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# Two Nations, Same Technology, Different Outcomes: Analysis of Technology Application in Africa and America

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Perpetua Ogechi Aondover\*<sup>1</sup>, Eric Msughter Aondover<sup>2</sup> and Abubakar Mohammed Babale<sup>3</sup>

<sup>1</sup>Department of Cinematography and Broadcast Studies, Faculty of Communication and Media Studies, Rivers State University, Port Harcourt, Rivers State, Nigeria.

<sup>2</sup>Department of Mass Communication, Caleb University, Imota, Lagos, Nigeria

<sup>3</sup>Department of Mass Communication, Adamawa State Polytechnic, Yola

\*Corresponding Author:  
Aondover7@gmail.com

One of the most distinguishing factors between a developed and a developing country is the application of technology. This paper examines the fundamental issue of two nations, same technology, different outcomes in the application of technology in Africa and the America. The paper is a conceptual framework within the context of the existing literature or secondary data where relevant literature that has direct bearing to the subject was interrogated like textbooks, journals, and internet materials. Technological Determinism and Mediamorphosis Theories serve the study goal. The paper argued that changes in the media landscape from the traditional to the modern platform, and the increasing yearning for real-time information, have not only showcased the indispensability of information and communication for society development but have buttressed the position that network societies are now better connected. Westernised societies are linked with those in the global south, and individuals and media organisations alike are creating content. Within this context, Digital Dichotomy Theory (DD-Theory) is proposed for understanding the application of technology in the two nations. The paper interrogates Africa and the Americas in the journey towards building knowledge societies in terms of technological infrastructure and systems. The analysis rekindles the global information order of the past, such as media dominance, information inequality, and asymmetrical and imbalanced information flow.

**Keywords:** Africa, America, application, different outcomes and same technology.

## INTRODUCTION

Paragraphing and applying a well-known line from Charles Dickens' **A Tale of Two Cities**, our contemporary information and communication age can be described as "the best of times and the worst of times" (Fayoyin, 2021). One of the most distinguishing factors between the developed and developing countries is the application of technology. The changes in the media landscape from the old or traditional to the new or modern platform, and the increasing yearning for real-time information, have not only showcased the indispensability of information and communication for society development, but have buttressed the position that the information society is now more than ever. The access, production, distribution and consumption of news have changed significantly, such that news production and dissemination which were

professional preserve have now become everyone's affair. News consumers, with the aid of digital media platforms have also taken on the role of producing and disseminating news.

Fayoyin (2021) affirms that ours is an era of unprecedented digital revolutions. "We live in a world of Virtual Reality, the Internet Of Things (IOTs), Chatbots, 3D Printing and Blockchain technology, etc. all innovation driving the current information society." Arguably, this new world of 'information chaos' is characterised by a growing global digital divide, heightened information inequities and inequalities, the weaponisation of information, the commodification of data, the instrumentation of knowledge and the polarization and pollution of the information ecosystem through digital technologies and social media

platforms. It is also an age of algorithmic intermediation, which creates clusters of information and multi-polarity of the digital age and space. The manifestations of extreme dysfunctions of the extent global information eco-system have been described as the 'infocalypse' (Schick, 2020).

These developments have necessitated individuals and interest groups to leverage on emerging media technologies (online media platforms, especially the social media) to create relevant, compelling stories and engage their target audience. Within the theoretical postulations, contemporary media-communication exists. However, instances of propositional frame of references to new media and communication such as Technological Determinism Theory, New Media Theory, and Mediamorphosis are so far limited to understanding the spread and influences of technology, and far less about what has and or can hinder or limit the overall benefits of D-ICTs. This is where DD-Theory fits in as a propositional frame of references towards making improved sense of technology or relevantly improved D-ICTs. In view of the digital divide concerns being accelerated by technology, the Digital Dichotomy Theory (DD-Theory) is proposed towards understanding the subject of 'two nations, same technology, different outcomes on the application of technology in Africa and America.'

### **Aim and Objectives**

This paper aims to examine the subject of 'two nations, same technology, different outcomes on the application of technology in Africa and America. The gap in the literature informed the choice of the following specific objectives:

1. To examine the application of technology in Africa and America.
2. To ascertain the propositional framework of digital dichotomy in the application of technology.
3. To interrogate the present technological age.

