International Journal of Library and Information Technology (IJLIT), Vol.4 No.1, April 2023. Pg.144 – 151

ASSESSMENT OF CBN AFRICA'S EQUIPMENT CHALLENGES AND THE DIGITAL SWITCHOVER.

MICHAEL P. ECHOI
BHU/22/MSC/MAC/030

KARGA KONWOSHI
BHU/22/MSC/MAC/003

BLESSING E. ENENU
BHU/22/MSC/MAC/010

&
PROF. S.A. SHAIBU
POFESSOR OF MEDIA STUDIES
BINGHAM UNIVERSITY
KARU, NASARAWA STATE, NIGERIA

Abstract
The emergence of digital technology has taken the broadcast industry and audience experiences to a new level, offering improved video and audio qualities.Computers, smartphones, and tablets can now be used to broadcast and receive information from any part of the world.With such benefits, the International Telecommunication Union (ITU), on June 16, 2006 signed an agreement for member nationto switchover from analog to digital broadcasting.While Nigeria is yet to complete the switchover as a result of various challenges including funds, lack of skills, and preparedness, few private media organizations who have managed to complete the switchover have, howeve,r continued to experienceother challenges. This study aims to examine how Christian Broadcasting Network Africa, a Nigerian based international broadcast organization, has coped with equipmentchallenges associated with the switchover. Anchored on McLuhan's technological determinism theory, the study used a qualitative research approach combining secondary information from literature and data from a 7-point in-depth interview for which 2 management staff, 4 senior staff, and 2 junior staff members of CBN Africa were purposively selected. The study revealed that CBN Africa still grapples with equipment related challenges long after the digital switchover. It is recommended that the Governmentmust make development and manufacturing of digital technology in Nigeria part of its policies.

Keywords:Broadcasting Challenges, Digital Switchover, CBN Africa, Nigeria, HDTV

Introduction

The invention of the first radio on 13 May 1897 by the German scientistGuglielmo Marconi, when he sent a Morse code message "Can you hear me" across open water to his colleagues on an island, marked the beginning of a communication and broadcast revolution. Holmes (2022) notes that Guglielmo Marconi's experiment was intended for contacting ships on the sea wirelessly, but his resultsinspired other scientists around the world,and they began to carry out more investigations on the invention. By the Eve of Christmas 1906, a Canadian, Reginald Fessenden, made the world's first radio broadcast.Fry (1973) explainsthat Fessenden had beamed a Christmas concert to surprise crews of ships out in the Atlantic Ocean and the Caribbean Sea.Soon after, radio equipment became commonplace as other inventors contributed to improvingthe clarity and power of Marconi's invention.

One of the earliest scheduled radio broadcast services in the world, according to Sterling and Skretvedt (2023), was on November 6, 1919, in Rotterdam, Netherlands, with other industrial nations joining between 1920 and 1925, including but not limited to France, Soviet Union, Belgium, Germany, Japan, Mexico, Norway, and Poland. The early experimental and cumbersome radio devices transformed into mobile formats through new technologies and brought about new inventions like television and cellular telephones.According to Federal Communications Commission, FCC (2021), these devices have continued to be relevant in mass communication, providing syndicated news, music, and sports. Public Broadcasting Service, PBS (1998) adds that the entry of mass communication into homes stimulates the development of mass culture;people can listen to the same song or news and share the same heroes from stories. LawLibrary (2023) also notes that radio and television broadcasting has presented rich entertainment and information to today's world.

According to PBS (1998), innovations in broadcasting have been on the increase. But, associated with every invention and technological advancementhas always beenone form of challenge or the other. For instance, LawLibrary (2023)argues that in the early days of broadcasting, stations had to operate at the same frequency with a challenge that stations with stronger signals always overshadow those with weaker signals. Even when it became possible for stations to broadcast on separate frequencies, there were limited channels and bandwidth to go round all intending broadcasters. This eventually necessitated some form of government regulation.Starr (2006) avers that another challenge is the speed with which advances in technology occur; this renders traditional ways of doing things obsolete with the attendant high cost of equipment upgrades and personnel training.

