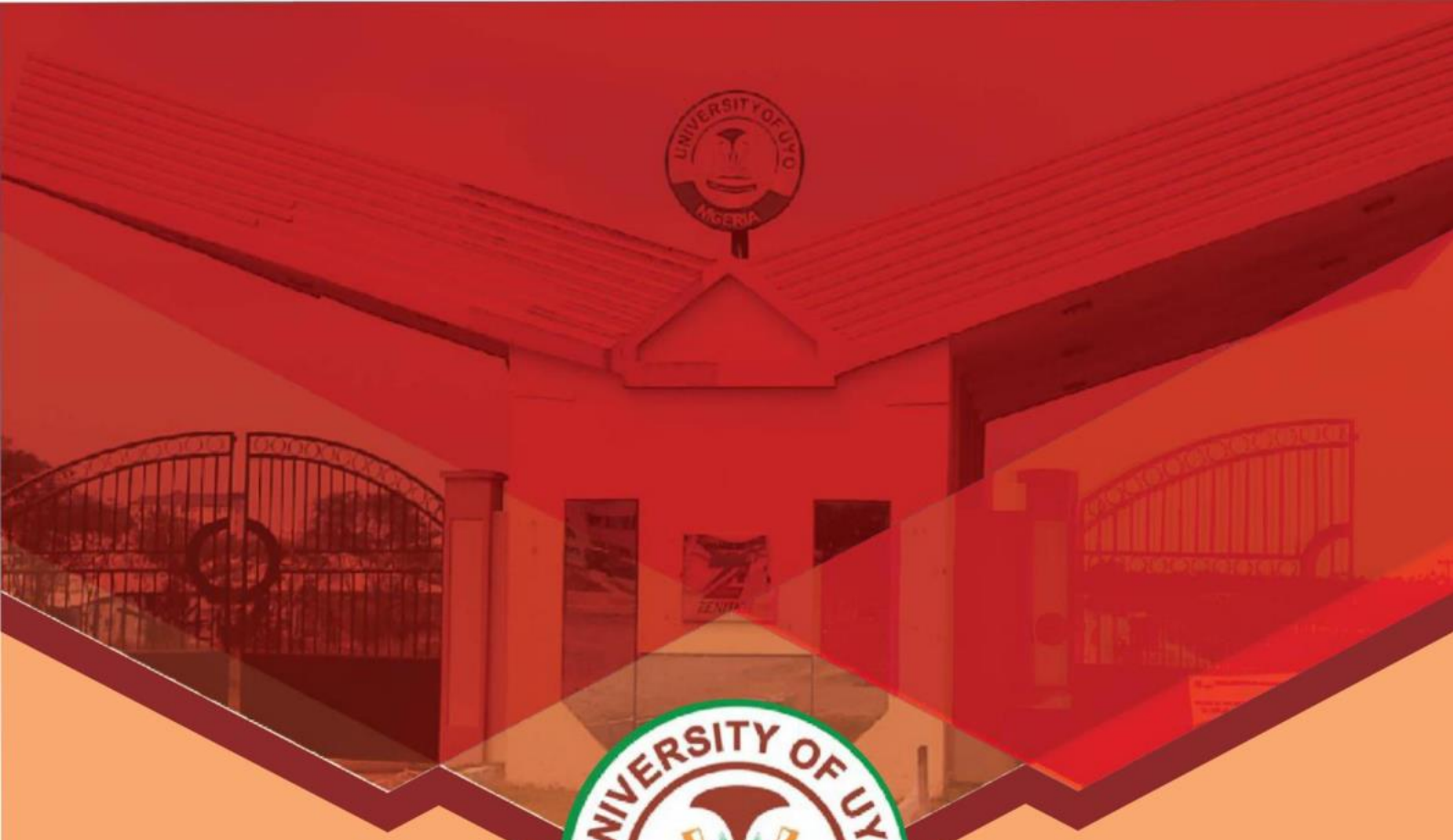

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Navigating the Shift of Transitioning Legal Research Paradigms in Nigerian Legal Education

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Abstract

Global advancements in legal education are reflected in the shift from print to digital and now artificially-facilitated legal research. This move is marked by a number of significant factors, challenges, and developments that define the way in which scholars, students, and legal professionals obtain and apply legal knowledge. Legal research was once exclusively print-based, but with the emergence of the technological era, new paradigms for legal study have evolved, with considerable implications for legal education in general. The benefits and limitations of print materials, computer-assisted legal research, the impact of artificial intelligence on legal research as well as avenues through which artificial intelligence can enhance teaching and learning are examined in this article. This study identifies challenges and proffers recommendations all in a bid to improve the integration of AI technologies in legal research and by extension legal education in Nigeria.

Keywords: Legal Research, Legal Education, Computer-Assisted Legal Research, Generative Artificial Intelligence, Disruptive Technologies.

1. Introduction

Academics in tertiary institutions engage in academic research as this enhances their intellectual base while priming them for promotions and societal recognition[1]. Legal education equips lawyers in training with legal knowledge or specialised skills[2]. The goal of legal education is to train

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[1] A Ndayebom and B Aregbesola, 'Problems Facing Research Programme in Nigerian Tertiary Institutions' (2023) 1(5) *European Journal of Higher Education and Academic Advancement*, 4-5. <https://www.researchgate.net/publication/373492734_Problems_Facing_Research_Programme_in_Nigerian_Tertiary_Institutions> accessed 12 January 2025.

[2] E Solomon, 'Towards Effective Legal Writing in Nigeria' (2017) 12(1) *Journal of Common wealth Law and Legal Education* 1. <http://www.googlescholar.net> accessed 12 January 2025.

lawyers who will uphold the principled application of the law in society[3], essentially highlighting the role of legal research in promoting quality legal education and practice[4].

Legal research is the study of the relationship between the world of the law and the world that the law purports to govern[5]. It is a systematic enquiry carried out within the law discipline[6]. In this paper, legal research is defined as a systematic process undertaken to identify principles, laws and administrative policies, to discover new information**,** and affirm or contradict existing knowledge. It aims to fill a gap in knowledge by igniting an enquiry towards answering a legal question. It is trite that legal research has evolved from print-based to computer-assisted and now, artificial intelligence-enabled legal research.

Legal research raises the standard of legal education by equipping law students, and lawyers with the requisite skills to learn and practice law effectively, in addition it enables the lawyer develop a critical mind. From time immemorial, legal research and legal education have coexisted; legal education being an indispensable component of the legal profession while legal research serves as the fulcrum for legal education[7].

Legal education, alongside access to legal research tools, fundamentally shapes the understanding and application of the rule of law. It focuses on developing advocacy, ethical reasoning, and critical thinking abilities[8]required to practice law.

A paradigm shift refers to a major change in the worldview and practices of how a concept is accomplished[9]Oni believes that a paradigm shift can occur in a wide range of circumstances; such as when new research techniques and methodologies are presented that drastically change the current order for improved legal research. Through legal research, the researchers verify, clarify and establish theories, principles

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3 N Madubuike-Ekwe, 'Challenges and Prospects of Legal education in Nigeria: An overview' (2017) 8(1) *Nnamdi Azikiwe University Journal of International Law and Jurisprudence* 128-129. <https://www.ajol.infoarticle> accessed 12 January 2025.

4 M Umoh, 'The Dynamics of Legal Research in Contemporary Legal Education in Nigeria' (LLM Dissertation, University of Uyo 2025) 69.

5 R Dubey and A Shaikh, 'A Study on Computer-Assisted Legal Research:An Inescapable Trend' (2020) 24(6) *International Journal of Psychosocial Rehabilitation* 18206-18207. <https://www.researchgate.net/publication/371503439_A_STUDY_ON_COMPUTER_ASSISTED_LEGAL_RESEARCHAN_INESCAPABLE_TREND> accessed 12 January 2025.

6 C Ogundare, 'Modern Trends in Legal Research Methodology'(September, 2020) (Paper presented at National Workshop for Legal and Research Assistants, Abuja) 9 <http://www.studocu.com> accessed 12 January 2025.

7 Ibid n4.

8 O Arewa, 'Law, Technology, and Legal Education: The Intersection of Academic Structures and Substantive Legal Change' (2020) 53(2) *Columbia Journal of Law and Social Problems* 165-204.

9 A Hayes, 'What is a Paradigm Shift? Definition, Example, and Meaning' (2022) *Journal of Business* Essentials <https://www.investopedia.com/terms/p/paradigm-shift.asp> accessed 12 January 2025.

and application of the law while understanding their effects on prevalent situations[10].

Prior to the technological revolution of the 21st century, legal research was primarily conducted using print materials[11], which were the "go-to" resource for legal scholars. As at then, legal research was conducted with the collections[12] in a physical law library. This is in tandem with the idea that, legal research concerns how to use the law library and the materials it contains[13].

This traditional approach involved lawyers or law students searching through lengthy legal documents, case law, statutes, and regulations, which took a lot of time and effort[14]. The effort put forth in research is linked to the fact that a lawyer is only as good as his or her research, with legal research being the hallmark of legal education. This outdated approach to finding legal information is tiresome, time-consuming, and energy-intensive; however due to technological advancements[15] this erstwhile trajectory has witnessed a paradigm shift. Judges, lawyers and legal scholars can now find legal information[16] in minutes using a personal computer, research software, the Internet, and an online connection known as Computer-Assisted Legal Research[17].

CALR involves the use of a variety of information resources[18]. More importantly, electronic law databases make case law available and accessible to the law student as distance is no more a barrier. Students evaluate authorities and access other cited materials by using these databases[19].

In recent times, the integration of artificial intelligence into legal research has become essential for modernising legal education. "Artificial intelligence[20]" was originally defined by John McCarthy[21] in 1955 as "the science and engineering of making intelligent machines." The idea has been

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10 S Oni, 'Global Trends and Paradigm Shift in Legal Research' (2023/2024) 5. *Lead City University Law Journal* 3-4. < https://www.journals.lcu.edu.ng> accessed 12 January 2025.

11 Ibid n3.

12 Such as, textbooks, law reports, statute books, periodicals, indexes, digests among others.

13 S Anasi, 'Digital Libraries and Legal Research in Nigeria: The way forward' 2010 3(1) *Library and Information Practitioner* 85-86.

14 Ibid n4.

15 Such as databases and more recently, Artificial Intelligence assistants.

16 Statutes, law reports, commentaries and other legal references.

17 CALR; Ibid n5.

18 Such as e-books, e-journals, full-text databases, bibliographic databases, CD-ROM databases and other e-learning resources.

19 A Ajala, 'Towards Sustainable Computer-assisted Legal Research in Nigerian Law Faculties: Exploring the Nexus between User Education, Intrinsic Motivation and Use of Electronic Law Databases' (2019) 6(1-2) *Asian Journal of Legal Education* 59. <https://www.researchgate.net> accessed 12 January 2025.

20 AI

21 C Manning, 'Artificial Intelligence Definitions' (2020). <https://hai.standford.edu>files> accessed 12 January 2025.

expanded to include the capacity of an artificial or non-natural object to perform tasks and engage in cognitive exercises just like a human[22].

According to Igbozurike, AI can be utilised to access virtual libraries for research purposes (finding the law, scanning through the law, and updating the law where appropriate)[23]. As a corollary, the International Bar Association[24]has called for a reassessment of legal education due to the breach between traditional legal education and the needs of the modern legal industry caused by the incursion of AI technologies[25]. Apparently, the tools of trade of a lawyer are no longer books in the traditional sense, rather his instruments are migrating to electronic formats and the internet[26]. To remain on top of their game, lawyers, law teachers and students must understudy changing research paradigms and apply them. Undoubtedly technological trends and evolving legal research dynamics have impacted legal education in Nigeria and globally. This paper will analyse progression from print to computer-assisted to AI-enabled legal research, its effects on legal education as well as highlight challenges and proffer recommendations.

2. Print Legal Research: The Traditional Paradigm

Traditional legal research is generally associated with the use of print resources since law libraries deal with physical objects[27], it facilitates access to documents as agents of instruction, reference and, research for educational institutions, professional organisations and industrial concerns[28].

Print resources were the main acquisitions made by law libraries and they are published materials in hard copy[29]. These resources,

[22] J Igbozurike, 'Adopting Artificial Intelligence to the Practice of Law in Nigeria – Lawyer's Delight or Dismay' (2020) 2. <https://papers.ssrn.com>papers> accessed 12 January 2025.

[23] Ibid n22.

[24] International Bar Association (IBA). (2020). The Future of Legal Education and Training. IBA Reports, 3

[25] Such as document automation, predictive analytics, and legal research tools.

[26] C Omekwu, 'Information Technology Fundamentals for Lawyers' (October 2004) (Paper presented at staff seminar of Nigerian Institute of Advanced Legal Studies {NIALS} 8; J Owoeye, 'Information Communication Technology (ICT) Use as a Predictor of Lawyers' Productivity' (2011) *Library Philosophy and Practice*, Paper 662 4-5 < http://digitalcommons.unl.edu/libphilprac/662> accessed 12 January 2025.

[27] Such as text-bearing objects, textbooks, law reports, periodicals, a wide variety of materials, audio-visuals etc

[28] O Akinwumi, 'Law libraries in the face of changing technologies: The Nigerian experience' (2012) 5 *Journal of Applied Information Science and Technology* 10-12. https://www.jaistonline.org accessed 13 January 2025.

[29] Such as books, journals, theses, government reports, and other printed documents.

categorised as either primary[30]or secondary[31]were the bedrock of legal research in the pre-digital era.[32]

Since the internet and technology-enabled research were unknown at the time, legal researchers had no option than to rely solely on print collections; in spite of the physical exertion involved. Legislation, case law and doctrinal literature are considered as vital in understanding the law; therefore, legal scholars organise, analyse and re-present this information in a convincing manner[33].

Traditional legal research encourages critical thinking and understanding of legal theories by reading textbooks accompanied by note taking. The standard editing and strict peer review process undergone before the publication of a book[34]makes it authoritative, affording the researcher utmost confidence to cite same without fear of it being labelled fake news[35]. Additionally, consulting print materials aids understanding of legal frameworks and concepts[36]. Another significant advantage that scholars in developing countries value is that books can still be read in areas[37]where internet connections are unavailable, or when the power grid collapses[38], and it does not require any technological equipment.

The act of holding a book and reading provides additional context and teaches the researcher basic research skills in event of internet outages[39]. Notably, print materials serve as the starting point for legal research; however, it is time-consuming and slow. Print resources quickly become outdated since published editions cannot be revised in real time[40]. Accessing print resources requires visiting a physical library, which can be

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30 e.g. law reports, legislation.

31 e.g. textbooks, journals.

32 A Obiamalu and A Echedom, 'Assessment of University Libraries in South-East Nigeria based on LRCN Standards and Guidelines: A Focus on Buildings, Furniture and Equipment' (2021) *Library Philosophy and Practice* (e-journal). 5092. <https://digitalcommons.unl.edu/libphilprac/5092> accessed 12 January 2025.

33 P Langbroek, K Bos, M Thomas, M Milo, and W Rossum, 'Methodology of Legal Research:Challenges and Opportunities' (2017) 13(3) *Utrecht Law Review* 5-6. <www.utrechtlawreview.org> accessed 12 January 2025.

34 Or other print resource.

35 Ibid n4.

36 J Baker, 'Teaching Legal Research in the Books:Necessary or Not' (2017) <http://www.gingerlawlibrarian.com/2017/10/teaching-legal-research-in-books.html> accessed 12 January 2025.

37 Like in rural areas or remote communities.

38 Like in Nigeria; See C Okocha, 'National Power Grid Collapses Again, 12th Time this year alone' *ThisDay* (Lagos,11 December 2024) p5. <https://www.thisdaylive.com/index.php/2024/12/12/national-power-grid-collapses-again-12th-time-this-year-alone/?amp> accessed 12 January 2025.

39 T Mospan, 'The Value of Teaching Print Legal Research, Research, Instruction and Patron Services' (2015) American Association of Law Libraries. 3. <https://ripslawlibrarian.wordpress.com/2015/06/08/the-value-of-teaching-print-legal-research/> accessed 12 January 2025.

40 J Eiseman, 'Time to turn the Page on Print Legal Information' (2010) 8. <https://blog.law.cornell.edu/voxpop/2010/09/15/time-to-turn-the-page-on-print-legal-information/> accessed 12 January 2025.

inconveniencing, and stocking print collections demand a large physical space.

3. Computer-Assisted Legal Research (CALR): A Transitional Phase

CALR presents a unique situation in which the method and medium of information search and retrieval, as well as the nature of information resources, differ from manual legal research. It incorporates the use of computers and other information technology capabilities, as opposed to the traditional legal research method of searching print resources[41]. There is no doubt that CALR has transformed the way legal research is conducted.

It first appeared in the mid-1960s in America, but its revolution began with the arrival of Lexis[42] and West Law in the 1970s. Lexis[43] was founded in 1973, while West Law gained prominence in 1975 after overcoming hardware and software deficiencies[44]. These databases make plethora of case law readily available and accessible as law students, lawyers and scholars utilise it to evaluate authorities and obtain other cited sources[45]. Scholars are not limited by any geographical location. Their large databases are routinely updated, presenting solicitors with the most recent changes in United States law[46].

The evolution of computers and the internet appears to have shifted legal research away from traditional techniques of sourcing materials through library catalogues and towards technology-based legal research via the Internet. This is not only time-saving, but energy-efficient and costs less in the long term. It also enables simultaneous access to information, and data at minimum expense[47].

In recent years, the Council of Legal Education[48] and the National Universities Commission[49] have made it mandatory for law libraries to subscribe to international and local content databases[50]; this is the rationale for the insistence by accrediting teams to sight receipts as proof of subscription and the demand for actual search sessions. As a result, law faculties in Nigeria have impressed upon university managements the importance of yearly subscriptions.

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41 Ibid n5.

42 Now lexis nexis.

43 The first commercial, full-text electronic database of case law.

44 P Hellyer, 'Assessing the influence of Computer-Assisted Legal Research:A Study of California Supreme Court Opinions' (2005) 5 William and Mary Law School Scholarship Repository Library Staff Publications 2. <https://scholarship.law.wm.edu/libpubs/5> accessed 12 January 2025.

45 M. Ashikuzzaman, 'Advantages or Benefits of E-resource' (2014) Network, Library and Information Science Academic Blog 2014 <http://www.lisbdnet.com/advantages-or-benefits-of-e-resource/> accessed 12 January 2025.

46 Ibid n5.

47 Ibid n8.

48 Established by Legal Education (Consolidation) Act, 1962.

49 Established by National Universities Commission Act 1974.

50 NexisUni (formerly LexisNexisAcademic), WestLaw, Heinonline, Law Pavilion, Legalpedia and Electronic Law Companion.

Law faculties in Nigerian universities ensure that their law libraries are equipped with computers, printers, scanners, photocopiers, digital library software, e-learning software, e-learning resources, and Internet access[51]; as information technology tools and platforms to aid CALR.

The integration of computer-assisted legal research into Nigerian legal education has definitely changed how law is taught and practised in the country. Indeed, keys to research and information are no longer held by traditional libraries or limited to a physical facility, but are now in the custody of digital libraries, which store and handle large collections in electronic formats[52]. Technology facilitates the retrieval and use of legal resources from these digital platforms or databases[53].

The CALR experience not only broadens comprehension of law students, scholars and lawyers, but it also equips them with necessary skills to navigate these platforms for research and academic purposes. Electronic law platforms offer a user-friendly interface for accessing legal information, provide advanced search functionality and tools for evaluating and visualising legal information. This makes it easy for scholars to locate and utilise legal knowledge[54]. The usage of electronic law platforms has simplified the legal research process, however digital information literacy is required to fully utilise them[55].

Despite the tangible benefits of CALR, there are limitations to its utilisation in Nigeria, namely inconsistent power supply, information overload, infrastructural deficits, the threat of cyber-attacks, limited access to reliable internet and inability to renew subscription to electronic databases[56], insufficient bandwidth, poor technological adaptation, high data costs, and digital search illiteracy. Furthermore, some researchers appear to be tech-resistant.

4. Artificial Intelligence in Legal Research

The fourth industrial revolution[57]is the integration of the physical, digital, and biological worlds[58]. 4IR "refers to the marriage of physical

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51 K. Sivakumaren, V. Geetha and B. Jeyaprakash, 'ICT Facilities in University Libraries: A Study' (2011) *Library Philosophy and Practice* <http://digitalcommons.unl.edu/libphilprac/628> 4 accessed 13 January 2025.

52 O Fakolujo, 'Data Retrieval and use of ICT in Research' in A Olayinka, V Taiwo, A Raji-Oyelade, and G Farai, (eds), *Methodology of Basic and Applied Research* 2nd ed. (The Post Graduate School, University of Ibadan 2006), 203.

53 I Kolade-Faseyi, 'Research and the Legal Profession: An Appraisal' (2018) (5) (1)*Unimaid Journal of Public Law*, 187.

54 Ibid n5.

55 Ibid n4.

56 From my professional experience as a law librarian, this could be attributed to the high cost of data subscription resulting from the high foreign exchange rate which poses a limitation on the part of many scholars and institutions in Nigeria.

57 4IR or Industry 4.0

58 N Ndung'u and L Signe, 'The Fourth Industrial Revolution and Digitization will transform Africa into a Global Powerhouse, Brookings' (2020) 1. <https//www.brookings.edu/research/the-fourth-industrial-revolution-and-

assets and advanced digital technologies: the internet of things[59], robots, drones, autonomous vehicles, 3D printing, cloud computing, nano-technology, AI and more that communicate, analyse and act upon information, enabling organisations, consumers and society to be more flexible, responsive and make more intelligent data-driven decisions"[60].

The 4IR introduced the virtual world[61], in which disruptive technologies[62]play an important role. DT are those technologies that challenge traditional ways of doing things, undermining existing products and even entire sectors[63]. It manifests also as AI. Paisley and Sussman affirm that AI refers to technologically generated intelligence capable of learning and processing large amounts of data using algorithms, often with greater speed and accuracy than the human brain[64]. It represents a paradigmatic shift in legal research, offering the potential to analyse vast amounts of legal information quickly and accurately. This technology not only promises improved accuracy but also reduces the time and costs associated with legal research.[65]

AI is having an increasing impact on the Nigerian legal profession, notably in legal research. AI-powered technologies are transforming the way lawyers access and interpret legal documents, statutes, and case law[66]. These technologies, which use Natural Language Processing[67]algorithms, enable the rapid processing of volumes of legal information, resulting in more comprehensive legal research. AI-powered software, which combines machine learning and NLP, can detect patterns and insights in massive volumes of legal data that humans would struggle to discover on their own[68]. For example, Timi, Nigeria's first AI legal assistant, has greatly

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digitisation-will-transform-africa-into-a-global-powerhouse/> accessed 12 January 2025.

[59] IOT

[60] P De-Filippi and X Lavayssier'e, 'Blockchain Technology: Towards a Decentralised Governance of Digital Platforms?' in A Grear and D Bollier (eds.) *The Great Awakening:New Modes of Life amid Capitalist Rules* (Brooklyn:Punctum Books, 2020) p.185-222. <https://punctumbooks.com> accessed 13 January 2025.

[61] I Pantami, (2022) *Skills rather than just Degrees* (Ibadan:University press) p. 9.

[62] DT

[63] In J Rajendra, 'Disruptive Technologies and the Legal Profession' (2020) 6(5) *International Journal of Law* 271-273. <www.lawjournals.org> accessed 13 January 2025.

[64] In: V Enebeli, and S Gilbert, 'Artificial Intelligence: Challenges and Opportunities for Arbitration in Nigeria' (2022) 1-19. <https://ssrn.com/abstract=4245238> accessed13 January 2025.

[65] L Tileke and A Gibbins, 'Artificial Intelligence and Legal Research in the 21st Century' (2020) 7-9. <www.tileke.com> accessed 13 January 2025.

[66] L Journal and T Sourdin, 'Judge V Robot? Artificial intelligence and Judicial Decision-making' (2018), 41(4) *UNSW Law Journal* 1114–1133. <https://www.researchgate.net> accessed 12 January 2025.

[67] NLP

[68] E Jiya, A Samaila and Y Surajo, 'Artificial Intelligence and Technology for Improving the Efficiency of The Judiciary in Nigeria' (2023) *International Journal of Research and Innovation in Applied Science*. 1-2. <https://doi.org/10.51584/ijrias.2023.8509> accessed 13 January 2025.

increased the speed and productivity of legal research, litigation support, and legal opinion drafting, demonstrating AI's enormous potential in the legal field[69].

There are various benefits to adopting and applying artificial intelligence. The use of AI in legal research improves the accuracy of research findings while reducing the amount of time that legal practitioners spend manually reviewing information. Artificial intelligence can also be used to draft correspondence. Furthermore, AI improves search operations by allowing users to perform contextual searches instead of keyword searches. This means that even if the exact keywords are not there in the documents, lawyers and law students can still find contextually relevant information[70]. Generative AI[71]is particularly well-suited to serving as virtual research assistants. It refers to algorithms that generate new content, such as text, code, photos, videos, and audio, based on user input. It seeks to create systems capable of producing creative results comparable to those produced by humans[72].

GAI's core feature is its ability to learn from large datasets, identify patterns, and generate new content with similar features[73]. GAI tools are divided into several categories, including content creation[74], idea generating and brainstorming, proofreading and editing[75], translation, and language support[76].

ChatGPT[77]is an AI content model that excels at language comprehension and generation, particularly in conversational settings[78]. It serves as a virtual research assistant, streamlining the research process and harmonising research papers[79]. ChatGPT helps speed the drafting of

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[69] J Onyekwere, 'LawPavilion unveils Nigeria's first Artificial Intelligence Legal Assistant' *The Guardian* (Lagos, 21stAugust, 2018) <https://guardian.ng> accessed 13 January 2025.