### **The Context**

Societies need information for many purposes in their journey to advancement. Whether it is for building the right physical infrastructure or for enhancing existing social structures, societies require the right kind of knowledge and information. As the central circulatory system carries oxygen to all parts of the body and expels the toxic substances, which could harm the body, the mass media are expected to infuse life-giving information to society, even the most remote members (Pate, 2021). Access to required information helps dispel impediments on the path to the wellbeing of society, be this ignorance or adherence to discordant beliefs and thoughts. The media are expected to promote harmonious living in society. Technology was meant to enhance media efficiency.

However, due to the digital divide across countries, the gains are uneven across the world. As technology-based media communication imperatives are increasing potent aspects of knowledge-driven societies, there is an urgency to advance theoretical insights on the issue towards gaining

a better perspective of media communication imperatives, especially about the position of the application of technology in these two nations. Premised on empirical inferences such as Technological Determinism as pre-existing theoretical frames, the paper argues that technologies may influence media communication imperatives in every society. However, there is a digital dichotomy and often affects the actual media communication outcomes between Africa and Americas.

Nyam (2021) observed that to maximise the impact of technology in such countries, governments, and other stakeholders as well as communication scholars ought to put all resources and expertise towards meeting technology-oriented digital media communication needs of the society. Given digital divide concerns being accelerated by technology, the need to revisit the Digital Dichotomy Theory (DD-Theory) is important as this paper proposed it to be a better way of understanding the inherent global media communication dynamics. This is so because the basic tenet of the theory is that entities without the same predisposing factors will often significantly vary in the adoption time of current experience(s). Thus, technology does aid media communication realities to play out and affect humanity in such disparities.

Pate (2021) observed that where technology has been efficiently harnessed for the social, economic, and cultural wellbeing of groups and nations, a knowledge society emerges. Media technologies have always been a concern. Sometimes they had been viewed from the wide-angle lens of their facilitation of development communication goals, politics and good governance, the institution of democratic culture equality, and social justice. At other times, innovations in media technologies are viewed more narrowly within particular sectors, such as particular forms of messages, scope, and nature of communication enabled. The goals in health communication and marketing communication are likewise to affect desired social behaviours. The concern in simplest terms is whether societies are never simple. As such, further questions are raised beneficial for which strata in society, under what conditions, and to what ends?

Most of the African countries are broadly classified as developing. "As rapidly as technology is developing in the rest of the world, in Africa, things have moved at a slower pace," (Smith, 2009). The implication is that the global media imperative may have fundamental influences, but media experiences in developing nations are lagging. In this perspective, the position of the digital dichotomy is clear. The theory offers explanations to the power of media communication landscapes, and experiences between developed (invention driven media communication environment), and developing countries. This has resulted in varying rates of technology-based digital updates and a 'global village.' Yes, this may be a global village, but the 'globe' has unequal media communication digits like in the case of Africa and Americas.

Arguably, since the 20th century, days when McLuhan,

argued that technologies help extend human capacity; media technologies have been regarded as liberating and empowering. Technologies aided human manipulation of mechanical and electronic processes in the media and communication industries. Similarly, social interactions were enhanced – extending audience reach, expanding scopes of coverage, altering the limitations of time and space, and bridging critical information gaps. With these came the potential to shift the balance of power in societies as desirable in democratic societies. As observed by Pate (2021) by adding the power of computing to mechanical and electronic innovation of the past, far greater is the potential of media in the 21st-century society. The networked societies are now better connected.

### Theoretical Framework

This paper finds the tenets of Technological Determinism, and Mediamorphosis Theories imperative. The two theories are considerably used in this paper together in a non-exclusive sense.

Technological Determinism applies to this paper because of its generic nature towards understanding how technologies are not just the base for mass communication, and contemporary mass media operations, but also how changes in technologies are determinants for changes in society, and respective media thereof. In other words, the theory applies to the generic influence of technology on humanity (Nwuneli, 2020). The Mediamorphosis Theory, on the other hand, is more specifically postulated towards a framework for understanding the constantly changing practices, and application in the media industry that can only be attributed to technology, which is hardly attributed to anything other than the technologies employed. As observed by Baran (2010) Marshall McLuhan postulated the Technological Determinism Theory in 1970 toward predicting, and evaluating the role of all technologies. The explicit position relates to how technologies have been and are expected to transform media organisation, and experiences.

Thus, the two theories appear to be of the same continuum. While Technological Determinism is about the sociological implications of technologies in general, Mediamorphosis is particularly the implication of technologies to media convergences, and the opportunities for dynamic media orientations in the new, and conventional media (Anaeto, Onabaajo & Osifeso, 2008).