The emergence of digital technology has further taken the broadcast industry and audience experiences to a new level. According to Aziz (2015), digital broadcasting technologies offer smaller hardware like TV and radio sets capable of highly improved video and audio qualities. Hanna (2023) posits that digital broadcast equipment utilizes digital compression technology,which reduces the bandwidth size needed for transmission. The result is that multiple channels of programmingcan be transmitted on the same frequency,thereby addressing one of the earlier challengestypical of analog equipment.Hanna (2023) adds that the benefits of digital broadcasting are enormous for the viewers or receivers of digital broadcast in that they have a myriad of programming options at their fingertips. Raitner (2018) further notes that the networking of digital devices like computers, smartphones, and tablets makes it possible to broadcast and receive broadcast information from any part of the world.

With the benefits digital broadcast technologies offer over their analog counterparts, it is no wonder regulatory bodies of the industrymade the move for a switchover from analog to digital broadcasting.Oyedokun, Molindo,and Ajayi (2022) assert that the International Telecommunication Union (ITU), on June 16, 2006, during an international conference with 104 countries,signed an agreement to switchover from analog to digital broadcasting by June 17, 2015. African countries, including Nigeria, were granted till 2020 to complete the switchover.Oyedokun et al.,however, note that despite efforts by the government and owners of media houses to achieve this goal, three years after the set deadline of 2020, Nigeria is yet to completely switchover from analog to digital media broadcast.

The slow pace of digital switchoverin Nigeria and other African nations is attributedto a number of challenges. Akinola-Badmus and Ojebuyi (2021) opine thatone major challenge is that Nigerian media practitioners lack adequate preparedness for the switchover.Okonji (2019) further adds that other challenges include a lack of infrastructure, funding, and political will by politicians to see the process through.Even with these challenges, some state-owned and privately owned media organizationsin Nigeria have done well to fully migrate from analog to digital media broadcast, while others are still on the way. Okonji (2019) avers that Jos, Plateau State, and Abuja in Nigeria's Federal Capital Territory have been switched with a state each from the six geopolitical zones following behind at different stages.

The challenges ofa digital switchover remain long after the process is complete. It necessitates the replacement of analog equipment with digital ones, changing operational strategies, restructuring, relieving personnel unable to adapt to new technologies and bringing in new ones, training and retraining of staff, and continual upgrade of equipment and software. Such a process proves very intense even for government and state-owned organizations. It, therefore, begs the question, "How are private broadcast entities dealing with

these challenges?" This study aims to examine how Christian Broadcasting Network Africa, an international but privately owned broadcast organization, has coped with equipment challenges associated with the digital switchover.

Research Objectives

The objectives of this study are to:

1. examine the Christian Broadcasting Network Africa's awareness of Digital Switchover,
2. assess Christian Broadcasting Network Africa's progress with the digital switchover,
3. evaluate Christian Broadcasting Network Africa's equipment challenges arising from the digital switchover.

Literature Review

What is Digital Broadcasting

The earlier form of TV and radio broadcasting relied on analog signal processing to function. Bhandari (2023) explains that analog signals are a continuous form of signals which are prone to unwanted interferences that can affect the quality of audio or video during transmission. Pribadi and Julianto (2023) also assert that analog forms of broadcast are easily disrupted by weather and other geographical conditions.The implication is that analog radio broadcastsoften contain a lot of statics and fade-outs, causing TV signals to be seen withimages that are damaged or cracked while in mountainous areas or when it rains.However, technological innovations have opened the broadcast landscape to better and more effective ways of delivering content to audiencesthrough digital broadcasting.