[70] T Balogun, 'Application of AI in Legal Research in Nigeria' *ThisDay* (Lagos, 20th January, 2025) <https://www.thisdaylive.com/index.php/2024/07/26/application> accessed 13 January 2025.

[71] GAI; Such as ChatGPT, GoogleBard among others

[72] S Park, 'Use of Generative Artificial Intelligence, Including Large Language Models Such as ChatGPT, in Scientific Publications: Policies of KJR and Prominent Authorities' (2023) 24 *Korean Journal of Radiology* 715, 718 <https://doi.org/10.3348/kjr.2023.0643> accessed 13 January 2025.

[73] S Kar, C Roy, M Das, S Mullick, and R Saha, 'AI Horizons: Unveiling the Future of Generative Intelligence' (2023) *International Journal of Advanced Research in Science, Communication and Technology* 22. <https://doi.org/10.48175/ijarsct-12969> accessed 13January 2025.

[74] Such as CHATGPT and GoogleBard.

[75] Such as grammarly and paperpal.

[76] Such as google and ChatGPT.

[77] Developed and launched by OpenAI in November, 2022.

[78] T Wu, S He, J Liu, S Sun, K Liu, Q Han, and Y Tang, 'A Brief Overview of ChatGPT: The History, Status Quo and Potential Future Development' (2023) 10 *IEEE/CAA Journal of Automatica Sinica* 1122-1136. <https://doi.org/10.1109/JAS.2023.123618> accessed 13 January 2025.

[79] B Fatani, 'ChatGPT for Future Medical and Dental Research' (2023) 15 *Cureus* <https://doi.org/10.7759/cureus.37285> accessed 13 January 2025.

research papers by assisting with data analysis, scientific writing and generating ideas[80].

GPT-3 has been suggested as a tool for assisting authors and content creators in coming up with ideas and overcoming writer's block[81], as well as for automating the production of repetitive or time-consuming content jobs[82].

Attri believes AI accelerates the collection of comprehensive, relevant, and current legal knowledge by automating and streamlining the research process[83]. This efficiency not only saves time, but also enables lawyers to concentrate on more difficult aspects of their work. Suffice it to say, while ChatGPT is a valuable legal assistant, its application poses ethical and scholarly issues such as the fact that the generated text may lack substance or misinterpret complicated legal concepts due to limitations in comprehension[84].

ChatGPT may not always provide the most up-to-date or accurate legal information, necessitating cross-verification with other sources. Over-reliance on AI tools may diminish critical thinking and problem-solving skills among legal professionals and students.[85] It is suggested that in order to maximise benefits, researchers should be encouraged not to rely solely on ChatGPT for key information, particularly complex ones. Lawyers, law students, lecturers and researchers must exercise caution and competence while employing AI tools to avoid becoming unduly reliant on the technology. To use it ethically, legal scholars should make an effort to understand the complex workings of the technology, its capabilities and limitations, it should supplement rather

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80 C. Macdonald, D. Adeloye, A. Sheikh, and I. Rudan, 'Can ChatGPT Draft a Research Article? An Example of Population-Level Vaccine Effectiveness Analysis' (2023) 13 *Journal of Global Health* <https://doi.org/10.7189/jogh.13.01003> accessed 13 January 2025.

81 T Duval, G Lamson, de Kérouara, and M. Gallé, 'Breaking Writer's Block: Low-Cost Fine-Tuning of Natural Language Generation Models' (2020) <arXiv preprint arXiv:2101.03216> accessed 12 January 2025.

82 G. Jaimovitch-López, C. Ferri, J. Hernández-Orallo, F. Martínez-Plumed, and M. Ramírez-Quintana, 'Can Language Models Automate Data Wrangling?' (2022) *Machine Learning* 1-30. <https://doi.org/10.1007/s10994-022-06259-9> accessed 13 January 2025.

83 In J Regalia, 'From Briefs to Bytes: How Generative AI is Transforming Legal Writing and Practice' (2023) *Tulsa law Review* 1-68. <https://.ssrn.com/papers=4371460> accessed 13 January 2025.

84 J Regalia, 'Generative AI and the Future of Legal Education' *Nevada Lawyer* (2023) <https://nvbar.org/wp-content/uploads/NevadaLawyer_Oct2023_Generative-AI-Education. pdf>. accessed 13 January 2025.

85 See K Miller, AI Overreliance Is a Problem. Are Explanations a Solution?, Stanford University Human-Centered Artificial Intelligence (Mar. 13, 2023), <https://hai.stanford.edu/news/ai-overreliance-problem-are-explanations-solution> (explaining that overreliance on AI is seen when humans tend to accept AI responses, even when the responses are incorrect); See, e.g., A Nowak, Five Reasons Law Students Shouldn't Rely on ChatGPT to Write for Them (Mar. 13,2023), https://nationaljurist.com/uncategorized/five-reasons-why-law-students-shouldnt-rely-on-chatgpt-to-write-for-them/.

than replace their research skills, they should do additional searches to corroborate the results of ChatGPT, and adhere to ethical standards about its use, such as proper attribution of ideas[86]. The question of who owns the copyright to an AI-generated work will be examined in the light of relevant legislation[87].

Section 1(1)[88]provides for works[89]that qualify for copyright protection. The preconditions hang on originality and expression. Originality test implies that sufficient effort must have been expended in making the work derive an original character[90]

A question might arise if a GAI system is capable of producing an original work, and the answer may be inferred that such system is incapable of creating original work as it has been pre-trained on multiple databases and generates its responses from there. Also, copyright protection entitles the author to enjoy his economic and moral rights, the economic right accords the owner the right to exploit his work[91]whereas moral right entitles the owner to claim paternity over his work with a major objective to prevent authorship from being attributed to another.

The Law recognises that only an author, who is a living being possesses the capacity to enjoy the economic and moral rights of his intellectual output. Moral rights are considered personal to authors therefore GAI systems, imbued with the ability to produce works almost like human-creations lack honour, reputation and personality[92]

Thus there is no simple solution when it comes to authorship and copyright ownership of research content generated by GAI[93]. Nigerian laws do not grant copyright protection to works created by GAI however, there will be a definite direction when Nigerian courts are faced with cases involving the infringement of copyright by GAI system or whether works created by AI tools are eligible for copyright protection[94].

In the United States, a copyright infringement lawsuit was filed against a technology company. They claimed that their copyrighted work

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86 So as to avoid plagiarism.

87 The Nigerian Copyright Act (2022) Cap C28. This law came into effect in 2023.

88 Copyright Act 2022 Cap C28.

89 Such as literary works, musical works, artistic works, audio-visual works, sound recordings and broadcasts.

90 Section 1(2).

91 Sections 9-13.

92 D Ekanem, 'Artificial Intelligence and Copyright Protection in Nigeria, Legal Impact and Challenges' (2024) <https://www.mondaq.com/nigeria/copyright/1473138/artificial-intelligence-and-copyright-protection-in-nigeria-legal-impact-and-challenges> accessed 13 January 2025.

93 This is because ChatGPT reacts to commands and algorithms set by a human being and, to some extent, human interaction and input are incorporated into the research output.

94 E Ogunlaja, 'Generative Artificial Intelligence and The Nigerian Copyright Act 2023' (2024). <https://www.dentons.acaslaw.com/en/insights/articles/2024/june/10/generative-artificial-intelligence-and-the-nigerian-copyright-act-2023> accessed 12 January 2025.

was used to teach the defendants' GAI tools; however, the defendants contended that their activities qualified within the fair use exception clause[95]. This proves that the level of human engagement in the process must be considered when determining whether GAI-produced content is protected by copyright.

The United States Copyright Office must evaluate whether the work is generally one of human authorship, with the computer[96]serving as an assisting tool, or whether the traditional elements of authorship in the work were conceived and accomplished by man rather than a machine. If the traditional aspects of authorship were created by a machine, the work will be considered lacking human authorship and will not be registered with the US copyright office[97].

A court in Shenzhen, China, recently ruled that an AI-generated piece is copyright eligible. The Court believed that the author of an AI program should be identified as the person who created the AI-generated works. It was alleged that Tencent[98]has been releasing new articles generated by an automated program named "Dreamwriter"[99]In China therefore, AI generated works are to be considered for Copyright protection as long as human effort is involved especially as technologies keep evolving. The issue of determining authorship and ownership of GAI-generated works is difficult and developing, and there is an increasing need for Nigerian Copyright laws to encompass the growing field of AI.

In the UK, AI-powered legal research tools like ROSS Intelligence are gaining ground in some law firms[100]. ROSS uses natural language processing and machine learning to search legal databases and provide relevant results, offering a powerful tool for legal researchers. Lawyers here anticipate the full deployment of generative AI and chatGPT in their legal research and practice, as Thomas Reuters[101]reports that a vast majority of lawyers and law firm professionals are aware of generative AI and ChatGPT, and believe it should be used for legal work. In spite of some law firms adopting AI-powered tools to assist with research tasks, the use

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95 B Brittain, 'Open AI says NewYork TIMES 'hacked' ChatGPT to build Copyright Lawsuit' (27thFebruary, 2024) Reuters.
<https://www.reuters.com/technology/cybersecurity/openai-says-new-york-times-hacked-chatgpt-build-copyright-lawsuit-2024-02-27/> accessed 13 January 2025.

96 Or other tool.

97 Copyright Registration Guidance: Works containing Material generated by Artificial Intelligence, copyright registration guidance works containing materials generated by artificial intelligence. (2023) <https://www.federalregister.gov> accessed 13 January 2025.

98 A major Chinese Technology Company.

99 S Paul, 'Chinese Court Rules AI-Written-Article is protected by Copyright'
<https://venturebeta.com/2020/01/10/chinese-court-rules-ai-written-article-is-protected-by-copyright/> accessed 13 January 2025.

100 For example, BakerHostetler, Womble Carlyle.

101 Thomson Reuters Institute, 'ChatGPT and Generative AI within Law Firms' (2023).
<https://www.thomasreuters.org> accessed 12 January 2025.

of AI in legal research raises ethical considerations as regards reliability, creativity, copyright, and critical thinking.

In the United States of America, AI has made significant inroads into legal research, with GAI tools enhancing the writing capabilities of legal professionals. GAI analyses legal data, and offers transformative potential in legal writing, curating vast arrays of sources and refining legal text.[102] Casetext and Harvey exemplify how GAI can streamline legal research and improve efficiency; by automating citation checking, summarising legal findings, and interpreting legal synonyms[103].

ChatGPT can assist law professors with routine tasks and complex research, providing near-finished products and valuable starting points[104]. AI chatbots[105]can transform static study materials into interactive learning tools, facilitating deeper understanding and improved memorisation for law students.[106]However, challenges such as the generation of fictitious cases and citations,[107]and data privacy concerns, highlight the need for cautious and ethical use of AI technologies.[108]This is an indicator that irrespective of the value of GAI in legal research, Nigerian law students/researchers should be trained on its ethical usage.

The use of Chatgpt has been criticised for its indiscriminate use of intellectual property of others without proper attribution. It runs on software, which is not specifically protected in Nigeria. Although, it may be argued that copyright protection extends to the original documented expression of the software, which is affixed to a medium. Consequently, ChatGPT outputs may be subject to copyright protection, depending on the specific content and materials used to generate the output[109]. In some cases, these rights may be owned by the creators of the training data used to train the AI model, while in other cases, they may be owned by the owners of the AI model itself; however efforts can be made to actually curb this problem and they are:

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[102] J Regalia, 'From Briefs to Bytes: How Generative AI is Transforming Legal Writing and Practice' (2024) *Forthcoming tulsa law review* 20. <https://ssrn.com/=4371460> accessed12 January 2025.

[103] R Bertolo and A Antonelli, 'Generative AI in scientific publishing: disruptive or destructive?' (2023) <https://www.researchgate.net> accessed 13 January 2025.

[104] T Oltz, 'CHATGPT, Professor of law' *Journal of Law, Technology & Policy*,(2023) 1. <https://papers.ssrn.com>papers> accessed 12 January 2025.

[105] Such as ChatGPT.

[106] S Harrington, 'The Ultimate Study Partner: Using a Custom Chatbot to Optimise Student Studying During Law School' (2023). <https://ssrn.com/abstract=4457287> on 13 January 2025.

[107] J Brodkin, 'Lawyers have real bad day in court after citing fake cases made up by ChatGPT' (2023) *Ars Technica* <https://arstechnica.com> accessed 13 January 2025.

[108] M Gurman, 'Samsung bans Staff's AI use after spotting ChatGPT data leak'(2023) *Bloomberg* 2. <https://www.bloomberg.com>articles> accessed 12 January 2025.

[109] E Attat, 'An Appraisal of Artificial Intelligence and Its Impact on the Legal Profession in Nigeria' (LL.B project, University of Uyo, 2023) 76.

i. Increased Protection for Digital Content: new laws or regulations should be formulated which would deter online piracy and also protect the rights of digital content creators.
ii. Strengthened Enforcement Mechanisms: Nigeria's copyright law provides for criminal penalties for copyright infringement, however increased collaboration between law enforcement and copyright owners could strengthen its enforcement, as well as use of technological tools to detect and prevent infringement.
iii. Changes to the Duration of Copyright Protection: Nigeria's copyright law currently provides for a copyright term of the life of the author plus 70 years. This term may be extended or shortened, in the light of international developments and debates around copyright duration[110].

5. Enhancing Teaching and Learning through AI Tools

Integrating AI tools into legal teaching and learning has great potential to transform legal education in Nigeria. The inclusion of AI tools has the capacity to enhance legal education which in turn improves the quality of law graduates. The following strategies should be adopted:

i. The existing legal research methodology curriculum should be revised to include courses on AI technologies. This should cover both theoretical knowledge and practical skills in using AI tools for legal research and writing[111]. AI improves and supplements the educational process; by delivering personalised learning routes, simulating intricate legal situations, and promoting a deeper comprehension of predictive algorithms and legal analytics[112]. With the deployment of AI students are geared to engage in thorough legal research and analysis quickly than with traditional methods.
ii. To ensure factual and practical applicability, the legal curriculum experts should develop modules that demonstrate the use of AI[113]in real-world legal matters.
iii. Continuing Professional Development programmes[114]should be organised regularly for the Faculty. These crop of law teachers will be empowered to introduce students to AI-powered legal

[110] Ibid n109.

[111] A Garba and A Waziri, 'Integrating Artificial Intelligence into Legal Education in Nigeria: Navigating the New Frontier for the Judicial System' (2023) 5(2) *kampala International University Law Journal* <https://www.researchgate.net> accessed 13 January 2025.

[112] Ibid n103.

[113] Such as predictive analytics and document automation which will help in legal research.

[114] Training workshops and seminars with the theme and sub-themes crafted round AI tools and their application in legal research.

research platforms[115] which provide enhanced search capabilities and document drafting assistance[116].

iv. Law Teachers can also promote the deployment of AI-powered productivity applications[117]. These tools offer intuitive interfaces and features that can assist law students in staying organised, managing assignments effectively, and enhancing research productivity throughout their academic journey.[118]

AI technologies should be deployed solely as a tool and not as a crutch. There should be a balance between human effort and reliance on AI. The benefits of AI to legal research and legal education can be exploited while maintaining the fundamental values of legal education[119], thereby positioning Nigerian legal education as a major player in the international legal sector.

6. Challenges in Transitioning Legal Research Paradigms

The deployment of AI in Nigeria is still developing because of challenges such as irregular power supply, lack of internet or technology culture, poor internet connectivity, low bandwidth, corruption among others[120]. Other forms of challenges include the conservative[121]nature of some lawyers who fear that robots will take over their jobs. There is also no policy regulatory framework for AI software. Another challenge is lack of digital information literacy and training among faculty and students.

7. Recommendations

The following recommendations are made:

i. There is an urgent need for development of national and institutional policies to guide AI deployment in legal research and legal education.
ii. The Government should invest in ICT infrastructure for the purposes of legal research in legal education.
iii. The University management should organise regular training programmes for faculty and students on AI tools and digital information literacy.
iv. The National Assembly should revisit the Nigerian Copyright Law by amending it in the light of AI.

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115 like Lexis+ AI Legal Assistant and Westlaw Edge.

116 Delaware law Library Guide, Generative AI & Legal Research, 2025. <https://libguides.law.widener.edu/generative-ai-legal-research> accessed 12 January 2025.

117 like Todoist, ScholarlyAI, Elicit, or PerplexityAI.

118 ProLawgue, AI Tools to Boost Your Efficiency: Law School Edition 2024. https://www.prolawgue.com/7-ai-tools-to-boost-your-efficiency-law-school-edition/ accessed 12January 2025.

119 Such as critical thinking, ethical reasoning, and legal analysis.

120 I Kolade-Faseyi, AI and The Nigerian Legal Profession, (2021) 1 *Achievers University Law Journal* 167 <https://aulawjournal.com> accessed 13 January 2025.

121 Book-biased.

v. Legal researchers should accept evolving legal research technology.

8. Conclusion

The evolution of legal research paradigms in Nigerian legal education reflects a trajectory from sole reliance on print resources to the advent and eventual acceptance of digital technologies, which has culminated in artificial intelligence systems. This revolution has significantly improved the effectiveness, efficiency, accessibility, and volume of legal research and pedagogy. Traditional legal research became overtaken by computer-assisted legal research; and then GAI technologies further transformed the dynamics of legal research and by extension legal education. AI tools possess the capability to transform teaching and learning in legal education and it is expected that these recommendations would be implemented by the stakeholders, so as enhance the Nigerian legal education system.

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Artificial Intelligence in Contracts

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Abstract

The integration of artificial intelligence (AI) in contract negotiations and e-commerce has ushered in transformative changes in business operations and consumer interactions. This paper discusses the use of artificial intelligence in e-commerce and the legal issues that arise from its application. The work highlights the benefits of AI in e-commerce, including personalised recommendations, predictive analytics, and chatbots, but also raises concerns about data privacy and security, algorithmic bias, and the lack of transparency and accountability in AI-driven decision-making processes. The use of AI in e-commerce raises critical legal issues and also delves into judicial decisions and legislative developments to illustrate the evolving legal landscape surrounding AI in contracts and e-commerce. Moreover, non-legal issues related to the use of AI in e-commerce are raised. This paper concludes by emphasising the need for regulations and responsible AI practices to address these challenges.

Keywords: Artificial Intelligence, contracts, e-commerce, accountability

1. Introduction

Artificial Intelligence (AI) refers to the simulation of human intelligence processes by computer systems. These processes include learning, reasoning and self-correction. AI encompasses a wide range of technologies and techniques, including machine learning, natural language processing, computer vision, robotics, and more.[1] The draft recommendation on the ethics of artificial intelligence (AI), elaborated by an ad hoc expert group established by the United Nations Educational, Scientific and Cultural Organisation AI systems as technological platforms or information-processing technologies that encompass models and algorithms capable of processing data in a manner akin to intelligent behaviour. These systems commonly incorporate features such as reasoning, learning, perception, prediction, planning, or control. Moreover,

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[1] S. Russell, Artificial Intelligence: A Modern Approach, 3rd ed. (NJ: Prentice Hall, 2009), at 70

AI systems are crafted to function autonomously to some extent, achieved through methods like knowledge modelling, data exploitation, and correlation calculation.[2]

The ultimate goal of AI is to create systems that can perform tasks that typically require human intelligence, such as visual perception, speech recognition, decision-making, and language translation. Artificial intelligence has evolved rapidly since 1956 when it was first coned, with significant advancements in algorithms, computing power, and data availability driving its progress.[3]Since its evolution, it has been put into use in various fields including contracts and electronic commerce. This paper explores among other things, ethical considerations and legal issues of AI in contracting.

2. The Use of AI in E-commerce

The use of artificial intelligence (AI) in e-commerce has revolutionised the way businesses operate, optimise processes, and interact with buyers/consumers. AI technologies, such as machine learning, natural language processing, and predictive analytics, enable e-commerce companies to personalise user experiences, automate tasks, and make data-driven decisions.[4]Here are some key ways AI is used in e-commerce.

i. Personalised Recommendations

AI algorithms analyse customer data, browsing behaviour, purchase history, and preferences to generate personalized product recommendations. These recommendations can be displayed on product pages, streaming software, in email marketing campaigns, or on the homepage, increasing the likelihood of conversion and enhancing the overall shopping experience.[5]

ii. Predictive Analytics

AI-powered predictive analytics algorithms forecast customer behaviour, demand trends, and inventory needs based on historical data and real-time inputs. E-commerce companies can use these insights to

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[2] Revised Draft Legal Taxonomy – Revised Section on Artificial Intelligence and Automation Section. United Nations Commission on International Trade Law Fifty-Fourth Session Vienna, 29 June–16 July 2021. https://uncitral.un.org/sites/uncitral.un.org/files/1064_add_1_advance_copy_e.pdf (Accessed on May 13, 2024)

[3] J McCarthy, M Minsky, N Rochester, & C Shannon. 'A Proposal for the Dartmouth Summer Research Project on Artificial Intelligence'. (1956). http://wwwformal.stanford.edu/jmc/history/dartmouth/dartmouth.html (Accessed on May 13, 2024)

[4] A Kumar, & S Singh. 'Artificial Intelligence in E-Commerce: A Review', 6 International Journal of Advance Research, Ideas and Innovations in Technology 4 (2020), 628.

[5] *Ibid*

optimize pricing strategies, inventory management, and marketing campaigns, reducing costs and maximising revenue.[6]

iii. Chatbots and Virtual Assistants

AI-powered chatbots and virtual assistants provide real-time customer support, answer inquiries, and assist with product searches and purchases. Chatbots use natural language processing to understand and respond to customer queries, improving customer engagement and reducing the need for human intervention in customer service operations.[7]

iv. Fraud Detection and Prevention

AI algorithms analyse transaction data, user behaviour, and patterns to detect and prevent fraudulent activities, such as payment fraud, account takeovers, and identity theft. E-commerce companies can implement AI-powered fraud detection systems to safeguard transactions, protect customer data, and mitigate financial losses.[8]

v. Image and Voice Search

AI technologies enable image and voice search capabilities in e-commerce platforms, allowing customers to search for products using visual or voice-based queries. Image recognition algorithms identify products based on images uploaded by customers, while voice recognition technologies enable voice-activated searches, enhancing the accessibility and convenience of online shopping.[9]

vi. Dynamic Pricing

AI algorithms analyse market dynamics, competitor pricing strategies, and customer demand to optimize pricing in real-time. E-commerce companies can implement dynamic pricing algorithms to adjust prices dynamically based on factors such as demand fluctuations, inventory levels, and competitor pricing, maximizing profitability and competitiveness.[10]

vii. Supply Chain Optimisation

AI-powered supply chain management systems optimise inventory forecasting, procurement, logistics, and fulfilment processes. By analysing historical data, demand forecasts, and supply chain parameters, AI algorithms can streamline operations, reduce costs, and improve efficiency throughout the supply chain.[11]

[6] A Jain., & S Gupta, 'Impact of Artificial Intelligence on E-commerce' A Literature Review. In Proceedings of the 10th International Conference on Cloud Computing, Data Science & Engineering (Confluence) (2020), 473.

[7] A Kamilaris, & F Prenafeta-Boldú, 'The Rise of Blockchain Technology in Agriculture and Food Supply Chains.' 1Trends in Food Science & Technology, 91(2018), 652.

[8] *Ibid*

[9] J Bielski, 'How AI Is Revolutionising Retail.' 34 AI & Society 3(2019), 606.

[10] P Verhoef, & F Eggers, 'Creating Value with Big Data Analytics: Making Smarter Marketing Decisions', 24 Journal of Interactive Marketing 3 (2010), 160.

[11] *Ibid*

viii. Sentiment Analysis

AI-powered sentiment analysis tools monitor customer feedback, reviews, and social media mentions to gauge customer sentiment and identify trends, issues, and opportunities. E-commerce companies can use sentiment analysis insights to improve product offerings, customer service, and brand reputation management.[12]

Other AI tools used in other fields include virtual and digital assistants for example Siri, Navigations, Chatbots for example Chat GPT, Claude 2, Bing AI, grammar checkers and rewording tools, facial recognitions, electronic payments for example Google pay.[13]

3. Legal Issues Arising from the Use of Artificial Intelligence in Contracting and E-Commerce

The emergence of artificial intelligence generally has led to the emergence of legal issues. Legal and non-legal issues have also arisen in contracting, commerce, electronic commerce and consumer protection. These issues will be discussed hereunder.

i. Legal Personality of AI

The increasing use of artificial intelligence in contracting and e-commerce has given rise to a plethora of legal issues. These issues include the negotiation, formation, and performance of contracts, as well as their interpretation, and the attribution of output from automated systems. A key question is whether AI systems should be conferred legal personality, and if so, how this would impact the attribution of output and the parties involved in contracts.

While some jurisdictions have recognised automated contracts, they generally regard AI systems as mere tools without independent will or legal personality. As a result, the output is attributed to a natural or legal person, although the specific person responsible may not be clearly defined in legislation or case law. In some instances, the person programming or operating the system, or on whose behalf the system is programmed or operated, may be held responsible.[14]

ii. Establishing Intention in AI-Facilitated Contract Negotiations

A significant legal challenge arises when automated systems are used to negotiate and enter into contracts, specifically in determining the intention of the parties involved. The requirement of intention, a fundamental principle of contract formation, remains essential even with automated contracting. However, the issue of intent becomes more complex when the party operating the automated system is unaware of the

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12 *Ibid*

13 Real-World Examples of AI Products in Action- From Start to Finish. Data to Biz. https://www.linkedin.com/pulse/real-world-examples-ai-products-action-from-start-finish-datatobiz-rzdgc/ (Accessed on 10 May 2024).

