



ETHICAL AND SOCIETAL IMPACT OF ARTIFICIAL INTELLIGENCE (AI)

Nigerian Communications
Commission

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1. CHAPTER 1: INTRODUCTION

1.1. BACKGROUND

In a world that is becoming more technology centric, it is only appropriate to consider the ramifications of creating various forms of life from that technology. One of such disruptive technology that is changing the way the world operates is Artificial Intelligence (AI). As the science and advancement of AI develops, smart technologies are increasingly being deployed and will have profound ethical, psychological, social, economic, and legal consequences for human society and our planet. Artificial autonomous agents are simply the next stage in the development of technology. Autonomous agents perceive, decide, and act on their own. In summary, autonomous agents behave as humans. This is a radical, qualitative change in our technology and in our image of technology. This raises concerns of the fact that AI agents could in the future, take unwanted actions that result in dire consequences.

It's increasingly clear that AI systems can be biased and that is a problem when they are put into roles of public trust, such as issuing criminal sentences or distributing welfare which could yield unequal treatment of the society member, based on their data-ful inherent biases and racial profiling. Hence the replacement of humans with these systems seems more dangerous than advantageous, in roles where the unique human mind is necessary. Ben Shneiderman, a University of Maryland renowned computer scientist who has for decades warned against blindly automating tasks with computers, stated that robots should collaborate with humans, rather than replace them (Markoff, 2020)¹. Instead of trying to create autonomous robots, he advised that, "designers should focus on a new mantra, designing computerized machines that are reliable, safe and trustworthy", with stringent monitoring on the human side. He stresses the need for public policy considerations that focus on technical and economic implications, and on the development of trustworthy and human-centered AI systems.

Inspired by recent triumphs in machine learning applications, issues of the societal impacts, governance, and ethics of these technologies have led to a deluge of concern, research and attention from policy makers (Pery, 2020)². Furthermore, in addition to Companies, Employees and societies, national education systems and the Legislature are also

¹ Markoff, J., 2020. A Case For Cooperation Between Machines And Humans. [online] Nytimes.com. Available at: <<https://www.nytimes.com/2020/05/21/technology/ben-shneiderman-automation-humans.html>>.

² Pery, A., 2020. Ethical Use of Data for Training Machine Learning Technology. AIIM. Available at: <https://info.aiim.org/aiim-blog/ethical-use-of-data-for-training-machine-learning-technology-part-2>

grappling with the new challenges resulting from constantly evolving technology. As Technology becomes much more sophisticated, this is having a substantial impact on the workforce. From Chatbots to driverless vehicles, AI has modernized various sectors globally such as healthcare, transportation, security, financial services, e-commerce and manufacturing (Valluri, 2017)³. These rapidly linked business areas, (leading to multiple linked algorithm, data-handling tools, and automated systems) are a leading current concern about technology's potential for profound and disruptive societal transformation (Souter, 2019)⁴. With the challenges of increased population, urban density and changing consumer expectations, advanced data mining, coupled with the power of AI have the potential to transform our society and how society meets the needs of its communities.

1.2. GENERAL STATEMENT OF THE PROBLEM

Due to the wide deployment of AI technology (in areas such as healthcare, financial services, manufacturing, agriculture, Smart Cities amongst others) that has already initiated the transformation of our societies, the emergence of ethical, legal and social challenges around their use has led to a collective debate on the potential positive and negative impact of AI, and if we can indeed allow these systems to occupy human roles. Hence, this research paper aims to dissect AI, its impact on society and the ethical considerations concerning its wide deployment.

1.3. SIGNIFICANCE OF THE STUDY

Due to the constant development of the ICT sector, AI continuously undergoes change cycles that result in new emerging ethical, social and legal issues. The topical nature of this study has not been thoroughly explored in previous research studies. This study would pave a way for future studies on AI and provide the Nigerian Communications Commissions with informed recommendations of measures that would see to the safe and ethical deployment and regulation of AI in Nigeria.

1.4. RESEARCH QUESTIONS

This study will focus on and answer the following research questions:

1. How does AI impact the society?
2. What are the ethical considerations related to AI?

³ Valluriorg. 2020. Artificial Intelligence And Its Applications. [online] Available at: <<https://www.valluriorg.com/blog/artificial-intelligence-and-its-applications/>>.