According to Hanna (2023), digital broadcasting is the transmission of radio or television signals using digital broadcast formats as opposed to the old analog methods. Bhandari (2023) notes that in digital broadcasting, the signals used consist ofdiscrete binary bits, 0s, and 1s which are very accurate compared to the continuously varying analog signals.Pribadi and Julianto (2023) further add that in digital broadcasting or transmission of information is in data form, like on a computer. This way, signals are preserved regardless of transmission distance and geographical conditions. According to Hanna (2023), digital television, DTV uses compression technology to convert digital signals into packets of data, which are then transmitted through cable or satellite. A digital TV antenna, cable box, or satellite receiver then receives these packets of signal, decodes them, and converts the signal back to analog form for display on the viewer's screen.

Aziz (2015) posits that with digital television, there are three possible formats a broadcaster may choose from: The 480 format, which delivers standard definition television, SDTV with signals aspect ratio similar to analog signals; The 720 and 1080 formats delivering excellent video qualities of High Definition TV, HDTV. Hanna notes that HDTV is an advanced digital broadcast with higher resolution than normal digital broadcast. Aziz (2015) further adds that digital broadcasting offers broadcasters the ability to send one or more sub-channels over one frequency thereby allowing audiences more choice of programs.

With all that digital broadcastingbrings to the industry, countries today are at different stages of transitioning from analog to digital forms of broadcast. Hanna (2023) posits that countries like the United States have stopped analog broadcasts since 2009 and that most analog television sets have been replaced owing to the growing affordability of digital televisions.According to International Telecommunication Union, ITU (2023), other countries that have completely switched over includethe United Kingdom of Great Britain and Northern Ireland, -2012; Saudi Arabia, -2013; the Republic of Rwanda -2014; and the Republic of Zambia, -2015. African countries like Zimbabwe, South Africa, Sierra Leone, and Nigeria are at various stages of implementing a switch over.

Benefits of Digitalization

The need for complete switchover by member countries of the International Telecommunication Union, ITU was necessitated by the overwhelming benefits of digital broadcast equipment over analog ones. Hanna (2023) avers that digital broadcast offers benefits for both broadcasters and audiences. Broadcasters enjoy digital compression of bandwidth, which allows for high-definition broadcast, and the addition of subchannels to give furtherprogramming options.On the other hand, viewers are offered better viewing

experiences in terms of picture and audio qualities.Hanna adds that with digital television, multiple channels from the same broadcaster can be received on one frequency. Ihechu and Uche (2012) also aver that digital broadcasting offers possibilities for digital television sets to function like computers and connect to the internet, thus creating room forinteractivityinprogramming.Part of this interactivity is the audience's ability to recall programs that have already been transmitted. Hanna (2023) notes that digital broadcast equipment provides digital video recording capabilities.Audiences can now arrange to record their favorite programs, watch or listen to them at their convenience, and provide necessary feedback.

Analog broadcasting requires muchphysical space to store rolls of magnetic tapes used for recording video and audio; digital broadcasting has,however, changed this. Sappington(2022) asserts that with digital technology, data can be packed into a small amount of space with binary codes of discrete values as against analog signals of voltage or magnetic fields.Text, video, and audio information can be stored digitally with the advantage of more information and less space for storage. Storing and accessing digital data is also a lot faster than analog processes. Digital storage drives take up less room space and are more cost-effectivethan analog equivalents.Both broadcasters and audiences enjoy the benefit of storage.

Convenience is another benefit of digital broadcasting. According to Hanna (2023), digital television does not essentiallyneed an antenna or a cable subscription to watch. Internet connectivity provides an alternative for programs to be streamed. This is whyIhechu and Uche (2012)posit that digital broadcasting promotes media convergence where many broadcasters now have online versions of their broadcasts. This enables audiences to accessprograms on television and through their computers, phones, and other information technology-compliant device.Also, Aziz (2015) opines thatwith digital broadcast equipment, the end user does not necessarily have to have the technical expertise to use them. The signals for television channels are automatically tuned irrespective of the brand of a television set, be it LCD, plasma, or any other type. Aziz further notes that the outlet for digital broadcasting is numerous: satellite, digital cable, internet connection, and mobile phone.