14 *Ibid*

contract's conclusion or its specific circumstances. In jurisdictions that recognize automated contracts, the intention of the party operating the system is typically determined by their state of mind or that of the person who programmed the system at the time of its deployment. This raises questions about how to establish intention when the automated system is acting autonomously, without direct human oversight or awareness. The attribution of intention becomes a critical issue in such cases, as the party operating the system may not have directly intended to enter into a contract. Instead, their intention may have been to simply deploy an automated system, without realizing the specific contractual obligations that would arise from its actions.[15]

In the *B2C2 Ltd. v. Quoine Pte. Ltd*. case, the Singapore courts took a similar approach to addressing the issue of intention and state of mind in automated contract formation, namely determining whether one party operated an automated system knew of a mistake made by another party. In the court of first instance, Singapore International Commercial Court held that Algorithmic programs used to enter into trading contracts are, in effect, mere machines carrying out actions which in another age would have been carried out by an appropriately trained human. They are no different to a robot assembling a car rather than a worker on the factory floor or a kitchen blender discharging a cook of the manual act of mixing ingredients. All of these are machines operating as they have been programmed to operate once activated.

Where it is relevant to determine what the intention or knowledge was underlying the method of operation of a precise machine, it is rational to have regard to the knowledge or intention of the operator or controller of the machine. In the case of the kitchen blender, this will be the person who put the ingredients in and caused it to work. His or her knowledge or intention will be simultaneous with the operation of the machine. But in the case of robots or trading software in computers this will not be the case. The knowledge or intention cannot be that of the person who turns it on, it must be that of the person who was responsible for causing it to work in the way it did, in other words, the programmer. Essentially this will have been done at a date earlier than the date on which the computer or robot carried out the acts in question.[16]On appeal, the Court of Appeal of Singapore agreed with this analysis and held that algorithmic trading is an area of dynamic change, and it might be more appropriate for legislative

[15] UNIDROIT Principles of International Commercial Contracts of 2016, Article 2.1.1.

[16] Legal Issues Related to the Digital Economy – Artificial Intelligence. United Nations Commission on International Trade Law Fifty-third session New York, 6–17 July 2020. A/CN.9/1012/Add.1. https://documents.un.org/doc/undoc/gen/v20/024/53/pdf/v2002453.pdf?token=Ypbi0B0bpMJxwTVUUO&fe=true (Accessed on 9 May 2024)

intervention in due course, if it were thought that a more essential redesign of the applicable legal framework is needed.[17]

In a separate judgment, Mance IJ dissenting with the approach, finding that it was not appropriate to adapt the relevant existing body of law (that is, the doctrine of unilateral mistake at common law) by shifting the enquiry from the actual state of mind of the parties in light of the circumstances surrounding the formation of the contract (of which they were not aware) to the programmer's actual state of mind at the time of programming the system. However, the judge did adapt the more flexible equitable doctrine of mistake by imputing on the state of mind of parties that they would have had if they were aware of the circumstances surrounding the contract formation. The *Quoine* case indicates that existing law of contract rules requiring a determination of state of mind in connection with the contract formation may not be sufficiently adapted to the use of automated systems. It also suggests that adapting those rules should be carried out on a rule-by-rule basis, taking into consideration to legal certainty and predictability and the promotion of trade.[18]

iii. Interpretation and Validity of Coded Contracts

A legal issue that has been raised by UNCITRAL in the context of smart legal contracts is the validity and interpretation of a contract that is memorialised – in whole or in part – in code (that is, the code of the program deployed on the distributed ledger system) to facilitate the automated performance of the contract. As code is a form of data message, the validity of contracts memorialised in code would ordinarily be covered by laws that recognise electronic contracts.[19]However, while the interpretation of the contract might not be problematic for some jurisdictions in which the courts are accustomed to interpreting code in the context of software-related disputes, a question may arise as to whether the contract is sufficiently certain and complete to be valid or enforceable.

While laws recognising electronic contracts may cover the validity of such contracts, questions arise regarding their certainty and completeness. This is particularly relevant when smart legal contracts rely on dynamic external data sources, such as market prices, which may change periodically or continuously.[20]If AI systems represent the next

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[17] *Singapore International Commercial Court, B2C2 Ltd. v. Quoine Pte. Ltd.*, Suit No. 7 of 2017, Judgment, 14 March 2019, [2019] SGHC(I) 03, paras. 209–210. In the case of *Australian Competition and Consumer Commission v. Trivago N.V.*, it was uncontroversial that the output of algorithms "used" by Trivago to offer services were attributed to it for the purposes of applying consumer protection law: Federal Court of Australia, Case No. VID 1034 of 2018, Judgment, 20 January 2020, [2020] FCA 16.

[18] *Ibid*

[19] Legal Issues Related to the Digital Economy – Artificial Intelligence *Supra* at 12.

[20] Vincent Ooi & Kian Peng Soh, 'Rethinking mistake in the age of algorithms: *Quoine Pte Ltd v B2C2 Ltd*', 31 King's Law Journal 3, (2020), 367. Lord Sales of the Supreme Court of the United Kingdom, writing extrajudicially, has observed that "in future the programs may become so sophisticated and operate so independently that it may be that this

generation of automated systems, a question arises as to whether the features that distinguish AI systems from automated systems permit differentiated treatment of the use of AI in the formation of contracts.

Writing extrajudicially, Lord Hodge of the Supreme Court of the United Kingdom has enquired into the ability of English contract law to deal with the issues addressed in the foregoing examination in the case of AI systems using machine learning techniques that autonomously make transactions. According to him, "If there is to be a contract drafted or adapted by machines, there will have to be significant development to our law of contract which will require careful and imaginative consideration." Questions regarding the intention to enter into legal relations, to whom that intention is to be ascribed and how the terms of a contract generated by computer are to be recorded to achieve legal legitimacy and interpreted will require creative thinking.[21]

Similarly, the Court of Appeal of Singapore in the Quoine case, stressed on several occasions that the automated system in question in that case was programmed to operate in a deterministic manner, in the sense that it would always generate the same output given the same input. While the court did not specify whether its legal analysis of contract law specifically, the doctrine of unilateral mistake at common law as applied to automated contracts would have varied if the system had not been programmed to operate in a deterministic manner but rather to develop its own responses to varying conditions, some commentators have suggested that such systems would require a different approach.[22]

iv. Product Liability

The use of AI in trade raises legal concerns, including product liability. Existing product liability laws may not be directly applicable to AI systems, as they often focus on goods rather than services. Even when AI-enabled goods are concerned, these laws might only cover specific types of harm, such as personal injury or property damage, and may not apply to products used for commercial purposes.[23] Furthermore, traditional product liability regimes assume that products remain static over time, whereas AI systems powered by machine learning algorithms are dynamic

process of looking back through them to the minds of those who created them will seem completely unreal".

[21] Lord Hodge, "The Potential and Perils of Financial Technology: Can the Law Adapt to Cope?" Edinburgh FinTech Law Lecture delivered at the University of Edinburgh, 14 March 2019, 13. www.supremecourt.uk/docs/speech-190314.pdf (Accessed on May 5 2024.

[22] Vincent Ooi & Kian Peng Soh op. cit. fn. 20 at 350.

[23] In Australia, the product liability regime, set out in part 3–5 of the Australian Consumer Law (schedule 2 to the Competition and Consumer Act 2010), applies to "goods", a term which is defined in section 2(1) of the law to include "computer software". However, in Nigeria, under the FCCPA, goods in section 167 does not include this but it extends to services, though no mention is made of software as a service kind of services.

and continually evolving. This poses challenges in establishing liability, as the product's development and circulation may not be fixed points in time.

Additionally, product liability laws often exempt manufacturers from liability if the product was developed according to the prevailing knowledge and technology at the time of production, or if the defect did not exist when the product was first circulated. These exceptions may not be applicable to AI systems, which learn and adapt over time.[24]As a result, the existing product liability frameworks may have limited applicability in the trade context, and new legal approaches may be necessary to address the unique challenges posed by AI-enabled products and services.

v. Contractual Implications of AI Utilisation in Trade: Challenges and Considerations

Where AI is used in trade, a contractual relationship may exist between the person deploying the AI system and the person operating the system (for example, a contract for the supply of AI-enabled goods) or between the person operating the AI system and an affected person (for example, a utilisation agreement for the supply of AI-enabled services). In both of these cases, machine learning and big data can present hardship in applying existing contract law rules, particularly with regard to establishing the presence of breach of contract and establishing causation of harm. Lack of information about the algorithm running an AI system and the data processed may make it tough for a party claiming breach to establish a correlation between the inputs and outputs of the system.[25]For example, in the case of the terms of use agreements, the difficulty may be in establishing whether the party providing the AI-enabled service has performed what it undertook to perform according to the terms of the agreement (for example, to support a claim of system malfunction or defective programming).

Lack of information may also make it hard for the party to establish that the breach was the cause of harm for the purposes of establishing liability in contract. For example, in the case of the contract for the sale of AI-enabled goods, the difficulty may be in establishing whether damage or injury suffered was caused by the operation of the AI system itself, as opposed to the quality of the data processed by the AI system that is attributable to a third party (or indeed the party claiming breach). These difficulties have the potential to shift the balance between contracting parties in the traditional sale context by putting the seller or supplier in a stronger position alongside the purchaser.[26]

vi. Challenges in Tort Law: Establishing Liability for Harm Caused by AI Algorithms

Legal issues also arise in the law of Tort because hard as it is to prove that some hardware defect was the reason someone was injured, for

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[24] Legal Issues Related to the Digital Economy – Artificial Intelligence *Supra* at 13.
[25] *Ibid*
[26] *Ibid*

example, it becomes very difficult to establish that the cause of harm was some flawed algorithm. It is even harder if the algorithm suspected of causing harm has been developed or modified by some AI system fuelled by machine learning and deep learning techniques, on the basis of multiple external data collected since the start of its operation.[27]Nonetheless, Lord Sales is of the opinion that while these difficulties may not be insurmountable, they may add to the cost and time of dispute resolution.[28] Similarly, many legal issues regarding the development and utilisation of AI-based software, including how to deal with the relationship of rights and who bears liability that might arise in connection to that development and utilisation, remain unclarified because these are novel issues, and existing legislation is insufficient. In light of these circumstances, there is a pressing need to determine the relationship of rights, attribution of liability, and other similar issues that arise when parties execute contracts.[29]

vii. Data Privacy and Security Concerns

AI systems rely on vast amounts of data to learn and make predictions, raising concerns about data privacy and security. Consumers may worry about how their data is collected, stored, and used by AI algorithms, leading to potential privacy violations or data breaches if proper safeguards are not in place.[30]Thus, e-commerce companies must ensure compliance with data protection regulations, such as the Nigerian Data Protection Act 2023, the Nigerian Data Protection Regulations 2019, and in other jurisdictions, the General Data Protection Regulation 2018 and the California Consumer Privacy Act 2018, to protect customer data from unauthorised access, misuse, and breaches.

4. Non- Legal Issues in the Use of AI in E-commerce

Non legal issues may also arise from the use of AI in e-commerce. Some of which include.

i. Algorithmic Bias and Discrimination

AI algorithms may inadvertently perpetuate biases present in training data, resulting in discriminatory outcomes for certain groups of

[27] The EU Expert Group on Liability and New Technologies. Liability for artificial intelligence and other emerging digital technologies. November 27 2019. https://op.europa.eu/en/publication-detail/-/publication/1c5e30be-1197-11ea-8c1f-01aa75ed71a1/language-en (Accessed on May 5 2024).

[28] Lord Sales, "Algorithms, Artificial Intelligence and the Law." Sir Henry Brooke Lecture delivered at the Freshfields Bruckhaus Deringer, London, 12 November 2019, 12 www.supremecourt.uk/docs/speech-191112.pdf (Accessed on May 5, 2024).

[29] Contract Guidelines on Utilisation of AI and Data: AI Section. Japan, Ministry of Economy, Trade and Industry, P.1 June 2018, www.meti.go.jp/press/2019/04/20190404001/20190404001-2.pdf (Accessed on May 11, 2024)

[30] M Hajizadeh, & M Mousakhani, 'The Role of Artificial Intelligence in E-commerce: A Systematic Literature Review and Bibliometric Analysis', 58 Journal of Retailing and Consumer Services 2 (2021), 135.

consumers. For example, biased algorithms may inadvertently discriminate against individuals based on factors such as race, gender, or socioeconomic status, impacting their access to products, services, or opportunities. There may also be discriminatory outcomes in e-commerce processes such as product recommendations, pricing decisions, and customer support interactions.[31]

ii. Loss of Human Interaction

AI-powered automation in e-commerce, such as chatbots and virtual assistants, may reduce the level of human interaction and personalised customer service. While AI can enhance efficiency and scalability, it may also lead to a loss of empathy and emotional connection with customers, particularly in sensitive or complex situations.[32]

iii. Dependency on Technology and Infrastructure

E-commerce companies that rely heavily on AI technologies may become overly dependent on technology and infrastructure, making them vulnerable to disruptions, failures, and technical glitches. Downtime or malfunctions in AI systems can disrupt business operations, affect consumer satisfaction, and lead to financial losses.[33]

iv. Fair Pricing and Competition

AI-powered dynamic pricing algorithms can adjust product prices based on factors such as demand, competitor pricing, and market conditions. While dynamic pricing can benefit consumers by offering competitive prices, it may also lead to price discrimination or unfair pricing practices if not regulated properly. Consumers may perceive such practices as unfair or exploitative, leading to concerns about market manipulation or anticompetitive behaviour.

v. Transparency and Accountability

AI-driven decision-making processes can lack transparency, making it challenging for consumers to understand how algorithms arrive at their recommendations or decisions. This lack of transparency can undermine consumer trust and confidence in AI-powered e-commerce systems.[34]

In as much as artificial intelligence offers opportunities to enhance consumer experiences and streamline commercial and e-commerce processes, it also poses several challenges as seen above. As such, E-commerce companies must prioritise consumer protection principles, implement robust safeguards, engage in responsible AI practices to build trust and confidence among consumers and regulatory authorities alike,

[31] T Davenport, & R Ronanki, 'Artificial Intelligence for the Real World', 96 Harvard Business Review 1(2018), 116.
[32] G Gheorghe, & E Vătămănescu, 'Big Data and Artificial Intelligence: New Trends in E-commerce'. In Proceedings of the 4th International Conference on New Challenges in Management and Business, (2023), 54.
[33] P Seetharaman, & A Kumar, 'A Study on Impact of Artificial Intelligence on E-commerce Industry'. 7 Journal of Critical Reviews 9 (2020), 892.
[34] *Ibid*

and regulations in the developing field of AI that pertains to contracts and e-commerce should be enacted.

5. Conclusion and Recommendation

This work has examined artificial intelligence in the context of contracts and electronic commerce. Some of the key legal issues identified include the attribution of legal personality to AI systems, intent determination during negotiations, and the interpretation of coded contracts. These challenges underscore the need for innovative legal solutions and regulatory interventions to ensure clarity, fairness, and accountability in AI-driven transactions. Moreover, tort law complexities arise in establishing liability for harm caused by AI algorithms, necessitating comprehensive legal frameworks to address emerging risks and uncertainties. Non-legal concerns, such as algorithmic bias, loss of human interaction, and data privacy, underscore the importance of responsible AI practices and regulatory compliance in e-commerce ecosystems.

This work recommends regulatory intervention, in that, legislative bodies should enact comprehensive regulations tailored to address the unique legal and ethical implications of AI in contracts and e-commerce. These regulations should promote transparency, accountability, and fairness while fostering innovation and competitiveness.

In addition, stakeholders in the AI ecosystem, including businesses, policymakers, and academics, should collaborate to develop ethical guidelines and best practices for AI deployment in contracts and e-commerce. These guidelines should prioritise consumer protection, privacy rights, and algorithmic fairness. Also, courts and legal institutions should provide clear guidance on issues such as the attribution of legal personality to AI systems, intent determination in automated negotiations, and liability for AI-generated harm. Case law and precedents should evolve to accommodate the complexities of AI-driven transactions.

Given the global nature of e-commerce and AI development, international collaboration and harmonisation efforts are essential to ensure consistency and interoperability in regulatory frameworks. Multilateral initiatives should aim to address cross-border legal challenges and promote a cohesive approach to AI governance.

By embracing these recommendations, stakeholders can harness the transformative potential of AI while mitigating risks and safeguarding the interests of consumers, businesses, and society at large. Effective regulation, ethical guidance, and collaborative efforts are essential to foster trust, innovation, and responsible AI adoption in contracts and e-commerce.

Exploring Artificial Intelligence (AI), Data Protection, And Digital Rights in Nigeria's Regulatory Framework and Global Standard

Edidiong Otong[*]

Abstract:
Nigeria's growing use of artificial intelligence (AI) has sparked worries about digital rights and data protection. With parallels to the tech bubble of the late 1990s and early 2000s, artificial intelligence's (AI) explosive growth has emerged as a major influence on contemporary culture. This paper examines how AI, data protection, and digital rights interact in Nigeria and emphasises the need for legislative frameworks to handle these problems. In particular, it assesses how well Nigeria's Data Protection Act 2023 addresses the particular difficulties AI presents. Important regulatory gaps, the difference between AI and robotics, and the significance of giving AI systems legal personhood are all further highlighted in this study. Policymakers are advised to fortify regulatory frameworks so Nigeria can fully utilise the fast advancement of artificial intelligence technologies.

Keywords: *Artificial Intelligence (AI), Data Protection, Digital Rights, Algorithmic Bias; Ethical AI Development; Transparency in AI; AI Regulatory Frameworks*

1. Introduction

Similar to the technological boom of earlier decades, the fast expansion of AI has changed sectors all around the world. AI has transformed from a specialised technology to a widely used instrument, spurring innovation in various industries, including healthcare, finance, and the military. With large expenditures in both research and real-world applications, such as cybersecurity, data analytics, and autonomous systems, the adoption of AI is growing in Nigeria, especially in the telecom and financial services industries, where it is used to improve operational effectiveness and service delivery.[1]

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[1] Ebenibo, Lionel, Joy Onma Enyejo, George Addo, and Toyosi Motilola Olola. "Evaluating the Sufficiency of the data protection act 2023 in the age of Artificial Intelligence (AI): A

Nigeria's regulatory system, on the other hand, is outdated and has sparked worries about ethical issues and data protection. AI's worldwide effects highlight the need for strong, flexible regulatory frameworks to reduce risks and promote innovation.[2]AI has grown unparalleled, profoundly influencing many aspects of contemporary life. The technology has infiltrated sectors ranging from education and defence to healthcare and finance because to its capacity to replicate human cognitive processes. AI-driven developments like autonomous systems and machine learning algorithms are changing decision-making processes, improving workflows, and increasing efficiency[3].

Controlling AI's development is becoming more and more important as it continues to transform sectors. AI has an influence on data privacy, security, and decision-making in the digital era, posing unavoidable ethical and legal issues.[4]Particularly in sectors like healthcare, banking, and law enforcement, unregulated AI may result in abuse, prejudice, and the violation of individual rights. Nigeria needs a more extensive legislative framework to handle the ethical and social dangers presented by AI technologies, even if the country is making progress in adopting these technologies. Efficient regulation guarantees the proper use of AI, promoting creativity while preserving human rights and guaranteeing responsibility. The growing dependence on AI highlights the pressing need for strong legal frameworks to handle its moral and practical ramifications.[5]

Thus, to provide an overview of the potential difficulties and privacy risks related to personal data processing and digital rights during the design and operation phases of AI systems in Nigeria, this article examines how these tools address concerns regarding personal data processing throughout the life cycles of AI systems – development and deployment. Additionally, it suggests strategies to close the gaps.

2. Definition of Artificial Intelligence

Adopting a uniform definition of artificial intelligence (AI) has been difficult, as it has been for several other technical ideas. This is particularly true given the diverse viewpoints of the numerous stakeholders. Furthermore, several technologies function automatically and display certain facets of human intellect, which are characteristics of artificial intelligence technology. It follows that no universally accepted definition of artificial intelligence encompasses the wide range of technologies that fall under this umbrella.

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comparative case study of Nigeria and the USA." *International Journal of Scholarly Research and Reviews,* [2024] 05 (01) 088 107.

[2] Russell, Stuart J., and Peter Norvig, 'Artificial intelligence: a modern approach'. (Pearson, 2016).

[3] Ibid

[4] Ibid

[5] Ibid

One may offer many definitions to illustrate this variety. The OECD, for instance, describes an AI system as a machine-based system that may impact the environment by generating an output (decisions, suggestions, or forecasts) for a certain set of goals. It:
(i) perceives actual and/or virtual environments using data and inputs based on humans and/or machines;
(ii) abstracts these perceptions into models via analysis, either manually or automatically (e.g., using machine learning); and
(iii) employs model inference to develop possibilities for outcomes. AI systems may function with different degrees of autonomy.[6]

Although this description makes an effort to include some aspects of AI, it compromises on conciseness. Other entities have chosen a shorter definition to prevent this. For example, an AI system is "an engineered system that generates outputs such as content, forecasts, recommendations, or decisions for a given set of human-defined objectives," according to the International Organisation for Standards (ISO).[7]The effort to define AI has also included contributions from academics.[8]As the father of artificial intelligence, McCarthy describes AI as "the science and engineering of making intelligent machines, especially intelligent computer programs, related to the similar task of using computers to understand human intelligence, but AI does not have to confine itself to methods that are biologically observable."[9]

There have been a few initiatives in Nigeria to define AI at the policy level. AI, for instance, is defined as "the creation of intelligent objects that work and react like humans to carry out certain tasks meant for intelligent beings without human intervention" in the NITDA's proposed national data plan.[10]This NITDA concept is intriguing since it implies that AI systems

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6 OECD 'OECD AI principles overview', https://oecd.ai/en/ai-principles (accessed 6 February 2025). The revised draft of the proposed EU's AI Act also defines AI in similar terms as 'a system that is designed to operate with elements of autonomy and that, based on machine and/or human-provided data and inputs, infers how to achieve a given set of objectives using machine learning and/or logic- and knowledge-based approaches, and produces system-generated outputs such as content (generative AI systems), predictions, recommendations or decisions, influencing the environments with which the AI system interacts' (n 11) art 3.

7 International Organisation for Standardisation 'ISO/IEC 22989:2022 information technology – artificial intelligence – artificial intelligence concepts and terminology', https://www.iso.org/standard/74296.html (accessed 5 Feb. 2025).

8 D Eke and others (eds) Responsible AI in Africa: Challenges and opportunities (2023); K Bala and others 'Artificial-intelligence-based models coupled with correspondence analysis visualisation on ART – Cases from Gombe State, Nigeria: A comparative study' (2023) 13 Life 715.

9 J McCarthy 'What is AI/AI basics', http://jmc.stanford.edu/artificial-intelligence/what-is-ai/index.html (accessed 5 February 2025).

10 NITDA 'National data strategy draft' 2022, https://nitda.gov.ng/wp-content/uploads/2022/11/Final-Draft-National-Data-Strategy.pdf (accessed 30 March 2023).

don't need human interaction, which isn't always the case.[11]Although the aforementioned definitions cover some aspects of artificial intelligence, they also reinforce the fact that stakeholders have varying opinions about the concept, making it difficult to give it a single meaning. This suggests that, given AI's complexity and the various technologies (such as robotics, automation, and machine learning) that surround it, a practical approach to contextualising AI is perhaps necessary. Harmonising the several meanings is not the main goal of this paper. However, it recommends defining AI contextually to avoid using conceptual concepts that are too complicated for the average human to grasp. AI systems might thus be seen as intelligent machines created to "think" and "act" like people in a variety of situations with differing degrees of human involvement.[12]In this way, the system's intended function helps contextualise AI.[13]

3. Historical Background of AI on Data Protection and Digital Rights

The idea of data privacy has a long history and has developed in tandem with cultural customs, social conventions, and technical breakthroughs. The foundation for early ideas of privacy was laid by ancient societies like the Greeks and Romans, who prized individual liberty and solitude. But it wasn't until the Enlightenment that the idea of privacy started to be incorporated into laws, as intellectuals and thinkers like Jeremy Bentham and John Locke defended it as an essential component of personal freedom.[14]Governments and businesses began collecting and monitoring more data as a result of the 19th and 20th centuries' industrialisation and bureaucratic growth. Early data protection regulations were developed in response to concerns about the abuse of personal information and the need to safeguard individual privacy. One of the first instances is the 1890 Harvard Law Review essay by Samuel Warren and Louis Brandeis, which provided the framework for the present right to privacy in the United States. Later legislative initiatives, such as the European Convention on Human Rights in 1950 and the U.S. Fair Credit Reporting Act of 1970, strengthened the legal acceptance of data protection concepts and privacy rights.[15]

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[11] There are many instances where AI systems require human input and intervention. See P Samuelson 'AI authorship?' (2020) 63 Communications of the ACM 22.

[12] See Society of Automobile Engineers 'SAE international releases updated visual chart for its 'levels of driving automation' standard for self-driving vehicles' 11 December 2018, https://www.sae.org/news/press-room/2018/12/sae-internationalreleases-updated-visual-chart-for-its-%E2%80%9Clevels-of-driving-automation%E2%80%9D-standard-for-self-drivingvehicles (accessed 5 February 2025)

[13] See B Marr 'What is the difference between weak (narrow) and strong (general) artificial intelligence (AI)' 21 July 2021, https://bernardmarr.com/what-is-the-difference-between-weak-narrow-and-strong-general-artificial-intelligence-ai/ (accessed 5 February 2025)

[14] John Babikian, "Securing Rights: Legal Frameworks for Privacy and Data Protection in the Digital Era." *Law Research Journal* 1, no. 2 (2023): 91-101.