Therefore, the adopted theories apply to this paper because of the importance of technology to society as well as the mass and the new media. Moreover, the role of technologies in the changing, constantly improving, but also diversifying forms of contemporary media, and communication means these theories are relevant. The basic assumptions, implications, and relative applications of information communication technologies justify this comparative analysis of the operational differences of the new, and traditional media, especially across societies at varying levels. For example, Sayad (2020) corroborates that 60% of teachers across the world are not actively going to

deal with D-ICT; just as besides 95% of students are not actively going to school, “digital mentoring” remains a key element for quality in education- lack of such digital aspects to education makes “10 points difference in learning within a country (micro-regions).”

### Methodological Approach

This paper is based on the conceptual framework within the context of the existing literature or secondary data. Relevant literature that has direct bearing to the subject was interrogated, like textbooks, journals, internet materials, among others. The paper examined the consistency of such findings from previous studies and theoretical postulations to underscore the arguments by scholars within the context of technology application in Africa and the Americas.

### Technological Application in Africa and the Americas

Africa is already lagging in the creation or use of technology. A BBC report indicates that an overwhelming majority of the technology is situated in North America, Europe, and Asia (BBC, 2019). To narrow the yawning digital divide between other continents and Africa, computer scientists from Africa are being trained by tech giants such as Google in the use of technology to solve different complex problems. Already in April 2019, Google launched its first-ever African technology centre domiciled in Ghana. However, the laboratory which is situated in Accra was used to help find solutions to improved healthcare by automating the diagnosis of diseases, agriculture, and education.

The major challenge to the development of technology in Africa is the multiple languages spoken on the continent. Currently, there are 2,000 languages spoken in Africa daily (BBC, 2019). Indeed, Mojaye and Aondover (2022) of techcabal suggest that Africa’s linguistic diversity is only second to Asia, adding that one-third of the global languages are spoken by Africans. In all this, the language of technology is yet to gain fluency. As a result, it has hackneyed to intertwine technology into every conversation about technology and society in Africa.

Machine learning, a major aspect of technology, relies essentially on using data (experience) to enhance better decision-making (performance). Nonetheless, Africa has a serious data challenge (Kurfi, Aondover, & Mohammed, 2021). This is linked to the leadership problem which occurs when African leaders habitually dismiss data points especially when the said data are not in their favour, thereby creating skepticism about a future in which sufficient encouragement exists for technology on the continent.

Worse still, there are not enough information and communication infrastructures in many African nations. This is evident in the amount of internet penetration across African countries, compared to flourishing technology hubs on the American continent. It has been observed that poor infrastructure affects internet affordability, and globally, Africans pay the highest amount of money for data

subscriptions (Kurfi et al., 2021). Therefore, for Africa to make important strides in technology, both dependability of the infrastructure and affordability of the internet are essential because there is already a digital divide between the West and the rest of Africa.

The transmission and reception of information in the modern world of technology have greatly broadened the revolution in both national and international communication and all the spheres of the society. For example, television as far back as the late 80s has aided in the transmission of audio-visual entertainment, and educational and informative content to various homes. As Aondover (2020) rightly posits that the new media technologies made broadcast visual of entertainment and news television sets not only the receivers but were also connected to video recorders and computers as new media of domestic entertainment. These new technologies had posed new challenges to the traditional media, especially in African countries that are considered information “have nots”.

The new media technologies struggle to engulf the traditional media and when there is a struggle between the old and new media there would be what is called “*functional displacement*.” An idea referring to the “struggle for up-starting media industries (internet, computer, etc.), to reap enormous profits and the efforts of the old media (conventional media) to gain control of new technologies,” to survive (Kurfi et al., 2021). The use of new media technologies like the internet has created intense competition among media industries. Aondover (2020) explains that the growing use of new media technologies increases competition among countries and reinforces threats to developing ones.