Challenges of a Switchover

Even though digital broadcasting offers many benefits to broadcasters and audiences, a switchover from analog to digital broadcasting presents various challenges thatstakeholdershave continued to grapple with all over the world.Akinola-Badmus and Ojebuyi (2021) argue that one major challenge in Nigeria is that media practitioners lack adequate preparedness for the switchover. In support of this argument, Ihechu and Uche (2012) note that events surrounding the digital switchover indicate that broadcasters and audiences do not have the requisite information to accomplish the goal.For instance, analog production and transmission equipment and home receivers like television and radio sets would have to be replacedwithdigital-compliantones for a successful switchover.Only very few stakeholders in the industry were prepared for this.

Okonji (2019) states thatsome major challenges stem from a lack of infrastructure, funding, and political will to see the process through.According to Adaramola (2016), Nigeria failed to meet the digital switchover deadline in 2015 due toa lack of funds to execute the project.Even after getting an extension for 2017, the federal government still failed to make budgetary provisions for the project. The situation is further compounded by regulatory authorities' lack of political will to drive the switchover. Aihe (2021) posits that instability in the leadership of the Nigerian Broadcasting Commission, NBS has weakened its ability to move the digital switchover forward as the ministerial task force set up by the day's administration lords it over the NBC, which is the rightful body empowered by law to be in charge.

The challenges ofa digital switchover alsonecessitate replacement of analog equipment with digital ones, change of operational strategies, replacement of personnel who are unable to adapt to new technologies with new ones, training and retraining of staff, and continual upgrade of equipment and software.Such a process is intense and,according to Aihe (2021),requires careful planning with measurable targets and execution to get the best.

Christian Broadcasting Network in Brief

The Christian Broadcasting Network, CBN,one of the foremost Christian television networks, was founded by Pat Robertson in 1960.According to CBN (2023), as a nonprofit organization, CBN produces and distributes life-changing, soul-edifying TV shows by cable broadcast and satellite to over 200 countries. These shows, usually a blend of testimonies, ministrations, interviews, and discussions of various life issues, aredesigned to cater to the needs of different audiences, including children. Burton (2017) avers that 700 Club, CBN's flagship show,was a result of a fundraising appeal to support the network in its infant days when it was almost going under. The 700 Club, according to Block (2021),is today the longest running television show in history.In addition to its numerous life-changing program productions, Forbes (2023), asserts that CBN also incorporates a humanitarian arm to provide for the needy in the U.S. and abroad.

The Christian Broadcasting Network is headquartered in Virginia Beach, United States of America,butoperates offices in all the continents of the world. Nigeria serves as the headquarters of Anglophone West Africa region of CBN's operations, it is also the production hub for the region. The CBN's production team in Nigeria is responsible for producing local content and showsfor distribution to television stations in African countries. For over twenty-six years of its operations, the Anglophone West African region has continued to add value to professionals broadcasting through annual TV training for its partner stations.

Theoretical Framework

Technological Determinism Theory

Marshall McLuhan in 1964, propounded the theory of technological determinism. The theory postulates that as we advance from one technological age to another, technology impacts how each member of society thinks, feels, and behaves and how society functions. Asemah (2011), avers that McLuhan believes technological inventions cause cultural changes. According to Jan, Khan, Naz, Khan, and Khan (2021), McLuhan divided human cultures into four eras: the tribal age, the literate age, the print age, and the electronic age. The tribal period was followed by the literate age, which gave way to the print age, and the print age gave way to the era of electronic communications. The day's technology transformed people's lifestyles according to their respective ages. For instance, Theory (2022) notes that the discovery of steam power facilitated the rise of industrial civilization, and the invention of computers and the internet ushered in the information era.