[15] Ibid

The second part of the 20th century saw a profusion of privacy laws and regulations, fuelled by concerns about government monitoring, consumer rights, and technical advancement. Important turning points in the evolution of privacy and data protection laws were the creation of regulatory agencies like the U.S. Federal Trade Commission (FTC) and the passage of historic laws like the European Union Data Protection Directive of 1995 and the U.S. Privacy Act of 1974.[16]In an increasingly digitalised world, these legislative initiatives established guidelines for the gathering, use, and disclosure of personal data, laying the foundation for contemporary data protection laws.

New privacy and data protection issues arose with the introduction of the internet and the globalisation of information sharing. In response, regional blocs and international organisations started to standardise data protection rules and practices to preserve individual privacy rights while facilitating cross-border data flows. Initiatives like the General Data Protection Regulation (GDPR) of the European Union in 2018 and the Organisation for Economic Co-operation and Development's (OECD) Privacy Guidelines in 1980 are examples of coordinated attempts to create universal standards and guidelines for data protection.[17]Even while privacy rights and data protection legislation have advanced significantly, many issues in the digital era remain. Artificial intelligence, big data proliferation, and rapid technology breakthroughs provide new privacy and data protection problems. Furthermore, issues like algorithmic bias, surveillance capitalism, and the monetisation of personal data highlight the need for ongoing attention to detail and innovation in the field of privacy legislation and policy.[18]

4. The Impact of AI on data protection and digital rights in Nigeria

Several Nigerians are incorporating AI-based technology into their daily lives more and more, and it is important to think about how these technologies may affect Nigerians' fundamental rights. The application of AI has the potential to either strengthen or weaken Nigerian human rights safeguards in some ways, starting with the original design and continuing through the sale of the technology to Nigerians (if relevant) and its eventual end usage. The Nigerian constitution's Section 18(2) lays out the government's policy orientation for advancing science and technology.[19]

Many nations, both regionally and globally, have AI as one of their top policy priorities. This is due to several state programs that emphasise the use of AI applications for economic growth and development. Nigeria has shown that it is prepared to establish a framework for the study, development, use, coordination, and regulation of AI systems as a tool in

[16] Ibid
[17] Ibid
[18] Ibid
[19] Constitution of the Federal Republic of Nigeria, 1999, as amended.

the country's transformation agenda in the areas of economic growth, job creation, and government transparency, among other things.[20]

The Nigerian government and other pertinent stakeholders should carefully consider how to develop a national AI policy that will support an AI economy that upholds standards like algorithmic accountability, data protection, explainability of machine-learning model decision-making, and the protection of citizens' human rights from violations, among other things. This AI policy's formation necessitates knowledge of how AI and related technological advancements can meet Nigeria's national objectives and assist in resolving a wide range of regional issues, from healthcare to food security. Given its large youth population, Nigeria needs a policy that will both control the risk of future job displacement and, on the other hand, provide guidance on how young people might engage in the emerging AI economy.

Indisputably, AI will affect business dealings, how businesses manufacture, how consumers consume, and how the Nigerian government provides services to its populace. The COVID-19 pandemic has brought attention to Nigeria's reliance on digital networks and technologies for judicial, educational, cultural, health, and commercial activities. For instance, some judges had to use speech-to-text transcription during Zoom court meetings just in the last 12 months.[21]In a broader sense, the Federal Ministry of Aviation in Nigeria purchased two AI-enabled robots to enhance passenger safety.[22]The robots are in charge of passenger identification and screening.[23]The abrupt use of AI and other digital technologies has also led to new risks for the commercialisation or exploitation of Nigerians' data.[24]

Relevant policy considerations are therefore necessary to address issues of algorithmic unfairness, privacy loss, lack of transparency, and the general difficulty of persuading Nigerians to comprehend and trust AI. Given the significant stakes, it is imperative that a rights-respecting AI

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[20] Emma Okonji, "Enhancing Government Service Delivery with Technology" *Thisday Nigerian Newspaper* (14 October 2021) https://www.thisdaylive.com/index.php/2021/10/14/enhancing-government-service-delivery-with-technology/ Accessed 5 Feb. 25

[21] Deji Elumoye, "Osinbajo: Judiciary Needs to Embrace Technology, Innovation" *Thisday Nigerian Newspaper* (27 July 2021) < https://www.newsheadlines.com.ng/thisday-newspapers-headlines-news-today/2021/07/27/osinbajo-judiciary-needs-to-embrace-technology-innovation />\ Accessed 5 Feb. 25

[22] Kunle Adebajo, "Abuja Airport Deploys AI Robots To Scan Passengers, Take Body Temperature", (28 June 2020), online: *HumAngle Magazine* <https://humangle.ng/abuja-airport-deploys-ai-robots-to-scan-passengers-take-body-temperature/> Accessed 5 Feb. 25

[23] Kelvin Osa-Okunbor, "Deploying identity management for air travel - *The Nation Nigeria News*", (July 29 2020), online: Latest Nigeria News, Nigerian News-papers, Politics <https://thenationonlineng.net/deploying-identity-management-for-air-travel/> Accessed 5 Feb. 25

[24] (e.g., to spread misinformation and disinformation and create societal divides).

policy be developed in order to meet the socioeconomic requirements and expectations of the Nigerian people while also giving Nigeria's democratic ideals and constitutional provisions top priority. A rights-respecting AI policy that encourages the appropriate and creative use of data can spur significant action from policymakers and establish a robust AI ecosystem

that is focused from the outset on the defence and enhancement of Nigerians' human rights.[25]

5. The current regulatory gaps and challenges in fully implementing AI into Data Protection and Digital Rights in Nigeria

Leading the front in the debate for an AI regulatory framework has been the National Information Technology Development Agency.[26]By providing a legal framework for data processing—essential for AI systems that depend on massive datasets—the March 2020 publication of NITDA's rules for handling personal data indirectly influenced AI. November of the same year saw the establishment of the National Centre for Artificial Intelligence and Robotics[27]. The Nigerian government made a major commitment with this project to use AI as a key element of its plan for the digital economy. The NCAIR's mission was to support AI-related research, innovation, and policy formation while laying the groundwork for later regulatory initiatives. To establish a systematic method of AI governance, NITDA started soliciting input from stakeholders for a National Artificial Intelligence Policy in 2022.[28]

NITDA finished the initial draft of this policy by March 2023, to provide a thorough framework for the research and use of AI in various industries. It underlined the need for data security, ethical concerns, and conformity to global best practices in addition to coordinating AI use with national democratic and human rights ideals. Nigeria released its first National Artificial Intelligence Strategy in August 2024. The National Centre for Artificial Intelligence and Robotics[29], the Federal Ministry of Communications, Innovation, and Digital Economy[30], and NITDA worked together to design the strategy. Among other areas, this policy seeks to use AI for national growth in the fields of education, healthcare, and agriculture. In addition to an expert group to advise on the ethical ramifications of AI and inclusion across many social segments, it advocates for the development of infrastructure.

Despite these developments, the NAIS is still in draft shape and, although it seems to be a positive step, it still needs financing sources,

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[25] Jake Effoduh Okechukwu. "Towards A rights-respecting artificial intelligence policy for Nigeria." *Paradigm Initiative (November 2021). <https://paradigmhq. org/wp-content/uploads/2021/11/Towards-A-Rights-Respecting-Artificial-Intelligence-Policy-for-Nigeria.pdf* > Accessed 5 February 2025.

[26] *National Information Technology Development Agency (NITDA) Act 2007*

[27] National Centre for Artificial Intelligence and Robotics

[28] National Artificial Intelligence Policy 2022

[29] Ibid, 28

[30] Federal Ministry of Communications, Innovation, and Digital Economy

comprehensive implementation schedules, and a solid basis of current AI rules. Existing legal frameworks have an indirect influence on the use of AI, but there are currently no laws in Nigeria that specifically control it. The Nigeria Data Protection Act[31], for example, provides a fundamental legislative framework for data protection, which is essential for any AI system handling personal information. According to the NDPA, data subjects now have the right to challenge decisions that are made only based on the automated processing of their data without human involvement if such decisions significantly affect their legal status or other aspects of their lives. Furthermore, some industry-specific laws control the use of AI in sectors including banking and telecom services. Additionally, the Security and Exchange Commission (SEC) Rules on Robo-Advisory Services govern financial services that may use AI technology, and the Nigerian Communication Commission Act[32]oversees telecommunication services that may use AI technologies.

In the fight to provide a thorough framework for AI governance in Nigeria, NITDA is also actively participating. To improve operational effectiveness, it promotes using AI in national security frameworks. This strategy is in line with NITDA's Strategic Roadmap and Action Plan (SRAP 2.0), which places a high priority on strategic alliances to use technology breakthroughs for the benefit of the country.[33]The organisation places a strong emphasis on cooperation across different industries, especially the communication and information sectors. As part of its efforts to promote ethical AI research, NITDA established the National Centre for Artificial Intelligence and Robotics (NCAIR). To ensure that advancements in AI projects are in line with human rights principles and social values, the agency is forming an AI Ethics Expert Group, as stated in the NAIS. Furthermore, in 2023, NITDA said that they had begun and were in the process of creating a Code of Practice for AI, which would provide guidelines for the appropriate use of ChatGPT and other AI technologies. To effectively manage AI technologies in Nigeria, NITDA's involvement in AI regulation includes developing policies, encouraging cross-sector partnerships, encouraging moral behaviour, and incorporating pre-existing legal frameworks. By these initiatives, NITDA hopes to protect the public interest while establishing Nigeria as a pioneer in moral AI innovation.[34]

Thankfully, in recognition of worldwide developments in this field, the Nigerian National Assembly has also stated plans to create thorough legislative frameworks controlling the usage of AI. Rt. Hon. Tajudeen Abbas, Speaker of the House of Representatives, has promised that the 10th

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[31] Nigeria Data Protection Act 2023

[32] Nigerian Communication Commission Act 2023

[33] Obidimma, Emmanuel Oc, and Richard Onyekachi Ishiguzo. "Artificial Intelligence and Cybercrime Investigation in Nigeria: Addressing the Legal And Technical Skills Gaps." *African Journal of Criminal Law And Jurisprudence* 8 (2023).

[34] Ibid

National Assembly would create a legislative framework to control the nation's adoption of artificial intelligence or AI. Abbas made this statement at Monday 2023–2024 matriculation ceremony at the University of Benin (UNIBEN)/National Institute for Legislative and Democratic Studies (NILDS) in Abuja.[35]We expect the National Assembly to quickly draft legislation governing Nigeria's use of artificial intelligence. To help legal practitioners embrace AI technology, the Nigerian Bar Association's Section on Legal Practice Technology and Law Committee has proactively developed such guidelines.[36]

6. Case studies and examples illustrating the intersections between AI, data protection, and digital rights

Among the many instances of artificial intelligence (AI) being used in the content generation process are news articles, scholarly papers, social media postings, images, and even chatbot talks. The possibility that artificial intelligence (AI) would either duplicate or replace human conduct has raised concerns as the technology develops and finds a wide range of uses in various fields and industries. As a result, numerous legal bodies and scholars are beginning to consider the potential effects of AI on society and the law.[37]These technologies are currently causing problems for many areas of law.[38]However, we shall particularly address the potential effects of AI-generated works on intellectual property law in this article, with a focus on copyright law. With a particular focus on the ChatGPT case study, we will quickly examine some of the copyright concerns associated with the use of AI systems that detect and produce text, known as large language models (LLMs).[39]As a widely used and well-known example of AI content creation, ChatGPT offers a useful prism through which to view some of the core copyright issues at the heart of this quickly expanding industry.

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[35] National Assembly Moves to Establish Legal Framework for Artificial Intelligence in Nigeria, April 25th, 2024. Retrieved online from https://nilds.gov.ng/national-assembly-moves-to-establish-legal-framework-for-artificial-intelligence-in-nigeria. Accessed 6 February 2025

[36] *Guidelines For the Use of Artificial Intelligence in the Legal Profession in Nigeria*, The Nigerian Bar Association - Section on Legal Practice Technology and Law Committee, April 2024.

[37] See N Helberger and N Diakopoulos, "ChatGPT and the AI Act" (2023) 12 Internet Policy Review 10.14763/2023.1.1682.

[38] See Garante per la Protezione dei Dati Personali, "Intelligenza artificiale: il Garante blocca ChatGPT. Raccolta illecita di dati personali. Assenza di sistemi per la verifica dell'età dei minori" (31 March 2023), <https://www. garanteprivacy.it/home/docweb/-/docweb-display/docweb/9870847> (last accessed 10 February 2025).

[39] See, eg, Y Goldberg, Neural Network Methods for Natural Language Processing (Cham, Springer 2017) p 105; P Henderson et al, "Ethical Challenges in Data-Driven Dialogue Systems" (2018) Proceedings of the 2018 AAAI/ ACM Conference on AI, Ethics, and Society 123; CD Manning et al, An Introduction to Information Retrieval (Cambridge, Cambridge University Press 2008) p 238.

OpenAI, a San Francisco-based artificial intelligence company[40], developed the language model known as ChatGPT, which can produce natural language responses to a range of questions. For problems involving natural language processing, an LLM is a very successful kind of machine learning procedure. Its primary focus is language modelling, which is the process of developing probabilistic models that, given the words that come before them, can correctly anticipate the next word in a given sequence.[41] By exposing the model to vast volumes of textual data, it is able to learn the likelihood of word occurrences as well as patterns in language usage. Language modelling is a crucial part of contemporary natural language processing applications since it aims to build a system that can reliably produce human-like replies and recognise natural language input.[42]

It is crucial to emphasise that the language modelling assignment cannot inevitably result in the acquisition of meaning because it only uses form as training input. Thus, the ability to "agere sine intelligere," or act without fully comprehending the consequences, is what distinguishes these models.[43]This idea emphasises the intriguing aspect of their method of operation as, despite their limited comprehension of the underlying mechanisms, they are capable of carrying out intricate tasks and generating outcomes that can be surprisingly accurate. This phenomenon calls into question accepted ideas of intelligence since these models can generate remarkable outcomes by combining complex pattern recognition skills, large data sets, and sophisticated algorithms. Their capacity to "agere sine intelligere" exemplifies machine learning's strength and its potential to transform several industries, including image identification and natural language processing. In today's world, introducing language models and other AI content-producing systems has been nothing short of revolutionary. Within seconds, these computers can produce material on any subject, language, and format. These technologies have a huge influence, and they have raised many ethical and legal questions that require investigation, particularly from the standpoint of copyright.[44]

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[40] A. Radford, K. Narasimhan, T. Salimans, I. Sutskever, Improving Language understanding by generative pre-training Homol. Homotopy Appl., 9 (1) (2018), pp. 399-438
<https://www.cs.ubc.ca/~amuham01/LING530/papers/radford2018improving.pdfGoogle Scholar> (last accessed 10 February 2025).

[41] See EM Bender and A Koller, "Climbing towards NLU: On Meaning, Form, and Understanding in the Age of Data" in Proceedings of the 58th Annual Meeting of the Association for Computational Linguistics (Association for Computational Linguistics, Online, 2020) pp 5185–98 (defining the term "language model" as any system trained only on the task of string prediction, whether it operates over characters, words or sentences and sequentially or not).

[42] Ibid

[43] L Floridi, "AI as Agency without Intelligence: on Chat GPT, Large Language Models and Other Generative models" (2023) 36 Philosophy & Technology 1, 6

[44] See, eg, R Abbot, The Reasonable Robot (Cambridge, Cambridge University Press 2020)

The potential protection of an AI-generated "creative" work under copyright or other comparable intellectual property (hence referred to as "the output") has been a major topic of discussion in the current legal dispute around generative AI and copyright.[45]But it's crucial to understand that using copyrighted material—here referred to as "the input"—to train and create AI systems also raises serious copyright concerns. Indeed, to produce high-quality outputs, AI systems need enormous amounts of training data, many of which contain copyrighted content.[46]This raises questions concerning fair use and derivative works, as well as whether and how such data may be gathered and used legally. Furthermore, it is imperative to address the copyright issues that arise from the training of AI models as these systems become more common and essential in our daily lives. This entails creating derivative works from protected sources, frequently involving data manipulation or change to improve their usefulness for teaching. There have been multiple lawsuits against the developers of generative AI systems, such ChatGPT, alleging copyright infringement as a result of the recent escalation in the legal debate around AI.[47]These legal actions give rise to justifiable worries over the illegal use of copyrighted content to produce original creative works. Given these difficulties, addressing the copyright issues related to AI requires a thorough and integrated strategy that takes into account both the inputs and outputs of AI systems. To perhaps propose legislation that promotes the ethical and responsible use of AI training data while safeguarding intellectual property rights, this inquiry will also look deeper into the policy justifications for taking a free or open-access approach.[48]

7. International frameworks and standards and its influence on Data Protection and Digital Rights in Nigeria

Over the past 20 years, Nigeria has been developing and implementing important institutional policies and regulatory frameworks to promote innovations and the broad use of ICTs by enterprises, local and global communities, and public and private institutions.[49] ICT infrastructure provision for smooth connections and effective operations of all Nigerian economic sectors is anchored by the communications

[45] Bonadio and L McDonagh, "Artificial Intelligence as Producer and Consumer of Copyright Works: Evaluating the Consequences of Algorithmic Creativity" (2020) 2 Intellectual Property Quarterly 112

[46] Ibid

[47] See, eg, Getty Images (US), Inc. v. Stability AI, Inc., No. 1:23-cv-00135-GBW (D. Del. Mar. 29, 2023)

[48] See, eg, European Parliament, Resolution on a comprehensive European industrial policy on artificial intelligence and robotics, (2018/2088 (INI)), 12 February 2019

[49] Martha Onyeajuwa Kanene. "Critical Assessment of Institutional and Regulatory Frameworks for Personal Data Protection in Digital Platform ecosystem: a study of Nigeria" (22nd Biennial Conference of the International Telecommunications Society (ITS): "Beyond the Boundaries: Challenges for Business, Policy and Society", Seoul, Korea, 24th-27th June, 2018)

industry. Four digital mobile network operators were licensed by the Nigerian Communications Commission (Commission) in 2001. As of April 2018, their market shares are as follows: MTN (41%), GLOBACOM (25%), Airtel (24%), and 9mobile (10%).

The National Broadband Policy Implementation Strategy and the Open Access Next Generation Broadband Network model were introduced by the Federal Government of Nigeria (FGN) in 2013 to facilitate the efficient nationwide deployment of broadband.[50]These initiatives allow for an inclusive, equitable, and transparent licensing process and provide incentives to both current and prospective investors without discrimination. Impressive rise in Internet users is being produced by this method. There were 101.2 million Internet users overall in April 2018.[51]

The digital environment is preceded by the Internet, which allows for real-time operations. Therefore, broadband penetration in developing nations like Nigeria increases the accessibility of ICT services and makes it easier for the unserved, underserved, unbanked, and underbanked segments of the population to have internet access. This allows them to take advantage of Digital Financial Services (DFS) and subsequently engage in the expanding digital ecosystem.[52]As seen globally, digital technology is still influencing many aspects of our lives, including behaviour, needs, opinions, knowledge sharing, choices, and more. These factors affect market structure and the Nigerian economy.

Notwithstanding the rhetoric about these advantages, platform business models appear to serve the dual purposes of empowering businesses and upending the sectors in which they are active.[53]Businesses, for example, abuse their position to dominate the ecosystem, control the supply of highly sought-after items, and stifle competition by underpaying employees. Other issues include giving businesses the chance to profit from the loopholes in the current regulations by exploiting consumers' rights by profiting from their data without obtaining their consent, often at little or no risk to them.[54]

Numerous national and international frameworks on consumer privacy and data protection have been prompted by this perceived harm to consumers' well-being. Among the international frameworks are the Asian-Pacific Economic Cooperation (APEC) Privacy Frameworks, the Organisation for Economic Co-operation and Development (OECD), and Convention 108 of the Council of Europe. Internationally recognised

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50 Ibid

51 NCC. (n.d.-a). *Nigerian Communications Commission.* Retrieved from ncc.gov.ng: https://www.ncc.gov.ng/stakeholder/statistics-reports/industry-overview

52 CBN, *Regulatory Framework for Mobile Money, 2012.* Lagos: Federal Govt Press.

53 Srnicek, Nick. "Value, rent and platform capitalism." *Work and labour relations in global platform capitalism*. Edward Elgar Publishing, 2021. 29-45.

54 Ibid

guidelines for online privacy and data protection tactics have been established by these frameworks.[55]

Harmonising policies among its member states has always been a priority for the African Union (AU). The 2014 AU Malabo Convention rules on Cyber Security and Personal Data, however, were only ratified by 15 of the 54 AU countries. The African Union Commission (AUC) and the Internet Society (ISOC) collaborated to create the Privacy and Personal Data Protection Guidelines for Africa, including input from academics, civil society organisations, and regional and international privacy experts. Six data protection principles are identified in Article 13 of the Malabo Convention, which corresponds to the eight principles of the EU General Data Protection Regulation (GDPR).[56]

These eight guidelines are commonly acknowledged to offer "a solid foundation for online privacy policies and practices" and have been implemented in more than 100 countries.[57]These serve as the foundation for rules that have been approved by the Commonwealth, the UN General Assembly, and the European Union's General Data Protection Regulation 2016.[58]The following eight guidelines govern the permissible processing and use of personal data:

i. collection limitation,
ii. data quality,
iii. purpose specification, and
iv. use limitation.
v. Security measures,
vi. Transparency,
vii. Personal involvement,
viii. Responsibility

Since 2016, the EU's General Data Protection Regulation (GDPR) has been making headlines globally. Regardless of the destination of the data, EU individuals are protected by GDPR. Processing done by businesses operating inside the EU is covered. Organisations outside the EU that provide products or services to EU citizens are likewise covered.[59]It implies that any business, wherever it may be located, whose database contains personally identifiable information about EU individuals is subject to the GDPR as of May 25, 2018. Both processors and controllers are subject to particular legal obligations under the GDPR, including obligations if a processor is at fault for a breach. Controllers now have

[55] ISOC, & AUL (2018, May 8). *Personal Data Protection Guidelines for Africa: A jiont initiative of the Internet Society and the Commission of the African Union.* Retrieved from internetsociety.org: https://cdn.prod.internetsociety.org/wp-content/uploads/2018/05/AUCPrivacyGuidelines_2018508_EN.pdf

[56] Ibid

[57] Ibid

[58] Ibid

[59] Ibid

further responsibilities under the GDPR to make sure their agreements with processors adhere to the regulations.[60]

The challenges that have been brought to light by the platform ecosystem appear to point to the necessity of strong institutional and legislative frameworks in order to guarantee sufficient consumer privacy and data protection in Nigeria. Nigerian and African consumer protection practices are still in their infancy, although developed nations have laws on consumer privacy and data protection and are working to strengthen them.[61]

8. Comparative Analysis from other countries, it best practices and lessons learned

Regarding AI research, development, and application worldwide, Canada is in the forefront. According to Dutton[62], it was the first nation to develop a national AI policy paper in 2017. According to Canada 2023[63] and CIFAR 2023[64], the Pan-Canadian Artificial Intelligence Strategy is a framework "designed to proactively identify and mitigate risks to prevent harms and discriminatory outcomes, while acknowledging the unique nature of AI ecosystem and ensuring that research and responsible innovation are supported." Through the development and evaluation of regulations and guidelines in close collaboration with stakeholders on a regular cycle and the adaptation of enforcement to the needs of the changing environment, the Canadian government adopted an agile approach to AI self-regulation "that will not stifle responsible innovation or needlessly single out AI developers, researchers, investors, or entrepreneurs".[65]

Along with the US, UK, and EU, Canada also took part in creating a worldwide Partnership on AI (GPAI) to encourage the global coordination in AI governance policies.[66]The Canadian strategy aims to avoid or lessen the harm caused by AI applications to people by forcing developers and users to adhere to a set of principles that are in line with new international AI governance standards and to enforce compliance with those principles, including consequences for non-compliance. According to Canada[67], these

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[60] Ibid

[61] ITU-TFG, *Commonly identified Consumer Protection themes for Digital Financial Services* (2016), Geneva: ITU.

[62] Tim Dutton, "An overview of national aı strategies." *Erişim Tarihi: Nisan* 16 (2023).

[63] Canada, *The Artificial Intelligence and Data Act (AIDA) – Companion document. 2023.* Ottawa: Government of Canada. Available at: https://ised-isde.canada.ca/site/innovation-better-canada/ en/artificial-intelligence-and-data-act-aida-companion-document. (Accessed on 13 February 2025).

[64] IFAR, *The Pan-Canadian AI Strategy*, 2023. Toronto: Canadian Institute for Advanced Research (CIFAR). Available at: https://cifar.ca/ai/. (Accessed 13 January 20234.

[65] Ibid

[66] Ibid

[67] Ibid

values include human supervision and monitoring, openness, equality and justice, safety, accountability, validity, and robustness.

According to Wyden[68], an Algorithmic Accountability Bill was introduced in the US Congress in February 2022, just before the exponential growth of AI in December of the same year. The bill requires businesses to "assess the impacts of the automated systems they use and sell, creates new transparency about when and how automated systems are used, and empowers consumers to make informed choices about the automation of critical decisions." However, the bill was shelved due to a lack of progress in the parliamentary process.