Within the context of Americas, over the last century, the Americas have adapted again and again to continuing technological change. American firms and workers have exploited opportunities inspired by a succession of technical advances, in the process creating new products, new services, and even whole new industries. The new ideas that have reshaped individual industries have often had a broader effect on the economy as well. Innovation makes it possible to produce more output from society’s available labor and capital, increasing the productivity of

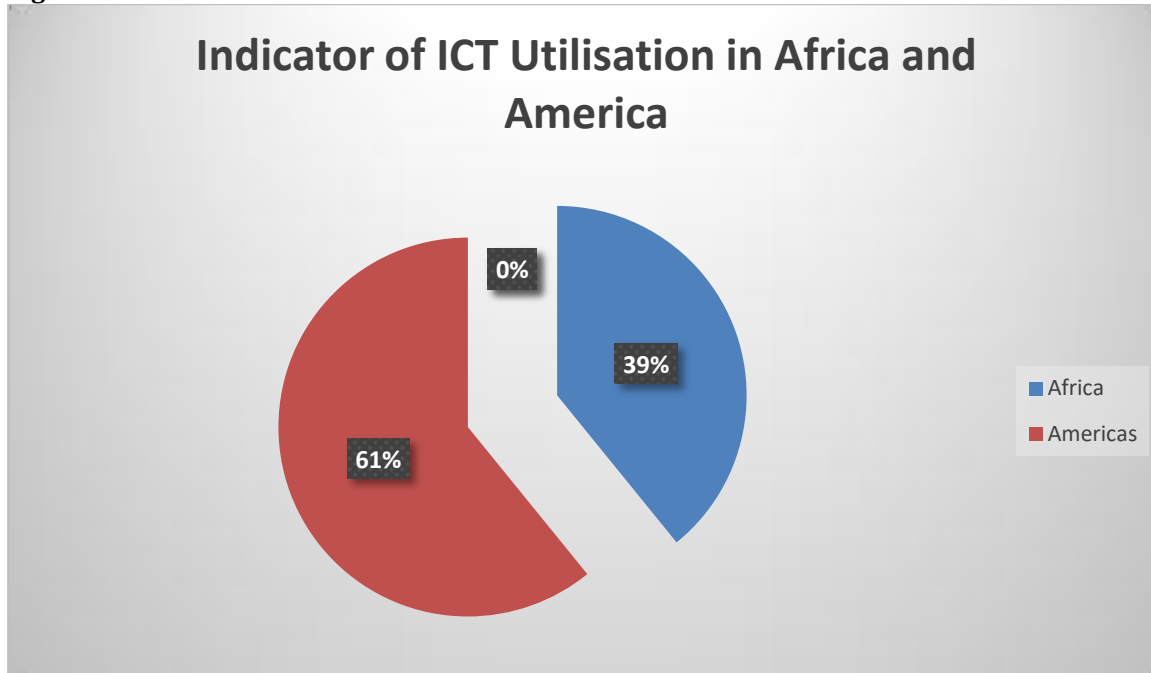
America’s workers. Those productivity improvements have led to rising prosperity and living standards.

Innovations during the 20th century have led to dramatic changes in how firms compete in the American technology. In some cases, new technology has given birth to new markets, where startup companies compete on equal terms on a fresh and level playing field. In others, it has opened a door for entrepreneurs to enter older industries and challenge the established incumbents. As these forms of competition have spread and flourished, consumers have benefited in numerous ways, from expanded service, greater variety, and falling prices. Today, new technologies are transforming the country. No one can yet predict all the changes to come, but it seems clear that the information technology is changing the way communication is shared. In addition, technology is increasingly redefining the role of information dissemination. Although technological innovation brings constant and ultimately beneficial change in America, it also requires a constant re-evaluation of government policies to determine how best to shape the forces of change to promote the public interest.

Thus, Americas is using the same technology with Africa, but the application of the technology is not the same. Although there are many factors to put into consideration as mentioned in the preceding discussion, the technology is the same, but the output is not the same. Perhaps, this can be attributed to factors like manpower, literacy level, mode of application, government policies, among others. Within the context of Digital Dichotomy Theory, it is not the strongest of the species that survives, or the most intelligent, but the one most responsive to change. In this direction, there is a digital dichotomy that unevenly affects actual media-communication outcomes, especially in Africa.

To maximise the impact of technology in Africa, governments and other stakeholders, as well as media-communication scholars ought to harness all resources and expertise towards meeting basic technological oriented digital media-communication needs of the society. If not, the outcomes of technology will never be the same in spite of the same technology. An indication of ICT utilization in the Pie Chart is a clear manifestation of the unequal application of the technology as advanced by DD-Theory.