According to Christie (2014), as cited by Sibani (2018), one major factor that leads to cultural change is invention. People modify existing ways of life in other to adapt to new technologies. Tang and Chan (2020) acknowledge that advanced technologies of communication have been a powerful tool that can affect and form human behaviors as well as culture. Gill (2023) notes that this is evident today by how the internet is changing society's economics, politics, and culture.

McLuhan's technological determinism theory is not without issues. While it shows how technologies change the course of human history, Gill (2023) opines that it fails to account for the fact that it is not technology per se that determines the human future but human acceptance and use of technology. He argues that society and individuals have the free will to deploy technology and determine how it will or not alter their future.

The factthat technological determinism theory attempts to explain societal behaviors as they relate to the technology of the day makes the theory very relevant to this study.

Methodology

A qualitative research approach combining secondary information from existing literature and data from a 7-point in-depth interview was adopted. During the interview, 2 management staff, 4 senior staff, and 2 junior staff members of CBN Africa,with years of experience between 2 and 23 years, were purposively selected. A recording of the face-to-face interview sessions which spanned 2 days was transcribed andanalyzed.The results are presented below.

Results

The study set out to evaluate CBN Africa's progress with the digital switchover and challenges arising from the process. Findings show that all members of CBN Africa staff interviewed were aware of the

concept of analog to digital switchover, and that CBN Africa has completely switched to the digital form of broadcasting for which various benefits are being enjoyed.These benefits include improved productivity through reduced turnover time and less laborious workflow;availability of more outlet for content distribution on the internet, like social media platforms; reduction of physical storage space; lower cost of digital production equipment in comparison to analog equivalents; and removal of the limitation of distance. According to one of the participants, (P-1), "Work can now go on from anywhere in the world while maintaining collaboration with team members".

The research also shows that there areequipment-specific induced challenges that CBN Africa must grapple with because of the digital switchover. These challenges are discussed as follows:

Partial Switchover

CBN Africa relies on partner stations in Nigeria and other African countries to air hercontents, but a good number of these stations are yet to complete the switchover. The implication is that high quality programs produced using digital equipment at CBN Africa are down converted to accommodate such stations; the station in turn would air the programs via analog equipment with a resultant poor-quality output to viewers.One of the participants expressed his frustration with this development by saying; "CBN Africa's digitalization does not guarantee that the quality of her program aired by stations will be of the digital standard because a good number of stations are still operating analog". (P-1).Such development ultimately makes nonsense of the need for a switchover in the first place.

Compromise of Creativity and Standards

Digital production equipmentistypically highly automated and packed with templates to aid productivity. Findings however revealed that some producers at CBN Africa are struggling to stay creative due to over reliance on the technology. Because of automated features built into equipment to help with transcription, spellchecks, graphics design, auto color correction, and many more, producersare paying less attention at honing their skills and becoming better story tellers. According to a participant (P-5),"Most workflow is automated making people lazy and robbing them of their creativity". The implication is that programs are beginning to lack originality, one program looks like another you have just watched because the same template was used to create them both.

Also, the ease of access to digital production equipment has unfortunately turned everyone who can afford the equipment into professionals thereby given rise to indiscriminate production ofsubstandard contents by this people. Such contents do not take ethical issues into consideration, and they mostly convey negative valueslike nudity and obscenity to the society. When these substandard contents find their way to social media platforms and some TV stations, sadly, they attract a lot of viewership. Some producers take suchsuccess in viewership as a motivation to drop the standard of their own productions. For some other producers the development puts them under additional pressure to create more appealing programs. Participant (P-3) captures this as follows, "Because these alternative contents are easy to come by and more appealing to some people, it puts the stress of competition on CBN Africa's programs creators to up their game in order to keep the programs relevant".The pressure to match audiences' short attention span occasioned by the digital revolution also forces producers to churn out large quantities of content at the expense of quality and excellence.