In early 2023, US Senate Majority Leader Schumer declared his plan to present legislation in Congress in the form of a framework with four "guardrail" safeguards to provide transparent, responsible AI and to lessen its misuse and disinformation in a way that allows for the continued development of innovative AI. In addition to safeguarding individuals and society from potential damage, these guidelines address who, where, and how it should be done. To maximise the benefits to society, the framework will limit any negative effects and damage, regulate AI, give knowledge, and match these systems with the nation's basic values. Additionally, the law would mandate that AI technology undergo independent, transparent testing and assessment before its release.[69]

President Biden's announcement of a voluntary "Blueprint for an AI Bill of Rights" in early October 2023 marked the first significant regulatory advancement. The document outlined a flexible, civil rights protection approach to AI.[70]However, it tries to shield individuals "from algorithmic discrimination, privacy intrusion, and other harms"[71] while acknowledging the use of AI for law enforcement monitoring. There was a mixed response to the AI Bill of Rights. Compared to the measures that other governments, particularly in the EU, first explored, some analysts see it as "too little, too late," while others say it is a straightforward, gradual step forward.[72]Governments seem to be reluctant to enact too stringent

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[68] Wyden, R.. *Wyden, Booker and Clarke Introduce Algorithmic Accountability Act of 2022 to Require New Transparency and Accountability for Automated Decision Systems, 2022* Washington, DC: US Senate. Available at: https://www.wyden.senate.gov/news/press-releases/wyden-bookerand-clarke-introduce-algorithmic-accountability-act-of-2022-to-require-new-transparencyand-accountability-for-automated-decision-systems. (Accessed on 13 February 2025).

[69] Schumer, C., *Schumer Launches Major Effort to get ahead of Artificial Intelligence, (2023)* Washington, DC: US Senate. Available at: https://www.democrats.senate.gov/newsroom/press-releases/ schumer-launches-major-effort-to-get-ahead-of-artificial-intelligence. (Accessed on 13 February 2025).

[70] Strickland, E, *The Who, Where, and How of Regulating AI*, (2023) Available at: https://spectrum. ieee.org/ai-regulation-worldwide. (Accessed on 13 February 2025).

[71] Ibid

[72] Atlantic Council, 2023a. *What does Biden's new executive order mean for the future of AI?* Available at: https://www.atlanticcouncil.org/blogs/new-atlanticist/experts-react/experts-react-whatdoes-bidens-new-executive-order-mean-for-the-future-of-ai/. (Accessed on 13 February 2025).

and restrictive regulatory frameworks, however, since this may have a detrimental effect on the world's developing AI economy.[73]The emphasis seems to be on a cautious, experimental method of voluntary self-regulation following certain criteria established by the government, initially, and then becoming more interventionist if those first steps do not provide satisfying results.

To guarantee the safe, secure, and reliable development and use of AI in the United States, the White House issued an Executive Order at the end of October 2023 that outlined a complete strategy. Eight guiding principles and goals for AI governance were outlined by the decree. Safety, security, privacy, equality, civil rights, competitiveness, innovation, and global leadership are some of these. Additionally, the order requires several actions to be taken to track and evaluate how these principles are being applied and enforced. Safety testing and information exchange for the most potent AI systems, the creation of guidelines and instruments for assessing AI, safeguarding against the dangers of utilising AI to create hazardous biological materials, and the advancement of AI research and teaching are some of these tasks.[74]To guarantee that job searchers are aware that their applications would be examined by AI systems that will undergo independent auditing, New York City has also implemented new regulations for companies.[75]This discloses the usage of AI in government operations, hence reducing black box opacity.[76]In the USA, a Framework for AI Risk Management has also been accepted by the National Institute of Standards and Technology (NIST). Approaches that "increase the trustworthiness of AI systems [and] help foster the responsible design, development, deployment, and use of AI systems" are identified by this optional framework.[77]A Digital Platform Commission Act is also being considered by the US Congress in 2023 to supervise the rollout of digital platforms in the country.

On the other hand, the majority of Southeast Asian countries, including the UK, have so far chosen laissez-faire policies by extending

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[73] Friedler Sorelle, Suresh Venkatasubramanian, and Alex Engler. "How California and other states are tackling AI legislation." (2023).

[74] White House. 2023. *Executive Order on the Safe, Secure, and Trustworthy Development and Use of Artificial Intelligence.* Available at: https://www.whitehouse.gov/briefing-room/presidentialactions/2023/10/30/executive-order-on-the-safe-secure-and-trustworthy-development-anduse-of-artificial-intelligence/. (Accessed on 13 February 2025).

[75] Lohr, S,. A Hiring Law Blazes a Path for A.I. Regulation. *New York Times,* 25 May 2023. New York. Available at: https://www.nytimes.com/2023/05/25/technology/ai-hiring-law-new-york.html?utm_source=substack&utm_medium=email. (Accessed on 13 February 2025).

[76] Wheeler, T., *The three challenges of AI regulation.* [2023] Washington DC: Brookings Institution. Available at: https://www.brookings.edu/articles/the-three-challenges-of-ai-regulation/?utm_ campaign=Center. (Accessed on 13 February 2025).

[77] NIST. 2023. *AI risk management framework.* National Institute of Standards and Technology. US Department of Commerce. Available at: https://www.nist.gov/itl/ai-risk-managementframework. (Accessed on 13 January 2024).

current technology laws to include artificial intelligence. To avoid impeding AI research shortly, the UK chose to temporarily halt potential AI legislation.[78]While India chose to pursue a more relaxed strategy with less government involvement, Japan created voluntary rules to control AI.[79] Except for Mainland China and South Korea, which adhere to rather stringent, top-down regulatory compliance measures, most other Southeast Asian nations are pursuing similar business-friendly laissez-faire approaches to AI regulation.[80]The Association of Southeast Asian Nations (ASEAN), which consists of ten countries, was also considering a draft voluntary guide to AI ethics and governance towards the end of 2023.[81]

A thorough examination and evaluation of AI regulation strategies in the Asia-Pacific area was put together by De Loitte.[82]Similar to Western nations, Taiwan[83], Singapore, and Australia encourage voluntary self-regulation, whereas mainland China, South Korea, Vietnam, and the Philippines implement more stringent, legally binding external regulations. Furthermore, certain nations—such as South Korea and Mainland China—are much farther along in the process of adoption and enforcement than others, such as Thailand and the Philippines.[84]

Together with the US government and major international technology businesses, EU authorities began working on a self-regulated voluntary draft AI Code of Conduct for AI corporations in June 2023 to begin the shift to a standardised international approach to regulation.[85] However, the EU passed a specific, legally binding AI Act at the end of

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78 UK. 2021. *National AI Strategy.* London: HM Government. Command Paper 525. Available at: https:// www.gov.uk/government/publications/national-ai-strategy. (Accessed on 13 February 2025).

79 Japan. 2023. *Japan's Approach to AI Regulation and Its Impact on the 2023 G7 Presidency.* Washington, DC: Centre for Strategic and International Studies (CSIS). Available at: https:// www.csis.org/analysis/japans-approach-ai-regulation-and-its-impact-2023-g7-presidency. (Accessed on 13 February 2025).

80 Mapp, M, Regulating Asia's Ai Ecosystem. *Irish Tech News*, 29 September, 2022. Available at: https://irishtechnews.ie/regulating-asias-ai-ecosystem/. (Accessed 13 January 2024).

81 Potkin, F. and Mukerjee, S, Southeast Asia eyes hands-off AI rules, defying EU ambitions. *Reuters*. 11 October 2023. Available at: https://www.reuters.com/technology/southeast-asiaeyes-hands-off-ai-rules-defying-eu-ambitions-2023-10-11/. (Accessed on 13 February 2025).

82 De Loitte., *Generative AI: Application and Regulation in Asia Pacific, [2024]* De Loitte Asia Pacific Centre for Regulatory Strategy. Available at: https://www2.deloitte.com/cn/en/pages/ financial-services/articles/generative-ai-application-and-regulation-in-apac.html. (Accessed 13 February 2025).

83 Taiwan,*Cabinet approves draft guidelines for use of generative AI by Executive Yuan and its subordinate agencies [2024],* AI Taiwan. Available at: https://ai.taiwan.gov.tw/news/cabinet-approvesdraft-guidelines-for-use-of-generative-ai-by-executive-yuan-and-its-subordinate-agencie/. (Accessed on 13 February 2025)

84 Ibid

85 Zubas¸cu, F. 2023. *EU and US hatch transatlantic plan to rein in ChatGPT, [2023].* Available at: https:// sciencebusiness.net/news/AI/eu-and-us-hatch-transatlantic-plan-rein-chatgpt. (Accessed on 13 February 2025)

2023[86]that made AI applications subject to new standards. This might make it more difficult for digital entrepreneurs to start and expand successful AI companies. According to Hazards, the EU AI Act "uses a tiered structure." Unacceptable-risk AI applications would be prohibited, while high-risk uses in industries including banking, the legal system, and medical would be closely monitored. The use of chatbots and other low-risk applications would need disclosures.[87]Risk is based on the intended uses of AI products and more severe systemic hazards are governed more strictly.[88]

Additionally, unlike the US, the EU plans to partially outlaw biometric monitoring, including face recognition software currently used by law enforcement.[89]Non-compliance carries severe consequences. The EU AI Act is "the world's first comprehensive, horizontal and binding AI regulation that will not only be a game-changer in Europe but will likely significantly add to the global momentum to regulate AI across jurisdictions," according to tech regulation expert Anu Bradford, a law professor at Columbia University in New York. It gives the EU a unique opportunity to set the standard and demonstrate to the rest of the world that AI can be controlled and that democratic supervision can be applied to its advancement.[90]According to an evaluation of the EU AI Act published in the MIT Technology Review, it is "one of the world's most important developments in AI regulation"[91]and sets a global standard.[92]While most other experts on the subject concurred, they concluded that the success of the plan would depend on how it was carried out.[93]The AI Act, according

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[86] EU. 2023. *AI Act.* Brussels: European Union. Available at: https://artificialintelligenceact.eu/. (Accessed 13 February 2025).

[87] Ibid

[88] Chan, K, *Europe agreed on world-leading AI rules. How do they work and will they affect people everywhere? [2023]* Available at: https://qz.com/europe-agreed-on-world-leading-ai-ruleshow-do-they-wo-1851089463?utm_source=email&utm_medium=Quartz_Daily_Brief_ Eu%E2%80%A6. (Accessed on 13 January 2024).

[89] Ibid

[90] Ibid

[91] Ryan-Mosley, T, Five big takeaways from Europe's AI Act. *MIT Technology Review*. 19 June 2023. Available at: https://www.technologyreview.com/2023/06/19/1075063/five-big-takeawaysfrom-europes-ai-act/?truid=4dc6f8238273ed16be3a7ba344a01130&u%E2%80%A6. (Accessed on 13 February 2025).

[92] Meaker, M, The EU Just Passed Sweeping New Rules to Regulate AI. *Wired.com,* 8 December 2022. Available at: https://www.wired.com/story/eu-ai-act/?bxid=5bd67bfe3f92a41245df2 d6d&cndid=47097893&esrc=HeaderAndFooter&source=Email_0_EDT_W%E2%80%A6. (Accessed on 13 February 2025).

[93] Atlantic Council. 2023b. *The EU made a deal on AI rules. But can regulators move at the speed of tech?.* Available at: https://www.atlanticcouncil.org/blogs/new-atlanticist/experts-react/expertsreact-the-eu-made-a-deal-on-ai-rules-but-can-regulators-move-at-the-speed-of-tech/?mkt_tok =NjU5LVdaWC0wNzUAAAGQCb%E2%80%A6. (Accessed on 13 February 2025).

to Chee et al.[94], does not go far enough to safeguard digital privacy and human rights, which has angered many powerful advocates for stronger protection of these rights.

However, the EU's 2108 General Data Protection Regulation (GDPR) has already established global norms for digital privacy and protection (EU 2018). For monitoring purposes, the policy governs the gathering and use of data, requiring access and express authorisation.[95] Nonetheless, France, Germany, and Italy are concerned about the Act's too stringent regulations. They choose the "softer" method of self-regulation so as not to impede AI's advancement and its possible benefits for their economy.[96]To better balance the creative development and deployment of AI with the regulation of its potential and actual negative effects, talks were being held in the EU at the time this article was written.[97]

Furthermore, a new artificial intelligence bill including human rights principles and regulations was released by the Brazilian government in May 2023. "The Bill takes a risk-based approach by classifying AI systems into different categories and establishes the creation of a new regulatory body to enforce the law," the bill states. In addition, it establishes a reporting requirement for major security issues and a protective framework of civil responsibility for AI system operators or suppliers.[98]AI procedures must be transparent, and its deployment in certain industries is rigorously controlled and given priority as high-risk applications. Frequent impact assessments "must take into account several factors about the artificial intelligence system, such as foreseeable and known risks, associated benefits, likelihood and gravity of negative outcomes, operational logic, conducted tests and evaluations, mitigation measures, training and awareness, transparency measures for the public,

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94 Chee, F., Coulter, M. and Mukherjee, S, *EU sets global standards with first major AI regulations.[2023]* Davos: WEF. Available at: https://www.weforum.org/agenda/2023/12/europe-landmark-airegulation-deal/. (Accessed on 13 February 2025).

95 Schneider, I, Democratic Governance of Digital Platforms and Artificial Intelligence? Exploring Governance Models of China, the US, the EU and Mexico. *JeDEM.* 12(1):1–24, 2020. Available at: DOI:10.29379/jedem.v12i1.604. (Accessed on 13 February 2025).

96 Satariano, A and Kang, C, 'How Nations Are Losing a Global Race to Tackle A.I.'s Harms'. *New York Times*. 6 December 2023. Available at: https://www.nytimes.com/2023/12/06/technology/ ai-regulation-policies.html?campaign_id=51&emc=edit_mbe_20231207&instance_id=109519&nl=morning-briefing%3A-europe-edition&regi_id=76467660&segment_id=151926&te=1&user_id=4dc6f8238273ed16be3a7ba344a01130. (Accessed on 13 February 2025).

97 Ibid

98 Access Partnership, *Brazil's New AI Bill: A Comprehensive Framework for Ethical and Responsible Use of AI Systems, [2023].* Available at: https://accesspartnership.com/access-alertbrazils-new-ai-bill-a-comprehensive-framework-for-ethical-and-responsible-use-of-aisystems/. (Accessed on 13 February 2025).

and others". AI products must also undergo routine quality control testing under the supervision of an impartial regulatory body.[99]

Whereas, in 2022, China became the first nation to enact complete mandatory regulations for its corporate and civil society sectors to govern artificial intelligence[100]. Three distinct methods are used, as Table 2 summarises. The first is a program designed to lessen the possibility of influencing user attitudes and behaviour. It includes stringent guidelines for confirming the accuracy of data used in AI processes intended for public consumption, transparency in the use of recommendation algorithms, and the option for users to not be included in such algorithms.[101]Focussing on the creation of measurement tools to guarantee the accuracy, reliability, and controllability of AI systems is a second strategy. According to Sheehan[102]and Mapp[103], the third strategy entails requiring role-players in this field to create a self-regulatory system of internal management of the development and application of AI systems. This system will take the form of a three-year roadmap and include a set of ethical principles that the players must adhere to.

Similar to those created by the US, EU, OECD, and UNESCO, these strategies have been converted into top-down, legally binding policies considerably earlier, most likely as a result of China's more straightforward, centralised decision-making process.[104]China has made significant investments in many types of technology capacity development so far, according to Brookings, which may help to explain this all-encompassing approach to technology regulation.[105]Chan[106]claims that "President Xi Jinping has also proposed a Global AI Governance Initiative, calling for an open and fair environment for AI development."

9. A lesson to Nigeria and other African Countries

In terms of modern technology, especially AI capabilities, and governance, African nations often lag much behind the rest of the globe, as previously described.[107]However, there are significant differences across African

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99 Ibid

100 Ibid

101 Ibid

102 Matt Sheehan, *China's New AI Governance Initiatives Shouldn't Be Ignored.* Carnegie Endowment for International Peace [2023]. Available at: https://carnegieendowment.org/2022/01/04/china-s-newai-governance-initiatives-shouldn-t-be-ignored-pub-86127. (Accessed on 13 February 2025).

103 Ibid

104 Ibid

105 Denford, J., Dawson, G. and Desouza, K, *A cluster analysis of national AI strategies.* Washington, DC: Brookings Institution, 13 December 2023. Available at: https://www.brookings.edu/ articles/a-cluster-analysis-of-national-ai-strategies/?utm_campaign=Governance. (Accessed on 13 February 2025).

106 Ibid

107 Wakunuma, K., Ogoh, G., Eke, D. and Akintoye, S. 2022. Responsible AI, SDGs, and AI Governance in Africa. Cunningham, M. and Cunningham, P. (Eds). *IST-Africa 2022*

nations in these characteristics. When it comes to several AI-related challenges, South Africa, Nigeria, Egypt, and Kenya have advanced the most so far (in decreasing order).[108]

In addition to offering several measures "...to maximise the benefits while reducing the risks associated with disruptive technological innovation," Signé[109]reviewed and evaluated the effects of Africa's 4IR on the continent. To acknowledge the many viewpoints and concerns at play, the significance of inclusive dialogues, diversity, and sector-specific risk methods were emphasised.[110]The notion that Western, Eastern, or African exceptionalism necessitates distinct strategies is disproved by the African Union's (AU) Malabo Convention on Cyber Security and Personal Data Protection (AU 2014), which further affirms these parallels. In addition to the need of unified regulation throughout the continent to effectively address technological hazards to data privacy and security, this agreement addresses comparable northern issues of technology regulation, including certain AI features.[111]

Also, it suggests regulations for national and AU data protection and cyber security monitoring bodies to oversee and safeguard data collection, processing, storage, usage, and security as well as e-commerce from an external perspective. Noncompliance will result in fines.[112]For the agreement to be binding, nevertheless, each African nation must ratify it and incorporate it into its domestic laws.[113]The protocol became effective in July 2023 after being approved by 15 AU member nations. Because of worries that it might conflict with its own information and communications technology laws, South Africa has not yet approved it. The 2014 AU convention may be incorporated into member nations' domestic legal systems using the framework provided by the 2022 AU Data Policy Framework. As is the case in the global north, the framework template thus specifically seeks to establish "a consolidated data environment and

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Conference Proceedings. 1–13. IST-Africa Institute. Available at: www.IST-Africa.org/Conference2022. (Accessed on 13 February 2025).

[108] Diplo Foundation, *Stronger digital voices from Africa Building African digital foreign policy and diplomacy*, [2022] Geneva: Diplo Foundation. Available at: https://www.diplomacy.edu/resource/ report-stronger-digital-voices-from-africa/. (Accessed on 13 February 2025).

[109] Signé, L. 2023ba. *The future of the world is intelligent: Insights from the World Economic Forum's AI Governance Summit.* Brookings Commentary, 8 December 2023. Available at: https://www. brookings.edu/articles/the-future-of-the-world-is-intelligent-insights-from-the-world-economicforums-ai-governance-summit/?utm_ca%E2%80%A6. (Accessed on 13 February 2025).

[110] Signé, L. 2023b. *Africa's Fourth Industrial Revolution.* (Cambridge: Cambridge University Press, 2023). Available at: https://www.amazon.com/Africas-Fourth-Industrial-Revolution-Landry/dp/1009200011. (Accessed on 13 February 2025).

[111] AU, *Convention on Cyber Security and Personal Data Protection, [2014]* Addis Ababa: African Union. Available at: https://au.int/en/treaties/african-union-convention-cyber-security-and-personaldata-protection. (Accessed on 13 February 2025).

[112] Ibid

[113] Musoni, M. "Looking into the crystal ball: Artificial intelligence policy and regulation in Africa." *ECDPM Commentary. Maastricht: ECDPM* 18 (2023).

harmonised digital data governance systems to enable the free and secure flow of data across the continent while safeguarding human rights, upholding security, and ensuring equitable access and sharing of benefits".[114]"The broad principles of transparency, accountability of institutions and actors, the inclusion of stakeholders, equity among citizens, and fair competition among market players" also shape the framework.

The framework is guided by the following principles: non-discrimination, representativity, quality and integrity, security, accessibility, interoperability, and trust.[115]18 African nations, however, still lack meaningful data protection legislation.[116]Developed by South Africa, Rwanda, Uganda, and GIZ, a Blueprint for AI in Africa was released in 2021.[117]In line with the African Charter on Human and Peoples' Rights[118], the paper was produced as a resource for the AU to construct a model African AI governance plan for the continent, which would include oversight of AI applications and hazards. This project is continuing. As part of its own domestic 4IR initiative, South Africa directs the creation of this model continental strategy and serves as the lead nation for this purpose.[119]

According to Musoni[120], the most developed African nations that either already have or are creating specific regulatory frameworks on AI are South Africa, Egypt, Rwanda, Mauritius, Kenya, Ghana, Ethiopia, Uganda, Tunisia, and Morocco. In terms of AI readiness, South Africa, Egypt, and Mauritius are the best.[121]Additionally, the economies of these nations are among the most developed in Africa. To improve technology governance in a variety of ad hoc methods, Kenya, Mauritius, Egypt, Rwanda, and Nigeria have already taken some action to put in place officially sanctioned policies, plans, or agencies that are reviewed and enforced by outside parties. The Diplo Foundation[122]notes that execution and enforcement of these policies have not been very successful so far. The AI regulations are still being considered in South Africa, Ghana, and Ethiopia. In many areas, they have gained considerable expertise and ability with cutting-edge technology, but they haven't done much to institutionalise their operations in a structured policy framework so far.

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114 Ibid

115 Ibid

116 Ibid

117Smart Africa, *Blueprint Artificial Intelligence for Africa, [2021].* Available at: https://smartafrica.org/ knowledge/artificial-intelligence-for-africa/. (Accessed on 13 February 2025).

118 Ibid

119 Ibid

120 Ibid

121 AI Media, *State of AI in Africa, 2022 Report: Baselining the 4IR in Africa – A foundation for growth.* Available at: https://aiafricareport.gumroad.com/l/State_of_AI_in_Africa_2022?layout=profile. (Accessed on 13 February 2025).

122 Ibid

These and other African nations' development of high technology and artificial intelligence capabilities is also directly aided by multinational technology corporation.[123]The continent's most sophisticated technical capability is found in South Africa. Over the last five years, 4IR has gained significant attention; nevertheless, the South African government has yet to publicly create a national policy or plan for this function.[124]According to the summary and evaluation above, African nations, Nigeria inclusive, still have a long way to go before they can catch up to the leaders in AI governance and capability.

10. Recommendations

Comprehensive legislative changes and strong capacity-building programs are necessary to strengthen Nigeria's AI regulations. To start, the Data Protection Act 2023 should be amended to include AI-specific issues such algorithmic fairness, transparency, and responsibility. To ensure ethical AI usage across industries, clear rules for AI developers and users are essential. Enhancing technical knowledge and enforcement capacities should also be the top priority for regulatory organisations' capacity-building initiatives. To promote innovation and make sure that regulatory frameworks can adapt to new AI issues, cooperation between the public and commercial sectors is crucial. This all-encompassing strategy will guarantee responsible AI governance and sustainable growth in Nigeria.

11. Conclusion:

Organisations have several difficulties navigating Nigeria's complex regulatory environment, including resource constraints, bureaucratic roadblocks, and overlapping legislation. This study has provided insight into Nigeria's complex compliance landscape, highlighting the challenges and complexity that companies and regulatory agencies must overcome. Among these difficulties, a recurrent theme shows up: the revolutionary potential of technology and data-driven strategies to improve compliance initiatives. These answers provide optimism by shedding light on a way through the regulatory labyrinth. The study's conclusions highlight how crucial data-driven tactics are for removing compliance roadblocks and significantly enhancing regulatory adherence.

Nigeria's compliance environment necessitates creativity and flexibility due to its complexity and constant change. Data-driven solutions provide businesses a strong toolkit that allows them to automate operations, use data to make insightful decisions, and set up real-time monitoring systems. These developments enhance operational efficiency, reputation, cost savings, and compliance. Businesses have used data and technology to their advantage, addressing compliance issues head-on and

[123] Ibid
[124] Ibid

coming out stronger and more resilient. Making important investments in data infrastructure, resource allocation, and ethical data practices are all part of the success path.

In this process, cooperation with regulatory agencies, a dedication to data privacy compliance, and operational openness are essential. Regulators also play an important role. Encouraging data-sharing platforms, adopting RegTech solutions, guaranteeing openness, and upholding uniformity in enforcement all help create a more favourable compliance climate. Regulatory agencies should give priority to instructional programs and flexible rules to keep up with the rapidly changing technological landscape.

In summary, the study has shed light on Nigeria's compliance landscape's future. Adopting data-driven strategies may help organisations better manage risks and handle complicated laws, which will support corporate expansion and sustainability in a constantly changing environment. At the same time, authorities may improve enforcement and supervision by using data-driven technologies, which will promote a more open and legal corporate environment. In the end, these initiatives help companies, regulatory agencies, and society at large by paving the way for a day when compliance is not just a legal need but also a competitive advantage in Nigeria's thriving and dynamic economy.

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Rethinking the Legal Status of Robots and Artificial Intelligence in Transnational Criminal Jurisprudence

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Abstract

Globalization and technological advancements have occasioned dramatic increase in transnational crimes, posing a huge threat to the socioeconomic basis of societies and the confidence reposed in the rule of law. Transnational crimes are contraventions of law that involve more than one country in their planning and execution. Their actual and potential effects transcend national boundaries and are hardly ever of entirely local interest. This explains the very pivotal involvement of the international community in combating the upsurge and multiplicity of transnational crimes. In the prosecution of transnational crime actors, international law recognizes the culpability of natural persons and artificial entities also known as juridical persons in the perpetration of transnational crimes. Natural persons are human beings and are held to be responsible for their actions according to law while juridical persons are creations of the law, usually, businesses or corporations which have capacity to sue as well as to face legal actions. A major development that appears to be overlooked in the consideration of the legal personality and liability of transnational crime perpetrators is the culpability of Robots and artificial intelligence (AI). The fast evolving field of robotics and artificial intelligence have ignited debates regarding its transnational criminal legal framework. There are no transnational legal regimes regulating actions conducted by artificial intelligence or robots. There is equally no transnational legal regime directly addressing the culpability of creators, manufactures, designers, programmers and owners of robots transnationally. The legal personality of robots and other artificial intelligence is recondite, raising several legal issues such as, are robots humans, are they legal persons capable of committing transnational crimes, can they be fired, can they be imprisoned, are they agents of their

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manufacturers e.t.c. This research reechoes the need for these complex issues plaguing the legal regulation of robots and artificial intelligence transnationally to be resolved with a great sense of urgency.