Figure 1: ICT Utilisation in Africa and America



(Source: International Telecommunication Union, 2022)

### Propositional Framework on Digital Dichotomy

Digital dichotomy simply refers to the digital divide. It is the centre of the conceptual frame of this paper. This hitherto referred to as 'technological divide.' As technologies have progressed into the digital phase, the divide has expanded more into a digital dimension-hence the term 'digital divide.' It has been the hallmark of persisting debate between developing nations and the otherwise developed ones. This is as a result of global media being a huge empire built on several years of inventions and innovations that have in turn been consistently improved upon. This technology remains dominated by the West (the large information-developed Northern hemisphere).

Therefore, Nyam (2021) is of the view that many countries have at one point or the other lamented that the technical capacity of the Western media has been abused towards information flow disorder against developing nations. This position was largely termed the New World Information and Communication Order (NWICO) debate. In ensuring dynamics, the international media, many of which are based in Europe and North America, as well as modern Asia are believed to have the capacity to influence the media outcomes of developing societies, mainly in Africa and South America.

Scholars like Ozuru and Ekeanyanwu (2013) remarked how communication at the international level comes with many consequences. Some of these consequences arise because of some imbalances, news manipulations, and sometimes, misrepresentation of some nations and people in the media systems of others. Corroborating this, Ciboh (2005) observed that in 1973, governments of non-aligned nations met and discussed media and information flow issues, suggesting ways to counter the real or perceived imbalance.

Based on the preceding, there is an apparent digital dichotomy. The global digital divide is not denied, except there is a feeling that it is not a very valid point that can devalue the role of digital technology in much of modern existence. The global divide describes the unequal distribution of information, and communication technologies across nations. It has become a description for the information-have, and have-nots, although, much of these positions are complex to understand. In the words of Ali, Akhtar and Ahmed (2011) argued that within academic circles it is well established that the digital divide encompasses more than physical access to D-ICTs. It is also a function of how D-ICTs are used. It is crucial to develop policies and programs that would bridge the global digital divide through D-ICTs.

For instance, former United Nations Secretary-General, Kofi Annan agrees that the digital divide is a serious issue, Annan's successor, Secretary-General Ban Ki-moon, admits, and leaders of the World Bank think so too. President James Wolfensohn, former World Bank even described the divide as "one of the greatest impediments to development." However, the significance of the digital divide has been challenged on several occasions, like Bill Gates thinking that the digital divide deserves no special attention because it is simply a symptom of economic disparity across nations, and thus the lack of access to information technologies in developing nations merely reflects the poverty level of those nations. Gates at a conference on the digital divide said "most of the world doesn't have cars, but we don't talk about the auto divide." Steve Jobs, Co-founder of Apple, reiterated the views saying that the so-called "digital divide" is "just a new sticker that people use to cover up a more important word: poverty."

In whatever point critics look at it, the significance of the digital divide becomes apt when culture and media orientation of audience from a technology-adopting environment fail to key into the original intentions of inventors, as compared to audiences from a technology-inventive environment like the United States. Again, the digital divide becomes a more serious issue when the economic and political policy, legal framework, and infrastructure of developing technology-adopting nations fail to meet up with international standards, and best media-communication practices.

The essence of digital technology is what prompted the conviction that the world is "truly" global. Yet some scholars are still skeptical that the export of digital technologies has not fully bridged the gap between developed and developing worlds, because the hitherto less developed third world has not been able to conquer attraction to media contents of the West.

### **Interrogating the Present Technological Age**

Since its evolution, humanity has experienced waves of innovation resulting in the advancement of social and institutional development. Fukuyama (2018) describes human growth in five dimensions: Society 1.0, characterised by the coexistence of human beings with the animal kingdom; Society 2.0, the beginning of agriculture and permanent settlements; Society 3.0, the advent of industrialisation; Society 4.0, the age of information society, internet and communication technology; and Society 5.0, the age of technological innovations with the use of data, Artificial Intelligence, the internet of things and the robotic era. Through this prism, human society is currently situated in Society 5.0, with the quantum use of data and information shaping decisions and all areas of life.

The evolution of modern society has also been described in terms of Industrial Revolutions. Along that line, Marwala (2020) views human development in four cycles of revolutionary. The first industrial revolution took place in the 18th Century, resulted in the increased volume and variety of manufactured goods, and improved standards of living, with a shift from an agrarian into industrialised economies. The second industrial revolution sprung from the discovery of electromagnetism, which gave human beings electricity and the mass production of goods. With the development of semi-conductors and materials that conduct electricity, the third industrial revolution ushered in the electronic age. We are presently in the world of convergence of media systems and communication infrastructure, described as the fourth industrial revolution. It is the offshoot of what has previously been described as the information society, network society, or the knowledge society.