Skills and Training

Digital technology is always changing and one of the challenges this has posedto CBN Africa is keeping up with the cost of this change, and the cost training required to keep staff up to date. Sometimes the skill level required to be able to reap maximum benefits of some equipment are barely reached before there is a need for an upgrade. One participant (P-4) alluded that some duplication equipment imported by CBN Africa in a particular year were discarded barely four months after the importation because of change in production and transmission formats, this led to the loss of thousands of dollars and the challenge of what to do with non-usable equipment.

Conclusion

The goal of this study was to ascertain the level of CBN Africa's digital switchover and to evaluate the equipment challenges associated with the switchover. Findings of the study show that CBN Africa has fully made a digital switchover. This fact is consistent with Marshall McLuhan'stheory of technological determinism and Christie (2014), as cited by Sibani (2018), who posits that People modify existing ways of life in other to adapt to new technologies. CBN Africa's production workflow and mode of content distribution was significantly transformed by digital technology.

The study also revealed that with CBN Africa's digital switchover brought along with it challenges that were not there before, especially equipment related ones. The challenges range from high cost of keeping up with the ever-evolving technology to the cost of training or hiring personnel to operate these new set of equipment. Other challenges include over reliance on the technology to the detriment of human creativity, and the stress of keeping with the competition and staying ahead of many other substandard contents in the market made possible by digital technology.

Finally, the reluctance,or otherwise, of some media organizationsto make the digital switchover was largely attributed to funding, but it may not also be unrelated to Gill (2023) perspective to McLuhan's technological determinism theory when he argued that the theory fails to account for the fact that it is not technology per se that determines the human future but human acceptance and use of technology. He further opined that society and individuals have the free will to deploy technology and determine how it will or not alter their future. A participant during the study also strengthened this argument when he asserted that "How we choose to deploy technology will ultimately determine the outcome or efficiency of that technology" (P-6). This is an area that may require more investigation.

Recommendations

To reap the full benefits of digital broadcast in Nigeria, it is recommended that:

i. The government and all stake holders in the broadcast industry must make the subject digital switchover a priority.
ii. Regulatory bodies must set minimum standards for contents before they can be broadcast on any platform, and there should be stiff penalties for defaulter.
iii. Government must make development and manufacturing of digital technology in Nigeria part of its policies.

Reference:

Adaramola, Z. (2016, April 11). *Lack of funds threatens DSO again*. Retrieved from Pressreader: https://www.pressreader.com/nigeria/daily-trust/20160411/281943132040911

Aihe, O. (2021, October 6). *Giving the DSO process a meaning and little hope*. Retrieved from The Cable: https://www.thecable.ng/giving-the-dso-process-a-meaning-and-little-hope

Akinola-Badmus , O. O., & Ojebuyi, B. R. (2021). 'We are aware but not prepared': Broadcast journalists' perception of challenges and benefits of digitization of broadcasting in Oyo State, Nigeria. *Ekpoma Journal of Theatre and Media Arts, 8)*(1-2).

Asemah, E. S. (2011). *Selected Mass Media Themes.* Jos University Press.

Aziz, I. (2015, September 30). *Understanding Digital Broadcasting*. Retrieved from Ezine Articles: https://ezinearticles.com/?Understanding-Digital-Broadcasting&id=9183545

Bhandari, S. (2023). *Difference Between Analog and Digital TV*. Retrieved from Ask Any Difference: https://askanydifference.com/difference-between-analog-and-digital-tv/

Block, A. B. (2021, October 7). *Why 'The 700 Club' Is the Show That Won't Die and Can't Be Killed*. Retrieved from Lamag.com: https://www.lamag.com/culturefiles/700-club-pat-robertson/#:~:text=Robertson%20is%20a%20titan%20of,running%20program%20in%20television%20history.