Key Words: *Transnational, Crime, Artificial Intelligence, Robots, Legal*

1. Introduction

Transnational Crimes have existed since the inception of organised societies. They have remained prominent in popular policies and cultures, evolving through different dispensations, under different economic and political conditions. These crimes encompass various offences ranging from corporate to organised and political crimes. Specifically, some of the crimes that are transnational in nature include human trafficking, cybercrimes, drug trafficking, migrant smuggling, sea piracy, terrorism e.t.c.

Globalization enlarged their markets and technological advancements have accelerated their trends. Despite the challenges posed by state sovereignty, the International Community have been actively involved in the suppression of transnational crimes. This is evidenced by the evolution of various Suppression Conventions, principal of which is the United Nations Convention against Transnational Organized Crime (UNTOC). Several International Institutions such as the United Nations Office on Drugs and Crimes (UNODC) and the International Criminal Police Organization (Interpol) have also been set in place to combat transnational crimes.

Technology has created a dynamic, rapid and complex world. The transnational nature of transnational crimes has been corroborated by technology, due to its global outreach. Technology has offered a cooperative medium for the perpetration of multiple transnational crimes and the anonymity provided by technology has contributed negatively to the evasion of justice by transnational crime perpetrators. Artificial Intelligence (AI) and robots are forms of technology used in the perpetration of transnational crime. These technologies are simply intelligence, demonstrated by machines as opposed to human intelligence. AI and robots are currently engaged for commission of transnational crimes by transnational crime actors, the same way legitimate businesses and companies are engaged for the same purpose.[1]In transnational crimes, AI and robots manage illegal supply chains, illegal social media data mining, they serve as tools for money laundering, concealing expensive and luxurious purchases as well as concealing the exchange of crypto currencies into physical cash. Transportation of contrabands are effected

[1] Enact observer 'AI and Organized Crime in Africa' (2023) <https:enactafrica.com.org> accessed 7 April, 2023

using these technologies and they perform several other transnational crime enabling functions. Most transnational crime syndicates have operations on all continents of the world and AI helps them run those operations more efficiently and speedily than ever.

Sadly, International legislations on transnational crimes appear to be oblivious of these trends. Existing legal frameworks speak less proactively on the legal personhood of these technologies and do not function in anticipation of future problems that these technological advancements may engender, thereby creating loose ends in transnational criminal investigations and prosecution. As artificial intelligence and robotic technologies become increasingly sophisticated and integrated into our lives, there is an increasing urgency to address legal issues that may be raised by their existence.[2] Understanding and tackling transnational crimes will remain problematic without careful consideration of some of its critical conceptual nuances and preempting the future. There is an urgent need to overhaul transnational crimes multilateral legislations (particularly the UNTOC) to reflect current realities as well as preempt the future.

2. Legal Personhood in Transnational Criminal Jurisprudence

Generally, the law recognizes two types of persons, natural persons and artificial entities also known as juridical persons.[3]Natural persons are human beings, esw and are held to be responsible for their actions according to law while juridical persons are creations of the law, usually businesses or corporations which have capacity to sue as well as to face legal actions.[4]

Originally, criminal law focused basically on assigning criminal culpability for the commission of certain crimes on natural persons. It was considered inappropriate that a juridical person, who is deemed to be incapable of moral culpability could be subjected to it. This idea has greatly changed. The old maxim that a corporation cannot commit a crime is no longer the position of the law, particularly in response to current transnational criminal trends. Transnational crimes actors may be natural persons or juridical persons. Therefore, prosecution of juridical persons is currently acknowledged as a relevant component of fighting transnational crimes.[5]

Transnational crime perpetrators are known to use businesses, charitable organizations, corporations or other juridical entities to commit serious transnational crimes. They use these organizations to mask the involvement of individuals in the perpetration of various crimes as well as

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[2] ibid

[3] B Smith 'Legal Personality' (1928) 37(3) *Yale Law Journal* 283-299.

[4] ibid.

[5] R Bhattacharjee, *Concept of Legal Personality in Jurisprudence* (Thinking Press, UK 2020) 1-5.

to preserve ownership of the proceeds of crime. The role of juridical persons in transnational crimes span through the various reflections of transnational crimes. There are very many manifestations of the involvement of business corporations in the perpetration of transnational crimes. For instance, corporations can be involved in the trafficking of persons through three different categories. The first involves the most obvious case which happens when companies directly and willingly recruit victims, transport them and provide them with the needed documentation to migrate to the place where they will be exploited. In most egregious cases, companies are specifically created as an instrument for commission of this nature of crime and to launder the obtained benefits.

The second category include use of companies to hire workers supplied by third parties domestically and abroad. Under this category, recruitment agencies engage in coercive recruitment practices including, isolation, surveillance, debt bondage, withholding money, violence and threats of denunciation to authorities in order to exploit people. The third category involves the involvement of corporations in human trafficking when their services, products or facilities are used in the trafficking process. This is rampant in the hospitality, tourism and transport sectors. The new position of the law as to liability of juridical persons serves to address the challenges faced in identifying transnational crimes perpetrators who try to shield their criminal conduct through the use of business corporations and to target the assets of a corporations used as a front for criminal conducts. Attention is not only had to key perpetrators of transnational crimes but a plurality of actors and enablers of transnational crimes both natural persons and artificial entities.

At the international level, the obligation upon state parties to implement the liability of juridical persons finds its basis as far as transnational crimes is concerned in the UNTOC, Article 10. The said liability may be criminal, civil or administrative.[6]The United Nations Convention against Corruption (UNCAC) has a similar provision with the UNTOC with respect to states establishing the culpability of juridical persons. It mandates states in its Article 26 to adopt measures as may be necessary and consistent with its legal tenets to establish the culpability of juridical persons for participating in the commission of offences established in the Convention. The liability may also be criminal, civil or administrative and would not absolve a natural person who was involved in the commission of the crime of his culpability. The UNTOC in its Article 10 (3) also provides that liability of juridical entities must be established without prejudice to the criminal liability of the natural persons who have committed the offence. The liability of natural persons who perpetrated the crimes in issue must be in addition to any corporate liability and must not

[6] Article 10 (2) there is no obligation to establish criminal liability if that is inconsistent with a state's legal principles. In such case, civil or administrative liability will be sufficient.

be affected by it. In effect, when an individual commits a crime on behalf of a juridical person, it is possible to prosecute and sanction both the individual and the legal entity.

The attribution of responsibility to an artificial entity or a natural person is often a complex problem for most jurisdictions because most legal systems base their criminal laws on a combination of physical and mental states.[7]While the element of physical conduct is relatively straight forward, the attribution of mental states such as intention or knowledge to a legal person is very difficult. However, some jurisdictions make the liability of juridical persons dependent on the culpability of individuals. In legal systems that adopt this approach, a company may be held culpable for a crime committed by an officer or employee of the organization. Other countries take the approach of identifying the responsibility of the organization in the way, in which it is structured, the policies of the organization and its failure to supervise its employees or agents. As with crimes committed by natural persons, defences to liability may be available to juridical persons. For instance, the defence of due diligence. A juridical person may reduce its culpability or escape liability if it is able to prove that it took reasonable steps to ensure compliance with the relevant provisions of the law.

The UNTOC in its Article 10 (4) specifies that states also have to ensure that effective, proportionate and dissuasive punishments are imposed on juridical persons upon conviction. The most frequently used sanction against juridical persons are fines which can be characterized as a criminal sanction, non-criminal sanction, or a hybrid one. Other sanctions include confiscation, restitution, or even closing down of legal entities. Some states may wish to consider applying non-monetary punishments available in some jurisdictions such as withdrawing of certain advantages or prohibition of certain activities, publication of judgment and the appointment of a trustee and direct regulation of corporate structures.

The establishment of the liability of juridical persons is a welcomed development as far as transnational criminal matters are concerned as it increases the difficulty for those in legitimate businesses to act as facilitators for transnational crime activities. It also has a deterrent effect considering that reputational damage can be very costly for organizations. It also acts as a catalyst for more effective management and supervisory structures to ensure compliance.

The offence of participation in an organized criminal group as seen in the UNTOC Article 5 is another encompassing provision as regards the liability of transnational crimes actors. Criminal offences such as conspiracy and criminal association existed in many jurisdictions long before it was affirmed at the international level. The offence as encapsulated in Article 5 advances the criminal justice response well

[7] UNODC 'Liability of Legal Persons' available at<http://www.unodc.org> accessed on 27 April 2023.

beyond the material commission of or attempt to commit the eventual offences damaging specific protected interests and it proscribes lesser participation in criminal groups.[8]

This expanded criminal liability targets not just the heads of criminal organizations who plan, coordinate and manage but do not always participate in the material commission of the final offence but also persons participating in non-criminal activities that aid the criminal capacity of the crime groups. This criminal policy can be translated into either the offence of association to commit crimes which is typical of Civil Law countries or the offence of conspiracy which is typical of Common Law countries. The differences are immaterial although the UNTOC by virtue of its Article 3 allows the adoption of either of both models.

That criminalization of association/conspiracy is essential to the successful prosecution of transnational crime offences because without a theory of vicarious group liability it would be almost impossible to overcome the secrecy, layering and hierarchical defences utilized by sophisticated organized criminal groups.[9]

3. The Legal Status of Robots and Artificial Intelligence (AI) in Transnational Criminal Justice

A major development that appears to be overlooked in the consideration of the legal personality and liability of transnational crime perpetrators is the culpability of Robots and artificial intelligence (AI). Through innovations in technology, engineering, science and complex mathematical calculations, sophisticated sets of rules called algorithms are being designed into artificial intelligence, making them capable of taking decisions and using high level of intelligence, thinking and emotion[10]just like humans.

The term robot was derived from the word Robota (which means forced labour) in the year 1921 by the Czech writers known as the Capek brothers.[11]Robots are defined as machines that can sense their environment, process the information they sense and act directly upon the environment. A more inclusive perception of robots describes them as artificially intelligent agents and machine learning algorithms. AI was created as an alternative to humans, a crafted machine with embedded

[8] UNODC, Legislative Guides for the Implementation of the United Nations Convention against Transnational Organized Crime and the Protocols thereto (New York United Nations 2004) 21, para 41.

[9] United States answers to the Questionnaire on the implementation of the United Nations Convention against transnational organized crime and the Protocol thereto, UNODC Informal Papers (28 July,2004).

[10] A Thanaraj, 'Can Robots be Prosecuted for a Crime' <http://cumbria.ac.uk> accessed on 5 February 2024

[11] R Adams, *The History of Science Fiction* (Palgrave Macmillan, New York)

learning and analysis capabilities, mastered to comply with real life situations and to perform as much as accurately possible, the task and works done by men.[12]

Robots and artificial intelligence are not exactly the same thing. Robotics is however, a part of artificial intelligence involving the manufacturing of robots, which could function without human intervention. The artificial intelligence system emulate the human minds and try to function as human beings. Both robotics and artificial intelligence involves some level of programming, even though the latter enjoys higher measure of discretion.[13]Thus, it would appear in a strict sense that robots are programmable machines that are able to carry out series of actions autonomously or in a partially autonomous way. Most robots are required to think independently in order to interact with the physical world and doing so requires some level of artificial intelligence. Conversely, artificial intelligence is a branch of computer science that involves the development of computer programs to complete tasks that should be carried out by human beings. In a loose sense, robots and artificial intelligence involve the use of technology to perform human tasks.[14]The dynamism of AI and robots have been categorized thus:

i. **The zero generation** – This generation was one in which malfunctions or changes in the monitored areas (signalled by sensors) result in the next step being disallowed and the system being stopped while the maintenance staff is called.[15]
ii. **The first generation** – Here robots work with single feedbacks capable of switching between several deterministically operating subprograms (developed in advance by a human) and working.[16]
iii. **The second generation** – Robots worked with optimization capability which is the ability to select the optimal program from predefined programs based on specified anterior i.e the precise rule governing the decision about the next known action.[17]
iv. **The third generation** – characterized by robots capable of independently modifying the original program (action plan) with a posteriori knowledge. Here only activity (task) in predefined, while the method of achieving the goal is left to the intelligence of control system, which itself creates an action plan consisting of successive steps and activities to achieve the given goal.[18]

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[12] B S Kokpan 'Criminal Liability of Robots in Nigeria' (2023) *International Journal of Advanced Multidisciplinary Research.*
[13] ibid.
[14] L Anat 'AI Entities as AI Agents: Artifical Intelligence Liability and the AI Respondent Superior Analogy' (2020) 46 (5) *Mitchell Hamline Law Review.*
[15] V Smejkal and J Kodi 'Challenges and Solution to Criminal Liability for Actions of Robots AI (2024) 9(1) *Advances in Technological Innovation* 65-84.
[16] Ibid.
[17] Ibid.
[18] Ibid.

v. **The fourth generation** – represented by autonomous robots with social, human like behaviour which means, they choose the goals of individual tasks independently based on an appropriate global criterion e.g the principle of long term existence/autonomy of such a system (survival, energy saving etc.)[19]

Currently, artificial intelligence and Robotics have become more sophisticated and are accordingly associated with different aspects of human life.[20]The fast-evolving field of robotics ignites debates as regards their legal status and legal framework. Whereas there are extant laws regulating the conducts and responsibility of humans in the society, there are scarcely legal frameworks directly and extensively addressing the culpability of robots as well as their creators, manufacturers, programmers and designers.[21]

Traditionally, laws are enforceable by and against legal persons, natural and artificial as already established. Within this traditional context, human beings are legal persons, countries and states are legal persons, businesses and corporations are legal persons, however, there are no provisions yet, especially in the transnational criminal jurisprudence, as to the status of robots and other Artificial Intelligence (AI) machines capable of reasoning and carrying out actions. In effect, they cannot be held liable or culpable for wrongdoings.[22]

As robots become increasingly sophisticated and integrated into our lives, there is an increasing urgency to address legal issues that may be raised by their existence.[23]As can be seen from recent events, self-driving cars already roam some streets in most countries of the world[24]and can be used as means for supplies of contrabands, weapon systems of varying degrees of autonomy have been integrated into armed forces of different countries.[25]Robots have shown potential to cause significant physical, financial and emotional harm to humans. In fact, automated trading allegedly triggered a crash in the United States stock market in 2018[26]and Tay, a "chat bot"[27]repeatedly made racist and rude remarks on twitter

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19 ibid
20 Ibid.
21 ibid.
22 Y Hu, 'Robot Criminals' (2019) *University of Michigan Journal of Law Reform*
23 ibid
24 G Gates and Others, 'The Race for Self-Driving Cars' (2016) <http://www.nytimes.com/interactive/2016/12/14/technology/how-self-driving-cars-work.html accessed on 24 January 2024.
25 R Crootof, 'The killer Robots are Here: Legal and Policy Implication' (2014) 36 CARDOZO L. Rev 1837, 1840
26 Z Karabell, 'This Week's Stock Market Drops was Machine-Made. The Freak-out that Followed was Man-Made (2018) <http://www.washingtonpost.com> accessed on 24 January 2024.
27 D Victor, Microsoft Created a Twitter Bot to Learn from Users. It Quickly Became a Racist Jerk (2016) <http://www.nytimes.com> accessed on 24 January 2024.

before it was shut down in 2016. As scientists continue to make breakthroughs in robotics and artificial intelligence, Robots and AI may soon reach a level whereby they would be capable to form criminal intents and act on that intent. There are alarming predictions that AI will reach human capabilities by the year 2029[28]and humans and machines will gradually converge, reaching the point of singularity in 2045.[29]Similar catastrophic predictions have been published by renowned figures such as Steven Hawking, Bill gates and Elon Musk.[30]In January 2015, they jointly signed an open letter on AI, with other AI experts.[31]The letter calls for research into the social impact of AI to prevent some potential pitfalls of speedy developments in Robotics and AI innovations which may also raise unsettling legal issues.The question is, how prepared are transnational criminal legal jurisprudence to face or cushion these impending repercussions?

Existing international legislations on transnational crimes appear to be oblivious of these trends. Transnational criminal legal frameworks, as they currently are, do not appear to take into cognizance future problems and needs, that may be created in transnational criminal investigations and prosecutions by the uncertainties surrounding the legal personhood and operations of robots and AI. The need to overhaul transnational criminal multilateral legislations (particularly the UNTOC) to reflect current realities as well as preempt the future is therefore of dire essence.

4. Arguments for and Against the Legal Personhood of AI and Robots

It is undoubtable that the regulation of the activities of robots is very important for the world to adapt effectively to the contemporary technological advancements. An unaccountable robotics system will pose grave problems for the society.[32]The safety of the globe requires that liability be ascribed to the wrongful conducts of robots. This is not entirely without challenges as it is argued that a robot will not feel nor appreciate the effect of pleading guilty to a criminal charge. It is argued that a robot lacks the requisite emotions to feel the pains of imprisonment or other forms of punishment. Robots are bereft of the mental capacity to feel the deprivations in prison or labour for community service. In event of an order for payment of fine, a robot is not known to be operating a bank account. A forfeiture order cannot be made against a robot and a sentence

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[28] S Vladimir and K *Jindrich* 'Challenges and Solutions to Criminal liability for the Actions of Robots and A J (2024) Vol 9 (1) *Advances in Technology Innovation Journal* 65 – 54.

[29] R Kurzweil, 'The Singularity is Near: when Humans Transcend Biology' (Penguin Books, New York 2006).

[30] S Russell, D Dewey and M Tegmark 'Letter to the Editor: Research Priorities for Robust and Beneficial Artificial Intelligence: An open letter (2015) 36 (1) *AI Magazine* 3-4.

[31] ibid.

[32] B S Kokpan, 'Criminal Liability of Robots in Nigeria'(2023) *International Journal of Advanced Multidisciplinary Research and Studies* 684-691

to caning will amount to no pain for the robot.[33]In effect, the concept of sanctions would be defeated if the person punished is unaware that he or she is suffering or losing a right as a result of misconduct.

Arguments, however, lie in favour of the culpability of robot manufacturers for the actions of the robots. Under this school of thought, robots are deemed either agents of their owners or manufacturers.[34] Where a robot commits a crime, in the course of carrying out its programmed functions, its act would be taken as that of his principal. In other words, the culpability of a robot would ground the liability of its programmer or designer.

Other scholars[35]argue that robots can evolve beyond the design and foresight of their creators. They opine that robots are not just any other technological creation but are intelligent and autonomous actors moving about in the physical world.[36]If robots merit personhood, then they can be held liable for their actions. Otherwise, liability must go to some human party.[37]Incidentally, subscribing to a case of joint liability between robots and their designers ignore the probability of a break in chain of causation leading to the culpability, third party interference and unanticipated natural occurrences.[38]This quagmire ought to be resolved one way or the other depending on the context of application of the facts in issue.

5. Jurisdictional Overview

Creation of regulatory regimes for robotics is a lengthy and multi-step process. Most regions have taken bold steps in this regard. The European policies for robotics are initiated by the European parliament, the European Commission and by individual government.[39]The European Union and its members possess a rich legislative framework that accommodates crucial roboethical principles. The American region have also made serious efforts in this regard. The United States' (US) interest in AI is evident in several executive orders, memorandums, reports[40]and cases. In the case of *Nelson v American Airlines*[41]it was held that operators of autopilot aircrafts would be held liable in event of an accident caused by

[33] ibid.

[34] ibid.

[35] T N White and S D Baum, 'Liability Law for Present and Future Robotics Technology' (2017) <http://sethbaum.com> accessed 5 February 2024.See also P Volha and Z Ivan, 'Autoplilot Operation: The Future is Coming' *Science, Trends and Development.*

[36] S D Baum, 'Liability Law for Present and Future Robotics Technology' (2017) <http://sethbaum.com> accessed 5 February 2024

[37] ibid.

[38] B S Kokpan, 'Criminal Liability of Robots in Nigeria'(2023*) International Journal of Advanced Multidisciplinary Research and Studies* 684-691

[39] S Langman and Others, ' Roboethtics Principles and Policies in Europe and North America' (2021) *SN Applied Sciences Review Paper*.

[40] ibid.

[41] 263 Cal App. 2d 742 (1968).

an autopilot system. In *Brouse v United States*[42]in which two planes crashed, one of which was a US military plane that was using an autopilot (robot), the court rejected the US claim that it should not be liable because the plane was being controlled by a robot. The court held that the human pilot ought to have paid attention and avoided such crash.

In Nigeria, there is no specific and authoritative statutory framework and judicial precedent on AI and robots culpability.[43]It remains to be seen how Nigerian courts will respond to cases relating to the liability of AI and robots in criminal law. Despite this gap in Nigerian law, manufacturers, owners and users of AI and robots could be held liable on the strength of Section 304 of the Nigeria Criminal Code which provides that it is the duty of every person who has in his charge or control anything, whether living or inanimate and whether moving of stationary, to apply all necessary care and precaution in the use or management of such a thing, in other not to cause harm to another. Also, section 24 of the Criminal Code impliedly provides for the offence of criminal negligence to ground the liability of manufacturers and programmers of robots whose careless acts or omissions enabled their robot to injure another. The argument that their liability can also be based on Section 7 of the Criminal Code because they are parties to the offence committed is not sustainable as unlike section 304, section 7 requires premeditated criminal intent.[44]The International Community is yet to embrace the urgency of this rapidly evolving reality of AI and robots especially as it relates to transnational crimes and liability of perpetrators.

A comparative analysis of legal frameworks surrounding the criminal liability of robots in various jurisdictions reveal both similarities and difference in their approaches.[45]While there are shared challenges, overarching legal principles, variations in legislation, case law and regulatory measures across the jurisdictions, one common challenge is the question of how to attribute criminal liability to robots that lack subjective consciousness and intent. The absence of human like mental states in robotic systems raises fundamental questions about culpability and the application of traditional legal principles such as mens rea.[46]Each jurisdiction grapples with finding a balance between holding individuals accountable for actions of robots while acknowledging the limitations of machine agency.[47]

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[42] United States District Court, N.D Ohio, decided in March 25th (1949)

[43] B S Kokpan, 'Criminal Liability of Robots in Nigeria'(2023*) International Journal of Advanced Multidisciplinary Research and Studies* 684-691

[44] Ibid.

[45] G Makam 'Criminal Liability of Robots – A Critical Analysis of the Legal Framework in the US, UK and Europe' https://SSM.com/abstract24649764 accessed on 31/1/2025.

[46] R Susskind 'The Criminal Liability of Artificial Intelligence Entities' (2019) *Cambridge Law Journal*.

[47] R Johnson 'Criminal Intent and Robots: The Challenges of Attributing Culpability' (2019) Harvard Law Review.

6. Factors Considerable in Formulating Principles to Establish Culpability of Robots and AI

An argument can be made for the criminal liability of a robot provided the following threshold conditions are satisfied.

a) The robot or AI is equipped with algorithms that can make nontrivial morally relevant decisions.
b) The robots or AI are capable of communicating its moral decisions to humans and
c) They are permitted to act on their environment without immediate human supervision.[48]

Each of the conditions is significant in its own right. The first distinguishes a robot or AI from a mere tool. The second condition ensures that humans are apprised of the moral significance of the robots decisions and thirdly that the robots or AI do not merely serve in an advisory capacity. A transnational criminal regulation for robots and AI will help reduce ambiguities by providing a minimum set of moral standards which all robots and AI must be held accountable. These minimum standard should not be left to the whims and behest of robot or AI manufacturers or trainers but should be decided by the society collectively.[49]

The fact that robots and AI will be programmed to take into account criminal laws to regulate their own behaviour will certainly have some deterrence effect on them. Imposing criminal liability on robots and AI can also help to identify culpable individuals who are truly responsible for the harm caused such as the manufacturers and trainers of the robots and AI. These manufacturers and trainers will be forced to establish ex ante mechanisms to prevent robot from wrong doing.[50]Robot and AI's criminal liability will also serve as a self-policing device to discourage individuals from using them to perpetrate crime.