However, other commentators extended the trajectory beyond four revolutions. Smihula (2010) suggests that human development is seeing the end of the information revolution as it moves into the 5<sup>th</sup> industrial revolution. This is an age of human intelligence, self-governing technologies, and the multi-polarity of technology-driven by the

convergence of ICT and networks. Thus, the world will yet undergo a post-information revolution that will usher in other waves of innovation. Along the same line, Silva and Di-Serio (2016) argue that the world is on the cusp of a sixth revolution, focusing on sustainability and innovations. The authors contend that the political, economic, and social problems demonstrated by the industrial revolution will lead to a new wave, one based on the need to achieve sustainability of the ecosystem.

One consequence of the extant digital revolution is the increased use of data and technology. Through sophisticated computer automation and engineering, society today is awash with different data sources and tools, affecting all forms of decision-making based on experience, intuition, and other non-data-driven approaches (Provost & Fawcett, 2013). To Mayer-Schonberger and Cukier (2013), data is no longer regarded as a static or stale resource but as a major raw material in business, a vital part of economic input, and a critical tool for creating new economic value. It is also no longer a question of hardheaded statistical packages or dead information available in archives or remote databases.

In the digital age, data is expected to be mined and efficiently utilised for social change and effective decision-making (Provost and Fawcett, 2013). The advent of big data and a host of other developments associated with digital technologies have culminated in the emergence of Knowledge Societies.

Pate (2021) corroborated that where technology has been efficiently harnessed for the social, economic, and cultural wellbeing of groups and nations, a knowledge society emerges. Media technologies have always been a concern. Sometimes they were viewed from the wide-angle lens of their facilitation of development communication goals, politics and good governance, the institution of democratic culture equality, and social justice. At other times, innovations in media technologies are viewed more narrowly within particular sectors, such as particular forms of messages, scope, and nature of communication enabled. The goals of health communication and marketing communication are how it affects the desired social behaviours. The concern in simplest terms is whether societies are never simple.

It is apparent in the literature that the adoption of technology in journalism and other communication practices brings up long-standing debates regarding the potential of technological innovations for good and evil in society. The paper, therefore, beamed the light on contemporary manifestations of global challenges, though understandably, the African context features prominently. Still, within the context of the literature, findings are shadowed by unprecedented global occurrences; the world has been bedeviled with a range of these in recent times.

Arguably, since the 20th century, McLuhan argued that technologies help extend human capacity; technology has been regarded as liberating and empowering. Technologies aided human manipulation of mechanical and electronic processes in the media and communication industries.

Similarly, social interactions were enhanced – extending audience reach, expanding scopes of coverage, altering the limitations of time and space, and bridging critical information gaps. With these came the potential to shift the balance of power in societies as desirable in democratic societies.

### **Conclusion and Recommendations**

This paper examines the fundamental issue of digital dominance in information technologies. The challenges of the information age revolve around the twin concepts of globalization and the information age, which embody social, economic, political, technical, and cultural processes and access to Information Technology (IT), Information and Communication Technology (ICT), and development policies in general. Technological problems in Africa and their solutions vary from country to country, therefore, countries must work together to find a way of improving technological developments in Africa. Countries must come to terms of agreement with clear policies to successfully incorporate the development of technology into national strategic plans which will lead to improvements in infrastructures and easy access. Any effort to improve technology in Africa must focus first on the development of the telecommunication infrastructure as seen from the various submarine fiber connectivity projects.

High bandwidth cost remains a major problem despite recent advances in various fiber connectivity projects. Efforts should be made to break the tight monopoly held by various telecommunication companies and governments to allow expanded access to this infrastructure, thereby reducing dependency on satellite technology as it is done in America. The use of open-source software will help bridge the technological gap at an acceptable cost. Governments in Africa must consider open-source software as a serious alternative to commercially licensed software, not only as a site for the implementation of software but more importantly as propagators of the philosophy behind the Open-Source movement.

### **Declaration Statements**

The authors declare that they have no known competing conflict, and financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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### **Data Availability Statement (DAS)**

The authors confirm that the data supporting the findings of this study are available within the article. The study is a conceptual paper whereby data were generated using secondary sources and the data can be found in the study.

### **Compliance with Ethical Standards**

This study does not involve human participants.

