artificial intelligence maybe conceptualised from hardware components, the actual intelligence is specified by coded programming language that are executed by technological devices (Ogbuoshi, 2021).

Empirical Review

Lee, et al., (2020) in the study "AI in Broadcasting: A Study of Opportunities and Challenges, explored the possible opportunities and challenges in integrating AI in broadcasting. The employed survey method research design with a sample size of 100 broadcast professionals and 20 in-depth interviews. Findings from the study identified opportunities for AI in broadcasting, such as improved content personalization and increased efficiency. However, challenges included concerns about job displacement, biased content, and the need for new skills and training.

Oliveira, et al., (2022), examined Artificial Intelligence in Radio Broadcasting: A Study of AI-Generated Content, found that AI-Generated content can improve efficiency and reduce production cost. However, challenges include ensuring the quality and authenticity of AI-Generated content, as well as addressing concerns about job displacement and the potential for biased content.

The impact of AI on TV News Production: A Comparative Study of Human and AI-Generated News Content, carried out by Chen, Zhang, and Wang, (2022), found that AI-Generated news content can be of high quality and comparable to human-generated content. Challenges however, included ensuring the accuracy and fairness of AI-generated content, as well as addressing concerns about the potential for biased content.

Methodology

This study used a qualitative research method to explore the opportunities and challenges of integration of AI in broadcast media in Enugu State Broadcasting Service. 12 staff of the ESBS comprising of presenters, editors and reporters were selected and interviewed using purposive sampling. The rationale is based on their experience in broadcast media and direct involvement or significant experience with AI technologies in their professional role. The method of data collection was interview and analysed thematically.

Thematic Analysis of Interview Data

This section presents data gathered through the interview of Ten (12) staff of ESBS. The views of the participants were collated and analyzed using themes, in line with the research objective.

Theme 1: Limited Use of Artificial Intelligence at ESBS

This theme reflects the limited adoption and application of artificial intelligence (AI) in broadcasting operations at ESBS. Participants noted that AI is used only in one activity at the station, and even this application is infrequent. Most staff appeared to have minimal interaction with AI tools, indicating a lack of integration into the station's daily operations. This limited use is attributed to insufficient resources and expertise within the station. One participant noted, "AI is not a common feature here. We only use it in rare cases, and most of the staff aren't even trained to handle it effectively."

Theme 2: Opportunities of Artificial Intelligence in Broadcasting

This theme highlights the potential opportunities that AI could offer ESBS if properly adopted. Participants discussed the possibilities of AI improving efficiency, enhancing content quality, and providing data-driven insights to better understand audience preferences. An interviewee mentioned, "If fully implemented, AI can save us a lot of time by automating editing and scheduling, allowing us to focus on producing high-quality content."

Theme 3: Challenges of Artificial Intelligence Implementation at ESBS

This theme explores the challenges faced by ESBS in integrating AI into its operations. Participants pointed out several obstacles, including limited financial resources, lack of skilled personnel, and inadequate infrastructure. As a broadcasting station in a developing country, ESBS also contends with unreliable power supply and internet connectivity, which are critical

for AI functionality. One participant observed, "AI systems are expensive to acquire and maintain. We simply don't have the budget for it right now."

Findings and Discussion

The study showed a limited use of artificial intelligence facilities in broadcasting at ESBS. This aligns with broader trends in Nigeria's broadcast sector, where the adoption of AI technologies remains limited. (Ogbuoshi, 2021), highlighted that the Nigerian broadcast industry had not fully embraced digital migration, hindering the integration of AI into broadcasting operations.

Furthermore, the study observed that AI presents great opportunities in broadcast media in improved content production, as it greatly improves the way contents is created. This agrees with the findings of Dai and Xu (2022), who noted the application of AI in creating intelligent media through knowledge graph construction, thereby streamlining content creation processes. AI tools reduce editing time and also improve production quality by automating scripting, building virtual sets, and streamlining other processes. It enhances operational efficiency by automating scheduling and optimizing resources. Supported by (Kim et al., 2021) who emphasized the efficiency gains in public administration through smart technology platforms.

AI provides new channels for audience engagements, including chatbots, real-time feedback, and interactive content. Through the analysis of viewer behaviour and the dynamic placement of ads, AI allows broadcasters to deliver targeted ads. This aligns with (Argan et al., 2023), who explored AI's role in advertising and its ability to deliver personalized ad experiences.

Accompanying the opportunities are its challenges. Being a complex technology, there are several technical obstacles to overcome when integrating AI technologies, such as maintaining system dependability and continuing maintenance. The cost of AI technology is high, and continuous updates add to the financial burden. This finding aligns with Oliver (2013), who discussed the financial constraints faced by UK broadcast media executives in adopting new technologies. Furthermore, Kim (2024) highlighted the expenses involved in maintaining and upgrading AI systems, AI's use in broadcasting raises concerns about data security, user consent, and potential data misuse. There is often a resistance and scepticism towards change and staff towards adopting AI technologies. This resistance can impede progress because AI adoption necessitates a workforce with specialized skills. This is supported by (Liu et al., 2021), who emphasized the importance of talent management in the AI era. The skill gap in AI technologies cuts across various industries, hence, the need for workforce development (Liu et al., 2021). Compliance with broadcasting standards and legal liabilities are significant challenges when implementing AI. Regulatory frameworks must evolve to keep pace with technological advancements. Wu (2022) in his findings highlighted the regulatory complexities involved in media convergence, supporting the findings on the legal challenges of AI integration.

Conclusion and Recommendations

The study examined the place of artificial intelligence in broadcasting operations in ESBS. It observed that despite the potentials and multifaced opportunities of AI, ESBS is yet to

integrate full digital migration in terms of the application of artificial intelligence. As a result, it has affected the integration of artificial intelligence in broadcasting operations.

This study has several limitations that should be acknowledged. Firstly, the sample size of 12 participants, does not fully capture the diversity of experiences and perspectives within the broader broadcast media industry. Secondly, the study is geographically limited to Enugu State Broadcasting Service, which affects the generalizability of the findings to other stations. Future studies should consider expanding the sample size and including participants from different professional practice to enhance the generalizability of the findings. Comparative studies across other broadcasting stations could provide a more comprehensive understanding of the implications of AI in broadcast media. ESBS should consider investing in training and development programs to bridge the skill gap and equip their workforce with the necessary AI competencies.

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