7. Conclusion and Recommendation

Transnational criminal jurisprudence overlooks the increasing legal conversations surrounding the existence of artificial intelligence and the legal status or liability of robots. Robotics and artificial intelligence are gradually conquering the world. Just as any progress, this development is expected to have relevant impact on the law in general as well as criminal law in particular.[51]It involves the potential of transforming the traditional conception of criminal responsibility, as notions of personhood, capacity and culpability will not stay unaffected. As fictional as the idea of a guilty

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[48] Y Hu 'Robot Criminals' (2019) 52 University of Michigan Journal of Law Reform.
[49] ibid
[50] ibid
[51] M Simmler and N Markwalder, 'Guilty Robots- Rethinking the Nature of Culpability and Legal Personhood in an Age of Artificial Intelligence' (2019) 30 Criminal Law Forum 1-30

robot appears today, it may be nothing unrealistic nor unlikely in the near future. It is becoming highly imperative that the understanding of personhood and criminal responsibility be reconsidered to define the legal personality of robots and other autonomous machines. Some proposed legal solutions that can help navigate this challenge include:

i. Clarification of Legal Definitions – These is a great need to provide clear and comprehensive definitions of key terms related to robots and AI such as autonomy, agency and responsibility under transnational criminal jurisprudence precisely. Unambiguous definitions of key concepts related to the subjects of discourse shall also help establish a common understanding and facilitate consistent application of legal principles across jurisdictions.

ii. International Cooperation and Standardization – Promotion of international cooperation and collaboration is crucial for addressing the global nature of robotic and AI technologies. Harmonization of legal frameworks, sharing of best practices and establishing international policies can facilitate consistent approaches to the certainty of transnational criminal liability of robots.

iii. Public Awareness and Education – Engendering public education schemes to create more awareness and understanding of the legal and ethical dimensions of robotic systems and AI is also very crucial. Educating individuals about their rights, the potential risks of robotic and AI technologies and the legal recourse available in cases of violation of rights will empower the populace to make informed decisions as well as engage public debates on the regulation of these technologies.

iv. Creation of Regulatory Sand Boxes and Adaptive Governance - Creating controlled environments where innovative Robotic systems are tested and monitored can facilitate the development of effective regulations. These sand boxes will allow for experimentation while ensuring compliance with legal and ethical principles. Also the adoption of governance approaches that foster strong dialoguing between regulators, industries, and experts can enable timely updates to legal frameworks to meet up with the dynamism of the subjects of discourse.

AI, as a Catalyst for Digital Transition in Nigerian Pension Administration

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Abstract

This work explores the transformative potential of artificial intelligence (AI) as a catalyst for the digital transition in Nigerian pensions administration. It analyses how AI can enhance inclusive pension coverage, especially among Nigeria's large informal workforce, improve operational efficiency through automation, optimise investment strategies, and strengthen risk management. The study also identifies significant ethical, regulatory, and technical barriers to AI adoption in traditional pension frameworks and examines the synergistic benefits of integrating AI with blockchain technology to foster security and transparency. By comparing Nigeria's AI initiatives to global best practices, particularly those in the Netherlands, the work offers strategic insights on how Nigeria can leverage AI responsibly to build a more robust, efficient, and inclusive pension system, crucial for the financial security of future generations. This comprehensive analysis emphasises the importance of a holistic digital strategy combining technology, regulation, and ethics to realise sustainable pension reform in Nigeria

1. Introduction

The global pensions sector is undergoing a profound transformation, driven by the pervasive integration of artificial intelligence (AI) technologies. This digital revolution is addressing systemic challenges such as demographic shifts, fiscal pressures, and member disengagement, which are particularly acute in developing economies like Nigeria. The country's pension landscape is characterized by infrastructural limitations and a large informal workforce, which poses significant hurdles to achieving universal pension coverage and operational efficiency.

AI offers a transformative pathway to modernize Nigeria's pension systems, enhancing operational efficacy, improving stakeholder interaction, and optimizing investment protocols. By leveraging AI, pension administrators can streamline operations, automate manual

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processes, and provide personalized services to members. This transition is critical for ensuring the sustainability and inclusivity of pension systems, especially in contexts where traditional models struggle to meet the demands of modern beneficiaries.

This paper explores the potential of AI in driving a digital transition in Nigeria's pensions administration. It delves into strategies for leveraging AI to achieve inclusive pension coverage, enhance member engagement, optimize investment decisions, and manage risks. Additionally, it examines the ethical, regulatory, and technical barriers to AI adoption and provides a comparative analysis of global best practices. Finally, it explores the transformative potential of blockchain and AI synergy in revolutionizing pension administration, offering insights into how Nigeria can harness these technologies to build a robust and equitable pension system for its future.

2. Leveraging AI for inclusive pension coverage and automated operational efficiency in Nigeria

Research and expert consensus increasingly validate the transformative potential of Artificial Intelligence (AI) in expanding pension coverage, particularly in contexts like Nigeria, where participation rates remain sub-optimal. The strategic adoption of AI by pension fund operators can drive substantial improvements in market reach and operational efficiency, especially for underserved populations, such as those within the informal economy.[1]

The implementation of AI within Nigeria's pension infrastructure offers a significant opportunity to rectify existing operational inefficiencies while extending coverage to previously neglected demographics, primarily the informal sector. By leveraging AI to automate routine administrative procedures and refine service delivery, pension systems can achieve marked enhancements in efficacy and ensure broader inclusion, as follows:

i. Inclusive Pension Coverage

a. Micro-Pension Penetration

To significantly increase micro-pension participation among Nigeria's predominantly informal workforce, representing over 80% of the working population, Artificial Intelligence (AI) offers a powerful approach.[2]Digital platforms and mobile applications, powered by AI, streamline the enrollment process, reducing obstacles to participation.[3]

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1 World Bank. (2022). *Social Protection and Pension Systems in Developing Economies*. <https://www.worldbank.org/> accessed March 13, 2025.

2 K Zaka, 'AI To Trigger Huge Leap In Insurance, Pension Penetration, Says Experts.' *Leadership News* <https://leadership.ng/ai-to-trigger-huge-leap-in-insurance-pension-penetration-says-experts/>(Abuja, Nigeria). accessed March 13, 2025.

3 SIS International. *Pension Fund Automation and Artificial Intelligence Consulting*. <https://www.sisinternational.com/solutions/fintech-strategy-consulting-

Algorithmic analysis of diverse data sources, such as mobile money transactions and community records, facilitates eligibility assessments, extending coverage beyond individuals with standard documentation; AI-driven chatbots and customised communication systems deliver personalised information, building trust and promoting enrollment.[4]

AI enables cost-effective scaling by automating enrollment and contributions processing, minimising administrative costs and making micro-pensions financially viable for low-income earners.[5]AI-driven chatbots also simplify remote enrollment for individuals in geographically isolated areas, and predictive analytics identify underserved demographic segments, enhancing the overall reach and effectiveness of micro-pension schemes.[6]

b. Data-Driven Outreach

Modern pension administration is undergoing a significant shift, driven by the integration of Artificial Intelligence (AI) and Big Data analytics.[7]These technologies empower pension operators to refine their strategies and reach previously overlooked segments of the population. In nations such as Nigeria, where participation in the Contributory Pension Scheme (CPS) remains limited to a relatively small portion of the workforce, specifically 10.2 million individuals, AI plays a pivotal role. Through the application of predictive analytics, AI can examine demographic datasets to identify populations that are currently outside of pension programs.[8]This facilitates the development of focused outreach initiatives, customized to address the unique needs and challenges of these groups, such as limited awareness or access.[9]AI also enhances the

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research/pension-fund-automation-artificial-intelligence-consulting/> (New York, NY, USA). Accessed March 13, 2025.

[4] C Nwaimo, A Adegbola, and M Adegbola, 'Predictive analytics for financial inclusion: Using machine learning to improve credit access for under banked populations.' *Computer Science & IT Research Journal*. Access: 2024 Computer Science & IT Research Journal. 5(6):1358-1373.

[5] M Goswami, 'Leveraging AI for Cost Efficiency and Optimized Cloud Resource Management'(2020) *International Journal of New Media Studies: International Peer Reviewed Scholarly Indexed Journal* 21-27.

[6] B Orimisan, Bankole. 'PenOP seeks adoption of AI, big data to promote sector's growth.' *The Guardian Nigeria*. Access: https://guardian.ng/business-services/penop-seeks-adoption-of-ai-big-data-to-promote-sectors-growth/. (Lagos, Nigeria) 24 October 2022.

[7] BPM. 'How AI is transforming pension management: The Netherlands is leading the way.' *Benefits and Pensions Monitor*. <https://www.benefitsandpensionsmonitor.com/news/industry-news/how-ai-is-transforming-pension-management/380655>. (Toronto, ON, Canada). October 19, 2023.

[8] G Hayman, 'Pensions in the Age of Artificial Intelligence.' *CFA Institute Research and Policy Center*. <https://rpc.cfainstitute.org/sites/default/files/docs/research-reports/pensions-in-the-age-of-artificial-intelligence_online.pdf>. (Charlottesville, VA, USA). December 2024.

[9] American Academy of Actuaries. 'Big Data, Big Changes for Insurance and Pensions.' <https://www.actuary.org/sites/default/files/files/publications/BigData_11.2018.pdf>. (Washington, D.C., USA). November 2018.

experience for existing members by providing personalised communication and streamlined procedures, often utilising tools like virtual assistants and user-friendly online interfaces.

c. Trust-Building via Claims Automation

Historically, prolonged claims processing times have eroded public confidence in both pension and insurance sectors.[10]To address this, integrating Artificial Intelligence (AI) presents a significant opportunity. By deploying AI to automate claims verification and settlement, processing durations can be substantially shortened. Evidence from sectors such as automotive insurance demonstrates that AI-driven systems can achieve claim resolutions within a significantly reduced timeframe compared to traditional methods, which typically require weeks. This improvement in efficiency not only optimizes operational procedures but also strengthens user trust by facilitating swift and precise settlements.[11]Therefore, the adoption of AI can incentivise greater participation in pension programs by mitigating concerns related to protracted payout delays.

To build confidence and encourage participation, particularly in schemes with low enrollment rates such as Nigeria's Contributory Pension Scheme, pension administrators can leverage AI. Automation minimises human error and guarantees regulatory compliance, fostering a sense of reliability. AI's ability to identify fraudulent claims through data analysis reinforces security and protects member assets.

d. Personalised Financial Advisory

Delays in claims processing have historically diminished public trust in pension and insurance systems. To counter this, the integration of Artificial Intelligence (AI) presents a viable solution. By automating claims verification and settlement procedures, AI can significantly reduce processing durations. Evidence from sectors like automotive insurance shows AI-driven systems achieve claim resolutions within a notably shorter timeframe compared to traditional methods, which often require weeks.[12]This enhanced efficiency optimises operational workflows and strengthens user trust through rapid and accurate settlements.

The implementation of AI also serves as an incentive for increased participation in pension programs by addressing concerns related to prolonged payout delays. By streamlining the claims process, AI directly tackles a major point of friction for potential and existing members. This not only makes pension systems more appealing but also contributes to building a more reliable financial security.

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[10] Zaka, (n.2).

[11] EY. 'How a Nordic insurance company automated claims processing.' <https://www.ey.com/en_gl/insights/financial-services/emeia/how-a-nordic-insurance-company-automated-claims-processing>. (Global). Accessed March 15, 2025.

[12] Forbes Finance Council. 'The Impact of Artificial Intelligence on Financial Decision Making.' (New York, NY, USA). May 1, 2024.

ii. Automating Operational Efficiency

a. Fraud Detection and Risk Management

To enhance the security of pension funds, Artificial Intelligence (AI) algorithms are deployed to conduct real-time transaction monitoring.[13] This allows for the identification of anomalies, including atypical contribution behaviours and unauthorised withdrawals. The Pension Fund Operators Association of Nigeria (PenOp) has emphasised the utility of AI in fraud prevention and data integrity, thereby protecting the financial interests of members.

b. Streamlined Administrative Workflows

To ensure the fiscal integrity of pension schemes, Artificial Intelligence (AI) algorithms are deployed for contemporaneous transaction surveillance. This enables the detection of anomalous activities, including deviations from standard contribution schedules and illicit fund withdrawals.[14]The Pension Fund Operators Association of Nigeria (PenOp) has articulated the probative value of AI in fraud deterrence and data remediation, thereby safeguarding the proprietary interests of pension scheme participants.[15]

c. Investment Optimisation

To enhance investment performance, Artificial Intelligence (AI) is utilised to scrutinise extensive data repositories, enabling the forecasting of market fluctuations and the refinement of asset distribution strategies.[16] This analytical capacity is particularly salient for Nigerian pension funds, which are subject to demands for competitive yields within an environment of economic instability. AI-powered portfolio evaluation can generate recommendations for adaptive modifications to holdings in both equity and fixed-income instruments.

In Nigeria, the use of Artificial Intelligence (AI) in financial advisory services is transforming the pension landscape by offering tailored guidance to individuals. AI systems analyze a person's financial situation, goals, and risk tolerance to create customized retirement plans. These plans are adaptable, adjusting to changes in market conditions and personal circumstances. AI-powered tools manage investments by continuously monitoring financial progress and adjusting asset allocations based on risk tolerance and retirement goals. This ensures that investment strategies remain aligned with evolving life circumstances.

The increasing reliance on Artificial Intelligence (AI) in the pension industry poses significant cybersecurity risks. AI systems, which handle

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[13] Orimisan, (n.6

[14] SIS International. *Pension Fund Automation and Artificial Intelligence Consulting*. <https://www.sisinternational.com/solutions/fintech-strategy-consulting-research/pension-fund-automation-artificial-intelligence-consulting/> (New York, NY, USA). Accessed March 15, 2025.

[15] Orimisan, (n.6).

[16] Zaka, (n.2).

sensitive contributor data, are vulnerable to breaches, necessitating robust encryption protocols and stringent oversight mechanisms. The regulatory compliance is critical, as AI tools must align with guidelines set by the National Pension Commission (PenCom). Ensuring transparency in automated decision-making processes is essential to maintain trust among contributors and regulators. Consequently, while AI offers automation and efficiency, human oversight remains indispensable for ethical decision-making in complex cases, emphasizing the need for collaboration between AI systems and human judgment.

3. AI-Driven Strategies for Enhanced Member Engagement, Investment Optimisation, and Risk Management in Pension Systems

AI-Driven Strategies for Enhanced Member Engagement, Investment Optimisation, and Risk Management in Pension Systems' essentially means using Artificial Intelligence (AI) to improve three key areas of how pension systems operate.

i. AI-Driven Strategies for Enhanced Member Engagement

Member engagement in pension systems can be significantly enhanced through the strategic application of AI to deliver personalised communication and value-added resources.[17] AI-powered virtual assistants and chatbots can provide real-time, tailored support, efficiently addressing member inquiries and offering personalised guidance based on individual profiles,[18] beyond personalised support, the strategic integration of AI serves to bolster trust and enhance efficiency within pension administration. Consistent with the principles of responsible innovation, the deployment of machine learning algorithms allows for the continuous monitoring of financial transactions, detecting anomalies and preventing fraudulent activities. This enhances trust in the system and supports adherence to ethical governance frameworks. AI also automates routine administrative tasks, which in turn increases operational efficiency. This frees up customer-facing personnel to provide more valuable interactions. In addition, by analysing large datasets, administrators can obtain valuable insights into member behaviours and preferences, informing data-driven strategies that facilitate targeted

17 E Hart, 'Revolutionising pension schemes: the power of artificial intelligence in boosting member engagement.' *Dentons*. <https://www.dentons.com/en/insights/articles/2023/december/6/revolutionising-pension-schemes-the-power-of-artificial-intelligence-in-boosting-member-engagement>. December 6, 2023.

18 N Ikemefune, 'Pension Operators Endorse Artificial Intelligence, Data Analytics & Big Data For Early Transformation.' *Business Post*. <https://www.businesspost.com.ng/pension/pension-operators-endorse-artificial-intelligence-data-analytics-big-data-for-early-transformation/>. (Lagos, Nigeria). April 27, 2024.

services, are consistent with sound risk management, and help improve overall retirement preparedness.

ii. Investment Optimisation and Risk Management

Systems such as the Electronic Pension Administration System (e-PAS), implemented by PenCom, automate processes to minimise errors and fraud in pension administration. However, with the advancement of digitalisation, vulnerabilities to cybersecurity threats also increase. To fully leverage technological advancements, regulators must adapt existing frameworks to accommodate new digital tools and practices. This adaptation should include promoting financial literacy among contributors and ensuring compliance with data protection regulations, such as the DPA. A proactive regulatory approach will foster innovation while safeguarding the interests of retirees.

Effective development of advanced investment strategies and risk management techniques in Nigerian pension administration necessitates building the skills of those responsible for their execution. This requires providing pension administrators with relevant training to apply these methods successfully. The integration of technology is a vital aspect of this development.

Achieving optimal investment outcomes and effective risk management in Nigerian pension administration requires a comprehensive approach that merges financial knowledge with regulatory compliance. By diversifying portfolios and utilizing strong risk management practices, pension funds can aim for consistent growth while protecting the interests of contributors.[19]The use of AI and data analytics can significantly improve investment decision-making and risk monitoring by delivering real-time insights and predictive analytics.

4. Ethical, Regulatory, and Technical Barriers to AI in Traditional Pension Data Frameworks.

While AI offers opportunities to improve efficiency and member engagement, its incorporation into traditional pension data frameworks introduces notable ethical, regulatory, and technical complexities.

i. Ethical barriers

a. Bias and Discrimination

Nigeria's diverse population, which includes informal workers and rural communities, faces the risk of exclusion from AI-driven pension solutions if datasets used to train AI algorithms are not representative or are heavily skewed towards urban populations. Furthermore, because AI algorithms learn from data, pre-existing societal biases (such as those

[19] Bolton, R. N., Lemon, K. N., & Verhoef, P. C. (2004). The theoretical underpinnings of customer asset management: A framework and propositions for future research. *Journal of the Academy of Marketing Science, 32*(3), 271–292.

related to gender, race, or socioeconomic status) can be perpetuated or amplified by AI systems, leading to potentially unfair or discriminatory outcomes in areas of pension administration like risk assessment for investment strategies, personalised retirement projections, and customer service interactions involving AI-driven chatbots.

b. Trust and Transparency Issues

Due to past inefficiencies and a lack of transparency, many Nigerians are sceptical of pension systems.[20]This scepticism may be heightened by AI adoption if decisions, like benefit allocations, are not adequately explained.

c. Accountability and Justification

Many AI algorithms, particularly deep learning models, operate as 'black boxes,' making it difficult to discern the reasoning behind their decisions. This lack of transparency raises ethical concerns regarding accountability[21](i.e., determining responsibility when an AI system errs), trust (i.e., fostering confidence in a system whose processes are opaque), and fairness (i.e., ensuring impartiality in a system whose operations are not understood).

d. Data Privacy and Security

Pension systems possess vast quantities of sensitive personal and financial data, raising ethical concerns about data collection, use, and storage practices; the potential for data breaches and misuse, and balancing data utilisation for service improvement with respecting individual privacy.

e. Job Displacement

AI automation can displace jobs in the pension industry, raising ethical concerns about fairly managing this transition; retraining /supporting affected workers; and the societal impact of increased automation.

ii. Regulatory barriers

a. Lack of Specific Regulations

Many current pension regulations were not established with AI in mind.[22]This creates uncertainty regarding how AI systems should be governed, what standards they should meet, and who is responsible for their oversight.

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[20] KPMG Nigeria. *2024 Nigeria Pension Industry Customer Experience Survey.* <https://assets.kpmg.com/content/dam/kpmg/ng/pdf/2024/12/2024%20KPMG%20Nigeria%20Pension%20Industry%20CX%20Survey.pdf>. (Lagos, Nigeria). Accessed March 17, 2025.

[21] E Zuccarelli, 'Emerging Technologies Building trust in AI means moving beyond black-box algorithms. Here's why.' *World Economic Forum.* [https://www.weforum.org/stories/2024/04/building-trust-in-ai-means-moving-beyond-black-box-algorithms-heres-why/#> (Cologny, Switzerland).April 2, 2024.

[22] Zaka, (n.2).

b. Data Governance and Compliance

The absence of comprehensive legislation governing AI use in pensions in Nigeria creates uncertainty for operators and exposes gaps in existing accountability frameworks.[23]While regulations like the NDPR and other data protection laws impose strict requirements on data handling, challenges remain in ensuring AI systems comply with these regulations; establishing clear rules for data sharing and access, and auditing AI systems to ensure compliance.

c. Liability and Accountability

Determining liability in cases where an AI system's mistake causes financial harm presents a significant; the procedures for resolving disputes involving AI systems and the legal validity of AI-driven decisions.

d. Algorithmic Bias

Regulatory bodies express concern regarding the capacity of AI algorithms to perpetuate or even amplify pre-existing societal biases, posing multifaceted challenges that encompass: the development of effective methodologies for the detection and mitigation of bias embedded within AI systems, the establishment of robust strategies to ensure fairness and equity in outcomes generated through AI-driven processes, and the definition of the appropriate role and responsibilities of regulators in the continuous oversight and assurance of algorithmic fairness.[24]

e. Cybersecurity Risks

The integration of Artificial Intelligence (AI) into pension administration introduces significant cybersecurity risks. The complexity of AI systems expands the attack surface, creating more potential entry points for cyberattacks.[25]Pension systems, holding sensitive personal and financial data, become prime targets for data breaches and exfiltration, potentially leading to identity theft and fraud.[26]

AI-specific attacks, such as model poisoning, model theft, and adversarial attacks, pose unique threats, while insider threats and the lack of security by design in some AI systems further compound these risks. Addressing these challenges requires a proactive approach, including robust security measures, data protection protocols,[27]AI-specific security

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[23] KPMG Nigeria. *2024 Nigeria Pension Industry Customer Experience Survey.* <https://assets.kpmg.com/content/dam/kpmg/ng/pdf/2024/12/2024%20KPMG%20Nigeria%20Pension%20Industry%20CX%20Survey.pdf>. (Lagos, Nigeria). Accessed March 17, 2025.

[24] E Lichtenstein, 'Who is Responsible When AI Makes Mistakes?' *AgentSync.* <https://agentsync.io/blog/technology/who-is-responsible-when-ai-makes-mistakes#:~:text=New%20AI%20technology%20challenges%20current,inscrutable%2C%20unintuitive%2C%20and%20statistically%2D>. (Denver, CO, USA). June 26, 2023.

[25] Satori Cyber. 'What is Data Security? Threats, Controls, and Solutions.' satoricyber.com. accessed March 17, 2025.

[26] PenOp. 'What has Data Analytics, Artificial Intelligence (AI) and Big Data got to do with Pensions?' <penop.org.ng>. Access: October 18, 2023.

[27] ThisDayLive. 'PenCom issues consumer protection framework (Part 3).' thisdaylive.com. Access: May 20, 2024.

considerations, employee training, regulatory compliance, and continuous monitoring to adapt to the evolving threat landscape.[28]Prioritising cybersecurity is crucial for pension systems to leverage AI benefits while protecting beneficiaries' interests

iii. Technical barriers

a. Data Quality and Availability

While AI systems depend on substantial volumes of high-quality data to operate effectively, pension administration frequently encounters limitations in data availability and quality.[29]These limitations manifest as incomplete, inaccurate, or inconsistent pension data; data silos across different systems, hindering accessibility;[30]incompatibility between legacy systems and AI technologies; the negative impact of poor recordkeeping, such as missing or inaccurate contributor details, on the reliability of AI models for personalized services and risk assessments.

b. Legacy Systems and Infrastructure

Many pension systems globally rely on outdated technology infrastructure, presenting significant challenges to modernization. These challenges include the complexities involved in integrating AI with these legacy systems, as well as the substantial costs and logistical hurdles associated with upgrading the infrastructure to support new technologies. In Nigeria, the issue of outdated infrastructure is particularly salient, with many pension schemes still operating on systems that hinder effective integration with modern AI tools, such as chatbots and fraud detection systems. This reliance on legacy systems creates obstacles to efficiency and innovation.[31]

Beyond the systems themselves, infrastructure limitations such as inadequate access to high-speed internet and secure cloud storage, particularly in rural areas, further restrict the ability to scale and deploy AI solutions across the pension sector. This digital disparity limits the potential benefits of AI for a significant portion of the population.

c. Technical Expertise and Skills Gap

Technological advancements have rapidly changed various sectors, and pension administration is no exception. While these advancements bring increased efficiency, cost reduction, and better service delivery, they

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[28] Fingerprint. 'Transaction fraud detection and prevention tips.'<fingerprint.com.> Access ed March 17, 2025.

[29] O Zdrok, 'The Critical Role of Data Quality in AI Implementations.' *Shelf.io Blog*. < https://shelf.io/blog/data-quality-in-ai-implementations/#:~:text=By%20investing%20in%20good%20data,smarter%20business%20decisions%20and%20aMay 2, 2024.

[30] Equable. 'A Pension Data Primer: What to Look for and Where.'< equable.org.> January 29, 2021.

[31] Zaka, (n.2).

also introduce new legal challenges.[32]As pension fund administrators increasingly adopt digital technologies, traditional regulatory frameworks may struggle to keep pace.

The intersection of technology and law raises complex questions regarding data privacy, cybersecurity, contract enforcement, and liability.

d. Interoperability and System Integration

The need for pension systems to interface with other systems, such as those related to healthcare or government administration, introduces complexities.[33]These complexities include the challenge of achieving seamless integration of AI systems across these various platforms, the necessity of developing and implementing standards for data exchange and interoperability, and the importance of mitigating potential security vulnerabilities associated with this interconnectedness of systems.[34]
To address the ethical, regulatory, and technical barriers hindering the adoption of AI in Nigeria's pension sector, stakeholders must focus on key priorities. Investments in digitization are essential to modernize legacy systems and improve data quality. Strengthening data protection laws and ensuring their enforcement will safeguard sensitive pension information against misuse and cyber threats. Additionally, inclusivity must be prioritized by designing AI solutions that accommodate Nigeria's diverse population, including rural and informal workers.

Initiatives like PenOp's advocacy for AI adoption have highlighted the transformative potential of technology in areas such as fraud detection, customer service enhancement, and investment analysis. However, achieving meaningful progress requires sustained collaboration among policymakers, regulators, pension operators, technology developers, and other key players. This collective effort is vital for responsibly integrating AI into traditional pension frameworks while enhancing efficiency, trust, and accessibility for all Nigerians.