## References

- Ali K, Akhtar MF and Ahmed HZ (2011). Bank specific and macroeconomic indicators of profitability-empirical evidence from the commercial banks of Pakistan. *International Journal of Business and Social Science* 2(6): 235-242.
- Anaeto S, Onabaajo O and Osifeso J (2008). *Models and theories of communication*. African Renaissance Books Incorporated.
- Aondover EM (2020). Internet Meme as a Campaign Tool to the Fight against Covid-19 in Nigeria. *Global Journal of Human-Social Science Research* 20(6): 27-39.
- Baran, S. J & Davis, D. K. (2010). *Mass communication theory: foundations, ferment and future*. Wadsworth Publishing Company.
- BCC (2019). The push towards artificial intelligence in Africa. Available online: <https://www.bbc.com/news/amp/business-48139212>.
- Ciboh, R. (2005). *Global media and culture domination*. Cherry Brooks.
- Fayoyin A (2021). Understanding the knowledge society, artificial intelligence and media nexus. (ed), Fayoyin A and Ademosu, I. *Knowledge societies: artificial intelligence and the media*. UNESCO.
- Fukuyama, M. (2018). Society 5.0: aiming for a new human-centered society, Japan spotlight July/August.
- Kurfi MY, Aondover EM and Mohammed I (2021). Digital Images on Social Media and Proliferation of Fake News on Covid-19 in Kano, Nigeria. *Galactica Media: Journal of Media Studies* 1(1): 103-124.
- Marwala, T. (2020). *Closing the gap*. Johannesburg: Macmillan.
- Mojaye EM and Aondover EM (2022). Theoretical perspectives in world information systems: A propositional appraisal of new media-communication imperatives. *Journal of Communication and Media Research* 14(1): 100-106.
- Nwuneli N (2020). Ensuring that hunger does not kill more people than COVID-19 in Africa. *Business Day*. Available: <https://businessafricaonline.com/covid-19-2/>
- Nyam, I. I. (2021). *Knowledge societies: artificial intelligence and the media*. (ed), Fayoyin A and Ademosu I. Digital dichotomy theory: towards propositional appraisal of artificial intelligence-based media-communication imperative. UNESCO.
- Ozuru E and Ekeanyanwu N (2013). Audience assessment of the influence of social media network on the global news flow controversy. *Communication and the news media in Nigeria social engagements, political development and public discourse*. African Council for Communication Education. Available online: [https://www.academia.edu/en/4883523/audience\\_assessment\\_of\\_the\\_influence\\_of\\_social\\_media\\_networks\\_on\\_the\\_global\\_news\\_flow\\_controversy](https://www.academia.edu/en/4883523/audience_assessment_of_the_influence_of_social_media_networks_on_the_global_news_flow_controversy)
- Fayoyin A and Ademosu I. (2021). Knowledge societies: artificial intelligence and the media. UNESCO Available online: <https://www.researchgate.net/publication/356775466>
- Provost F and Fawcett T (2013). *Data Science and its Relationship to Big Data and Data-Driven Decision Making*. Mary Ann Liebert Inc. Publishers. Available online: <https://doi.org/10.1089/big.2013.1508>
- Sayad A (2020). Education for the future, means respond to the present. A paper presented at the 1<sup>st</sup> virtual and 7<sup>th</sup> Annual Conference of the Association of Communication Scholars and Professionals of Nigeria (ACSPN), in collaboration with UNESCO, IFAD and COMEST. September 2-3.
- Schick T and Schütze H (2020). Exploiting cloze questions for few shot text classification and natural language inference. Available: <https://arxiv.org/abs/2001.07676>
- Schonberger S and Cukier K (2013). *Big data: A revolution that will transform how we live, work, and think*. Houghton Mifflin Harcourt. Available online: <https://academic.oup.com/aje/article/179/9/1143/2739247>
- Silva G and Di-Serio LD (2016). The sixth wave of innovation: are we ready? *RAI Revista de Administração e Inovação* 13(2): 128-134.
- Smihula B (2010). Waves of technological innovations and the end of the information revolution, *Journal of Economics and International Finance* 2(4): 58-67.
- Smith JA, Flowers P and Larkin M (2009). *Interpretative phenomenological analysis: theory, method and research*. Sage Publications Ltd. Available: <https://books.google.com.ng/books?id=WZ2Dqb42exQC&printsec=frontcover#v=onepage&q&f=false>