Burton, T. I. (2017, August 5). *Understanding the Christian Broadcasting Network, the force behind the latest pro-Trump TV newscast*. Retrieved from VOX.com: https://www.vox.com/identities/2017/8/5/16091740/christian-broadcasting-network-cbn-pat-robertson-trump

CBN. (2023). *About CBN*. Retrieved from CBN: https://www1.cbn.com/about/cbn-partners-history

CBNNigeria. (2023). *CBN Nigeria*. Retrieved from CBN Africa: https://cbnafrica.org/region/700-club-nigeria/#

FCC. (2021, April 12). *History of Commercial Radio*. Retrieved from FCC: https://www.fcc.gov/media/radio/history-of-commercial-radio

Forbes. (2023). *Christian Broadcasting Network & Operation Blessing*. Retrieved from Forbes: https://www.forbes.com/companies/christian-broadcasting-network-operation-blessing/?sh=2e9e5cad5226

Fry, M. C. (1973, March). Radio's First Voice...Canadian! *The Cat's Whisker - Official Voice of the Canadian Vintage Wireless Association, 3*(1).

Hanna, K. T. (2023, February). *Digital television (DTV)*. Retrieved from Techtarget: https://www.techtarget.com/whatis/definition/digital-television-DTV

Holmes, J. (2022, May 11). *Marconi's first radio broadcast made 125 years ago*. Retrieved from BBC: https://www.bbc.com/news/uk-england-somerset-61327062

HopeComputer. (2022, October 18). *When was the first computer invented?* Retrieved from Computer Hope: https://www.computerhope.com/issues/ch000984.htm

Ihechu, I. P., & Uche, U. (2012). The Challenges of Digitization of Broadcasting in Nigeria. *New Media and Mass Communication, 5*.

ITU. (2023). *Status Of The Transition to Digital Terrestrial Television (DSO)*. Retrieved from ITU: https://www.itu.int/en/ITU-D/Spectrum-Broadcasting/DSO/Pages/Countries.aspx

LawLibrary. (2023). *The History Of Radio, The History Of Television, The Future Of Radio And Television, Cable Television Read more: Broadcasting - The History Of Radio, The History Of Television, The Future Of Radio And Television, Cable Television - JRank Articles* https://law.jrank.org/pages/4884/Broadcasting.html

Okonji, E. (2019). *Addressing Africa's Challenges in Digital Switch Over*. Retrieved from Thisday: https://www.thisdaylive.com/index.php/2017/11/16/addressing-africas-challenges-in-digital-switch-over/

Oyedokun , D. M., Molindo , A. W., & Ajayi , M. P. (2022). Analogue To Digital Broadcast Switchover: An Inquiry Into The Progress, Challenges, And Benefits Of Digitising The Nigerian Broadcast Sector. *Nasarawa Journal of Multimedia and Communication Studies (NJMCS), 4*(2), 50-66.

PBS. (1998). *KDKA begins to broadcast 1920*. Retrieved from PBS: http://www.pbs.org/wgbh/aso/databank/entries/dt20ra.html

Pribadi, A., & Julianto, A. (2023). *The Difference Between Analog TV And Digital TV, So You Won't Be Confused About The Transition*. Retrieved from VOI - Waktunya Merevolusi Pemberitaan: https://voi.id/en/technology/70187

Pringle, P. K., & Starr, M. F. (2006). *Electronic Media Management.* Elsevier.

Raitner, M. (2018, July 27). *A Brief History of Digitalization*. Retrieved from A Brief History of Digitalization: https://raitner.de/en/2018/07/a-brief-history-of-digitalization/

Sappinton, J. (2022, November 24). *WHAT IS THE ADVANTAGE OF DIGITAL STORAGE?* Retrieved from promax.com: https://www.promax.com/blog/what-is-the-advantage-of-digital-storage#:~:text=Digital%20storage%20allows%20you%20to,of%20time%20than%20analog%20methods

Sterling, C. H., & Skretvedt, R. (2023, March 27). *Radio broadcasting*. Retrieved from Britannica: https://www.britannica.com/topic/radio