5. The Transformative Potential of Blockchain and AI Synergy in Pensions Administration

The incorporation of blockchain and AI into pension systems creates a powerful combination that enhances operational effectiveness, strengthens security measures, and deepens member engagement. By merging blockchain's reliable record-keeping capabilities with AI's

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[32] OECD. *OECD Employment Outlook 2023 Artificial Intelligence and the Labour Market.* <https://www.oecd.org/en/publications/oecd-employment-outlook-2023_08785bba-en/full-report/skill-needs-and-policies-in-the-age-of-artificial-intelligence_fe530fbf.html.> (Paris, France). July 11, 2023.

[33] C Riumallo-Herl and E Aguila, 'The effect of old-age pensions on health care utilization patterns and insurance uptake in Mexico.' *BMJ Global Health* 4, no. 6 (2019) <https://gh.bmj.com/content/bmjgh/4/6/e001771.full.pdf.> (London, UK).12 November 2019.

[34] G Nwaobi, (2024). Nigerian Firms and Digital Transformation: Incubations, Unipoding and Prospects. Quantitative Economic Research Bureau. MPRA Paper No. 121833.

analytical capabilities, pension administrators can tackle long-standing challenges, foster greater confidence among stakeholders, and improve retirement outcomes for beneficiaries.

The blockchain technology offers a revolutionary solution to Nigeria's pension system, addressing crucial issues such as security, transparency, and operational efficiency. It further explains that Artificial Intelligence (AI) and Machine Learning (ML) are reshaping the Nigerian pension sector by enhancing efficiency, accuracy, and decision-making processes.

The transformative potential of blockchain and AI synergy in pension administration introduces the following:

i. Leveraging Technology for Enhanced Security, Transparency, and Expanded Pension Coverage

Blockchain technology, with its decentralized and immutable ledger, establishes a secure and verifiable record of all transactions within a pension system. This encompasses contributions, benefit disbursements, and modifications to beneficiary details. By ensuring that each transaction is recorded and validated across the network, blockchain diminishes the likelihood of fraud, data manipulation, and errors. Additionally, smart contracts operating on the blockchain can automate processes and enforce agreements, thereby enhancing transparency and reducing reliance on intermediaries.[35]

Artificial Intelligence (AI) algorithms can provide continuous surveillance of blockchain networks to detect anomalies and identify potential fraudulent activities in real-time. AI also strengthens identity verification procedures, making it more challenging for unauthorized individuals to access or interfere with pension accounts. Additionally, AI can analyze large datasets within the blockchain to uncover trends and patterns that may indicate fraudulent behaviour.

The combined application of blockchain's secure and transparent record-keeping with AI's intelligent monitoring and analysis creates a robust system that substantially improves the security and transparency of pension administration.[36]AI offers the capacity to interpret and act upon the data securely stored on the blockchain, while blockchain delivers the secure and verifiable foundation essential for AI's operations. Beyond security and transparency, AI-powered tools, such as chatbots, can enhance customer service and expand the accessibility of pension products to Nigeria's underserved mass market. In a country with over 200 million people but only about 10 million pension accounts, these tools can offer timely guidance, address inquiries, and simplify processes for individuals

[35] D Kovács, M Bálint and V Weininger. 'Blockchain-Enabled Pension System Innovations: A Hungarian Case Study on Business Process Management Integration.' *Computers*, *13*(12), 345. 2024.

[36] Ikemefune, (n.18).

who may have limited financial literacy, thereby fostering greater inclusion.[37]

ii. Improving Efficiency and Reducing Costs

Virtual assistants can automate routine pension tasks, such as account updates, balance inquiries, and claims processing.[38]This automation leads to reduced operational costs and cycle times, resulting in faster execution and improved service delivery—a critical benefit for Nigeria's resource-constrained pension industry.[39]

iii. Personalized Communication and Guidance

AI chatbots offer the capability to analyze individual profiles and deliver tailored guidance on retirement planning and contributions. For example, they can alert users to milestones such as salary changes or provide personalized investment recommendations based on personal data.[40]This personalized approach helps to cultivate trust and engagement within the Nigerian workforce.

iv. Overcoming Data Challenges

The Nigerian pension industry faces challenges related to incomplete or outdated data. AI offers solutions by processing historical data to uncover trends and anomalies, and by promoting accurate record-keeping.[41]This results in improved decision-making capabilities for both operators and members.

v. Engaging Millennial and the Informal Sector

Given that a significant portion of Nigeria's workforce is in the informal sector, AI tools can enhance inclusion by offering user-friendly, mobile-based solutions. Additionally, chatbots can cater to millennial by providing digital-first experiences.[42]

AI-powered virtual assistants and chatbots offer Nigeria's pension industry a pathway to resolve systemic challenges and improve member engagement, operational efficiency, and accessibility.

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[37] T Adenmosun, 'The problem with pensions in Nigeria.' *Stears*. <https://www.stears.co/article/the-problem-with-pensions-in-nigeria/>. (Lagos, Nigeria). September 9, 2022.

[38] Ikemefune, (n.18).

[39] Okwechime, Janie. 'What has Data Analytics, Artificial Intelligence (AI) and Big Data got to do with Pensions?' <https://www.penop.com.ng/training/what-has-data-analytics-artificial-intelligence-ai-and-big-data-got-to-do-with-pensions(Lagos, Nigeria). Accessed March 17, 2025.

[40] J Okwechime, (n.18).

[41] Kovács Molnár, and Weininger. (n,35).

[42] Adenmosun, (n.37).

6. Comparative Analysis of AI-Driven Digital Transition in Nigerian Pension Administration, with Global Best Practices.

Globally, the pension administration landscape is experiencing a profound shift towards digitalization, notably through the adoption of artificial intelligence. Nigeria is also partaking in this evolution, albeit with a unique approach. By comparing Nigeria's current initiatives with established international best practices, we can highlight both its progression and distinctive focus within this AI-driven digital transformation.

i. Operational Automation

Nigeria's Approach

As earlier stated, Nigeria's pension sector is undergoing a transformative integration of artificial intelligence (AI) to enhance operational efficiency, security, and customer service. This integration involves the automation of administrative tasks, the deployment of AI-driven fraud detection systems, the utilization of chatbots for addressing customer inquiries, and the analysis of data to inform strategic decisions.[43] Particularly, the automation of Pension Clearance Certificates (PCCs) has significantly reduced processing times from two weeks to 48 hours, with over 38,000 digital certificates issued since 2024.[44]Additionally, four Pension Service Solution Providers (PSSPs) are set to deploy standardized remittance templates starting in April 2025.[45]

However, to ensure the successful and ethical implementation of AI within the pension system, several challenges must be addressed. These include overcoming infrastructure limitations, mitigating data privacy concerns, establishing a robust regulatory framework, and bridging the skills gap. Addressing these challenges is crucial for harnessing the full potential of AI in Nigeria's pension sector.

Global Best Practices

The Netherlands is at the forefront of leveraging AI in pension management, leading to significant improvements in operational efficiency and investment outcomes. AI is being used to automate various aspects of pension administration, such as data analysis and investment decision-making, which reduces operational costs and enhances decision-making

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[43] E Nwoji, 'PenCom: Pension Assets to Hit N22tn 2025'Q1 on Tech-driven Transformation,' THISDAYLIVE, (23 December 2024),<PenCom: Pension Assets to Hit N22tn 2025'Q1 on Tech-driven Transformation – THISDAYLIVE> accessed March 23, 2025.

[44] Nwoji, (n.43).

[45]B Chimobi, 'PenCom's New Policy: What Organisations and Employees Need to Know,' (Blog Post, March 19, 2025), <PenCom's New Policy: What Organisations and Employees Need to Know>. Accessed March 23, 2025.

processes.[46]This automation allows professionals to focus on more strategic tasks, improving overall productivity and customer service. Additionally, AI plays a crucial role in risk mitigation by identifying potential risks and enabling proactive measures to safeguard investments. The Dutch Pension Federation is actively working on a controlled and responsible use of AI, emphasizing principles such as transparency and human oversight.[47]

AI is also transforming the way pension providers interact with their clients. For instance, APG, a leading pension administrator in the Netherlands, is using generative AI like ChatGPT to create intelligent chatbots that provide personalized information to clients, enhancing their experience and understanding of retirement planning.[48]AI and machine learning models are also boosting analytical capacities in portfolio management and enhancing actuarial analyses of pension fund risks.[49]The integration of AI in the Dutch pension sector is guided by a principle-based approach, ensuring that AI applications are aligned with regulatory frameworks and sector-specific needs.[50]This approach not only supports operational efficiency but also fosters trust and rapport with pension plan members by maintaining transparency and robust governance.[51]

A key difference lies in the approaches to artificial intelligence within the Nigerian and Dutch pension sectors. In Nigeria, AI implementation is geared towards automating specific, isolated processes like issuing clearance certificates, and standardizing remittances.[52]The Netherlands, conversely, adopts a comprehensive strategy, integrating AI technologies throughout the pension value chain.[53]This reflects a fundamental divergence in how strategically AI is being utilized.

Nigeria's strategy focuses on streamlining individual tasks, leading to localized efficiency gains. However, this approach may not fully capture

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[46] 'How AI is transforming pension management.' *Benefits and Pensions Monitor*, 19 Oct.2023. <How AI is transforming pension management | Benefits and Pensions Monitor> accessed March 23, 2025.

[47] N Tuck, 'Dutch pension sector working on 'controlled and responsible' use of AI.' European Pensions, 20 Sep. 2024.<Dutch pension sector working on 'controlled and responsible' use of AI - European Pensions> accessed March 23, 2025.

[48] 'How AI is transforming pension management.' *Benefits and Pensions Monitor*, 19 Oct. 2023.< How AI is transforming pension management | Benefits and Pensions Monitor> accessed March 23, 2025.

[49] 'AI & Pensions' <https://expatpensionholland.nl/ai-pensions accessed > accessed March 23, 2025.

[50] Tuck, (n.47).

[51] 'AI Consultation response submission - Dutch pension funds.pdf.pdf.' Targeted consultation on artificial intelligence in the financial sector, 13 Sep. 2024.

[52] N Jones-Biyere, 'An Overview of Nigeria's National Artificial Intelligence Strategy (Draft), 2024.' *Kenna Partners*, August 2024.

[53] International Monetary Fund. Monetary and Capital Markets Department. 'Kingdom of the Netherlands-The Netherlands Financial Sector Assessment Program-Technical Note on Insurance and Pension Fund Regulation and Supervision.' 18 Jun. 2024.

the synergistic benefits of a comprehensive, interconnected AI ecosystem.[54]The Dutch model prioritizes the seamless integration of AI across all stages of pension management, from data collection and member interaction to investment strategy and risk assessment. This end-to-end integration creates a more dynamic and responsive system, enabling real-time adjustments and personalized services. The Dutch approach facilitates a fluid exchange of data and insights, leading to better-informed decision-making at all levels and creating a system that learns and adapts holistically, rather than improving isolated components.

ii. Member Experience Enhancement

Nigeria's Pension System

Nigeria's pension system currently lags behind global standards, as reflected in its lower ranking of 4.3 in the Allianz Global Pension Report.[55] This is primarily due to limited coverage, particularly within the informal sector, and a need to improve financial literacy and access to financial services among the population.[56]Besides, the system struggles to effectively redistribute wealth or provide adequate insurance against old-age risks, with benefits being heavily reliant on fluctuating investment returns and economic conditions.

Global Best Practices

Global best practices in pension systems encompass several key strategies to enhance security and inclusivity. Hybrid models, combining defined contribution and defined benefit elements, offer a balanced approach to managing retirement funds.[57]Inclusive approaches, extending coverage to the informal sector, ensure broader participation and reduce old-age poverty. Multi-pillar systems, integrating various pension schemes, mitigate risks and improve the capacity to protect retirees against financial uncertainties in old age.[58]

For instance, Sweden's pension system exemplifies a hybrid model that incorporates explicit redistribution, savings, and insurance functions, providing a comprehensive safety net.[59]Similarly, the UK pension system demonstrates an inclusive approach by extending its reach to the informal sector, ensuring that a larger segment of the population has access to retirement benefits.[60]These strategies reflect a commitment to building

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[54] Hayman, (n.8).

[55] 'Allianz ranks Nigeria bottom of global pension system.' Financial Nigeria, 28 Apr. 2023.

[56] O Muslim, 'Comparative Analysis of Pension Scheme in Nigeria and United Kingdom: Bridging the Gap' (2024) 12(11) Journal of Law and Sustainable Development, 1-24.

[57] R Holzmann, 'Global Pension Systems and Their Reform: Worldwide Drivers, Trends, and Challenges.' IZA Discussion Paper No. 6800, Aug. 2012.

[58] F Durán-Valverde, 'The ILO Multi-Pillar pension model: Building equitable and sustainable pension systems.' Social Protection for All Issue Brief.1-5.

[59] Holzmann, (n.57).

[60] Durán-Valverde, (n.58).

pension systems that are resilient, equitable, and capable of meeting the diverse needs of their populations

Significant Disparities between Nigeria and Global Leaders

A notable divergence exists between the Nigerian pension landscape and leading international models concerning the breadth of coverage. While nations such as the United Kingdom are actively pursuing strategies to integrate individuals engaged in informal economic activities into their pension frameworks, Nigeria faces ongoing challenges in expanding its overall pension coverage. This disparity underscores the necessity for Nigeria to explore and implement more inclusive approaches to pension provision.

The structural design of Nigeria's pension system, which is primarily based on a defined contribution (DC) model, contrasts with those employed by countries like Sweden. Sweden's approach integrates defined contribution (DC) and defined benefit (DB) elements, fostering a more diversified and robust system that allow for greater savings flexibility, insurance provisions, and redistribution mechanisms. This structural difference highlights potential areas where Nigeria could enhance its pension framework to provide greater security and flexibility for its participants.

The provision of minimum benefit guarantees also reveals significant differences. Unlike the Swedish model, which offers a more universally accessible minimum pension, Nigeria's system imposes specific eligibility criteria that individuals must meet to qualify for such benefits. This distinction in minimum benefit accessibility underscores the need for Nigeria to examine and potentially revise its qualification requirements to ensure a more equitable distribution of pension benefits.

The stability of pension investments represents another important area of divergence. Nigeria's pension system, heavily reliant on investment returns, is more susceptible to market volatility. In contrast, models such as Sweden's incorporate mechanisms that mitigates market risks, providing greater stability and predictability for pension beneficiaries. This difference in investment stability highlights the importance for Nigeria to consider diversifying its investment strategies and implementing risk mitigation measures to safeguard pension funds against market fluctuations.

Nigeria possesses the financial resources to improve its pension system, despite existing challenges.[61]Given its relatively young population and limited spending on elderly care, the country can strategically invest in reforms to broaden coverage, enhance benefit security, and ensure long-term sustainability. The anticipated moderate increase in the old-age

[61] Muslim, (n.56).

dependency ratio by 2050[62]offers an opportunity to implement such reforms.

iii. Risk Management

Globally, the application of artificial intelligence is fundamentally altering how pension risk is managed, with improvements seen in predictive modeling, streamlined operations, and increased participant interaction. Nations with developed economies, such as the Netherlands and Sweden, are at the forefront of this technological integration. In contrast, Nigeria's pension industry is just beginning to explore AI's potential for resolving its inherent systemic issues.

a. Predominance of Manual Operations

A significant impediment to the efficiency of Nigeria's pension sector is the continued reliance on manual procedures. This reliance results in extended processing times for claims resolution and a diminished overall experience for users.[63]Still, the participation rate in the Contributory Pension Scheme (CPS) remains notably low, with only a small fraction of the population actively involved.

b. Limited Integration of Advanced AI

The application of sophisticated AI tools, particularly in areas such as risk evaluation and predictive modeling, is currently underdeveloped within Nigeria's pension industry.[64]Similarly, the integration of AI into investment management practices is minimal, hindering the potential for enhanced decision-making and performance.

c. Initial Explorations of AI Applications

Insurance providers and Pension Fund Administrators (PFAs) are beginning to investigate the use of AI chatbots for fundamental customer interactions and claims processing. For instance, AI technology holds the potential to drastically reduce the timeframe for resolving motor insurance claims, from weeks to mere hours. Pilot initiatives are also being conducted in areas such as fraud detection and data normalization, but the expansion of these projects is constrained by infrastructure limitations.

d. Regulatory and Trust-Related Obstacles

A lack of financial understanding and skepticism towards pension systems present significant obstacles to increased participation.[65]While the use of AI-driven personalization could potentially address these issues by tailoring services and information, the implementation of such solutions

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[62] P. Tanyi, P. André, and P. Mbah, 'Care of the elderly in Nigeria: Implications for policy,' *Cogent Social Sciences* 4, no. 1 (2018).

[63] 'Analysts show how AI will shape Nigeria's insurance, pension sectors,' *Businessamlive*, April 9, 2024, < Analysts show how AI will shape Nigeria's insurance, pension sectors – Businessamlive> accessed March 24, 2025.

[64] Zaka, (n.2).

[65] KPMG Nigeria, '2024 Nigeria Pension Industry Customer Experience Survey,' (2024< 2024-nigeria-pension-industry-customer-experience-surve - KPMG Nigeria> accessed March 24, 2025.

necessitates the establishment of robust regulatory frameworks to guarantee data protection and security.

Global Best Practices

Artificial intelligence is being employed to evaluate market patterns, life expectancy risks, and financial projections, allowing for the simulation of various disruptive events, such as inflationary pressures or company failures.[66]In a notable example, Sweden's integrated pension framework utilizes AI to perform adaptive asset-liability management, effectively harmonizing both defined benefit and defined contribution components.[67]Techniques such as generative AI are improving the accuracy of actuarial estimations and strategies for risk reduction, facilitating the ability to make instant adjustments to investment portfolios based on current market conditions.[68]

The automation of data processing is significantly improving the efficiency of pension risk transfer (PRT) activities, minimizing errors in benefit calculations and regulatory reporting. In the United Kingdom, AI is used to standardize the data from smaller pension schemes, enabling faster large-scale annuity purchases from insurance providers. AI-powered chatbots and customized dashboards are being implemented to improve financial education and increase member participation. In the Netherlands,[69]AI is utilized to develop individualized retirement plans, contributing to the nation's high ranking in the 2023 Mercer CFA Institute Global Pension Index.

Natural language processing is also being leveraged to monitor changes in regulations and ensure adherence to compliance standards. Swedish pension funds are also utilizing AI to enhance decision-making processes involving multiple stakeholders and to improve the effectiveness of trustee governance.

Globally, pension fund management is increasingly leveraging advanced technologies, with real-time risk simulations,[70]AI-driven personalized planning, AI-enhanced governance, and automated legal compliance becoming commonplace. In contrast, Nigeria's pension sector

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[66] Olivier Fines, 'AI and machine learning to enhance pension plan governance and the investor experience: new CFA Institute research,' *CFA Institute*, December 17, 2024, < AI and machine learning to enhance pension plan governance and the investor experience: new CFA Institute research | CFA Institute> accessed March 24, 2025.

[67] CFA Institute. (n.d.). AI and Machine Learning to Enhance Pension Plan Governance and the Investor Experience: New CFA Institute Research. FF News | Fintech Finance.< https://ffnews.com/news/fintech/ai-and-machine-learning-to-enhance-pension-plan-governance-and-the-investor-experience-new-cfa-institute-research/> accessed March 24, 2025.

[68] Scribbledata. (n.d.). Generative AI in Pension Risk Transfer: Introduction, and Key Use Cases. < Generative AI in Pension Risk Transfer: Introduction, and Key Use Cases> accessed March 24, 2025.

[69] BPM, (n.7).

[70] O Onabowale, The Rise of AI and Robo-Advisors: Redefining Financial Strategies in the Digital Age. *International Journal of Research Publication and Reviews,* (2024). 6.

predominantly relies on traditional methods, characterized by static risk models, basic member engagement through SMS and portals, manual governance oversight, and manual regulatory reporting, indicating a significant technological gap.

iv. Inclusion Strategies

AI has the potential to significantly expand financial inclusion, particularly for marginalized populations.[71]AI simplifies complex financial tasks, making it easier for underserved populations to understand and make financial decisions. Nigeria is striving to broaden pension coverage to include its large informal workforce, while global leaders are leveraging AI to enhance inclusion.

In an effort to broaden pension coverage in Nigeria, PenCom is focusing on the informal sector, creating micro-pension plans that offer flexible contribution options tailored to the income streams of these workers. This initiative seeks to integrate over 60 million individuals into the national pension scheme, ensuring they have access to retirement savings.[72]Recognizing that a lack of confidence in the pension system and insufficient understanding of its benefits are significant hurdles for informal sector workers, the National Pension Commission (PenCom) is actively working to build trust and raise awareness through targeted outreach. This involves proactive engagement with strategic stakeholders, including organizing sensitization campaigns to educate potential participants about the advantages of the micro-pension scheme and addressing any concerns they may have. Also, PenCom is forging strategic partnerships with trade associations and other relevant organizations that represent informal workers. By collaborating with these established groups, PenCom aims to leverage existing relationships and communication channels to effectively disseminate information and encourage participation in the micro-pension initiative.

To overcome the challenges of reaching and enrolling a widely dispersed and often less digitally connected informal workforce, Nigeria is leveraging the power of mobile technology. This includes utilizing mobile phone platforms and Unstructured Supplementary Service Data (USSD)-based services, which are accessible even on basic mobile phones without internet access. By employing these technologies, the micro-pension scheme aims to simplify the enrollment process, making it more convenient and accessible for informal workers to register and begin

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71 N Aishwaryalaxmi, and P Rathod, (2024). Artificial Intelligence (AI) as a Moderating Variable in the Relationship Between Financial Inclusion, Digital Adoption, and Financial Literacy in Developing Economies. In ITM Web of Conferences (Vol. 68, p. 01034). EDP Sciences.

72 D Kadaba, P Aithal, and S KRS, 'Impact of Digital Financial Inclusion (DFI) Initiatives on the Self-Help Group: For Sustainable Development', (2023) *8 Int'l J. Mgmt., Tech., & Soc. Sci.* (IJMTS) 20.

contributing. This approach directly addresses logistical barriers and seeks to increase participation by meeting individuals where they are, both geographically and technologically.

Global Best Practices

In Brazil, behavioral AI is used to encourage enrollment in pension plans by analyzing individual behaviours and delivering customized prompts to increase participation.[73]This approach leverages principles of behavioral economics to promote voluntary pension savings through automatic enrollment in employer-sponsored supplementary pension plans, with the option for workers to opt out. Brazil launched an automatic enrollment public policy on February 27, 2024 for employer-sponsored supplementary pension plans, where all workers hired by a company that offers a sponsored pension plan will be automatically enrolled in the plan without needing to apply for membership.[74]

India's Aadhaar-linked pension system utilizes biometric identification to reach a high coverage rate of 98%, which helps ensure access to and management of pension benefits, even for marginalized populations.[75]This system, known as Jeevan Pramaan, uses the Aadhaar platform for biometric authentication of pensioners, streamlining the process of obtaining life certificates and making it easier for pensioners to receive their rightful pension amount.[76]Pensioners provide their Aadhaar number and biometrics (fingerprint or iris scan) for authentication.[77]Digital Life Certificates are generated and stored in a repository, accessible to pension disbursing agencies.[78]

7. Conclusion

The integration of Artificial Intelligence (AI) presents a transformative opportunity for Nigeria's pension sector, addressing critical challenges such as low coverage, operational inefficiencies, and diminished member engagement. This analysis reveals AI's capacity to drive inclusive pension coverage, particularly within the informal economy,[79]and to automate administrative processes, significantly

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[73] M Nicolás, and R Sampaio, 'Balancing Efficiency and Public Interest: The Impact of AI Automation on Social Benefit Provision in Brazil' (2024) 13(3) *Internet Policy Review*.1

[74] Boletín, Pension Notes N° 80 / Automatic enrolment in pension plans in Brazil and other jurisdictions* (Pension Notes N° 80, June 2024). Accessed 24 March 2025.

[75] S Banerjee, 'Digital Dividends world development report Aadhaar: Digital Inclusion and Public Services in India' *Conference Proceedings* (2016) 1-16.

[76] S Kulkarni, Biometric-enabled digital life certificate for pensioners: 6 benefits, how to avail from home The Economic Times (India, Oct 24, 2024) <economictimes.indiatimes.com> accessed March 24, 2025.

[77] Kulkarni, (n.76).

[78] Banerjee, (n.75).

[79] H Falaiye 'Inclusive pension scheme vital for informal workforce' *Punch Newspaper* (Lagos, 8th January 2025)< 'Inclusive pension scheme vital for informal workforce'> accessed March 24, 2025.

enhancing operational efficiency. Additionally, AI-driven strategies have demonstrated their effectiveness in optimizing investment decisions, managing risks, and fostering stronger member relationships through personalized services and real-time information access.

However, the successful deployment of AI necessitates a strategic approach that acknowledges and mitigates existing ethical, regulatory, and technical barriers. Specifically, the complexities of traditional pension data frameworks require robust data protection measures and a commitment to ethical AI practices. The exploration of blockchain and AI synergy highlights the potential for creating a more transparent and secure pension ecosystem.

Nigeria can improve its pension system by learning from global best practices, particularly the Netherlands' success in using AI for member engagement and efficiency. Collaboration between regulators, administrators, and tech providers is vital for establishing transparent and accountable frameworks. By adapting global strategies and addressing cybersecurity, regulatory compliance, and the need for human interaction, Nigeria can leverage AI to reduce costs by 20-40% and expand pension coverage significantly.

The successful integration of AI into Nigerian pension administration requires a comprehensive strategy that includes technological advancements, regulatory adherence, and ethical considerations. By focusing on data, partnerships, and beneficiary needs, Nigeria can create a strong and sustainable pension system. This digital shift is crucial for the financial security of future generations and, with ethical implementation guided by global examples, will lead to a more just and stable pension landscape, promoting social justice and economic stability.

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