⁴ Souter, D. 2019. Inside the Digital Society: Why do we need ethics in AI?. Available at: <https://www.apc.org/en/blog/inside-digital-society-why-do-we-need-ethics-ai>

3. Can AI be regulated? If so, how?

1.5. LIMITATIONS

This topical field of study is new and understudied hence there is limited information. The social and ethical challenges of AI weigh heavily upon multifaceted fields, such as international humanitarian law, intellectual property, data protection. As well as ethical enquiries, such as governance, ethical research, fairness, or transparency (Larsson and Heintz, 2020)⁵. The scope of the study cannot encompass all the various fields due to time and resource constraints, hence it is limited to general interdisciplinary survey of literature.

⁵ Larsson, S. and Heintz, F., 2020. Transparency in artificial intelligence. *Internet Policy Review*, 9(2). Available at: <https://policyreview.info/concepts/transparency-artificial-intelligence>

2. CHAPTER 3: LITERATURE REVIEW

2.1. HISTORY OF AI

The American Heritage Science Dictionary (2020) defines AI as the ability of a computer or other machine to perform actions thought to require intelligence⁶. The actions include logical deduction and inference, creativity, the ability to make deductions based on past experience or insufficient or conflicting information, and the ability to understand language. Today, AI Researchers are drawing parallels with how humans think. A recent definition from Stanford University's 100 Year Study on AI describes AI as "a science and a set of computational technologies that are inspired by, but typically operate quite differently from, the ways people use their nervous systems and bodies to sense, learn, reason, and take action (Peter Stone et al., 2016)⁷. In layman's terms, AI is the development of computer systems that are able to perform tasks that would require human intelligence. Examples of such tasks are visual perception, speech recognition, decision-making, and translation of languages. The emerging field of AI is a multidisciplinary concept combining Philosophy, Logic/Mathematics, Computation, Psychology, Neuroscience and Evolution.

The seeds of modern AI were idealized by classical philosophers who attempted to describe the process of human thinking (Chincholkar and Sarkar, n.d.)⁸. This work culminated in the invention of the programmable digital computer in the 1940s. This device and its accompanying ideas inspired scientists to start considering the possibility of creating an electronic brain. In 1950, British mathematician Alan Turing published a paper on computing machinery and intelligence (Turing, 1950) posing the question of whether machines can think. He developed a simple experiment to test his hypothesis: could a computer have a conversation and answer questions in a way that would trick a suspicious human into thinking the computer was actually a human? The resulting "Turing test" is still used till this date. The term AI was coined by John McCarthy, an American computer scientist, in 1956 at The Dartmouth Conference where the discipline was officially born (Valluri, 2017)⁹. It is currently used as an umbrella term that encompasses everything from robotic process automation to actual robotics.

⁶ The American Heritage Science Dictionary. Available at: <https://ahdictionary.com/word/search.html?q=artificial+intelligence>

⁷ Peter Stone et al., *Artificial Intelligence and Life in 2030: One Hundred Year Study on Artificial Intelligence* (Stanford: Stanford University, 2016), https://ai100.stanford.edu/sites/default/files/ai100report10032016fnl_singles.pdf.

⁸ Chincholkar, M. and Sarkar, R., n.d. *Artificial Intelligence : Renaissance Of Technology*. [online] Medium. Available at: <<https://becominghuman.ai/artificial-intelligence-renaissance-of-technology-66a98c1c6975>>.

⁹ Valluri. 2017. *Artificial Intelligence And Its Applications*. [online] Available at: <<https://www.valluriorg.com/blog/artificial-intelligence-and-its-applications/>>.

Although such ideas were developed fairly long ago, computers needed to fundamentally change before the implementation of AI. Before 1949, computers were unable to store commands and could only execute them. In other words, the computers couldn't remember what they did and could only execute commands. Secondly, computing was extremely expensive. In the early 1950s, the cost of leasing a computer ran up to \$200,000 a month (Anyoha, 2017)¹⁰. Only prestigious Universities and big Technology companies could afford to experiment in such precarious research. A proof of concept as well as advocacy from high profile people were also needed to persuade funding sources that machine intelligence was worth pursuing. In recent times however, the fundamental limit of computer storage that was holding Society back 30 years ago is no longer a problem. Moore's Law, which estimates that the memory and speed of computers doubles every year, had finally caught up with computing, following immense breakthroughs in computer science, mathematics, and neuroscience. As a Society, we now live in the age of big data, an age in which we have the capacity to collect huge sums of information too cumbersome for any human being to process, but which fall within the capabilities of AI. The application of AI in this regard has already been quite fruitful in several industries such as technology, banking, marketing, and entertainment (Anyoha, 2017).

2.2. APPLICATIONS OF AI

AI involves a variety of technologies and tools, such as Natural Language Generation and processing, Speech Recognition, Machine Learning, Deep Learning Platforms, Biometrics, Robotic Process Automation and Text Analytics (Ajay, 2018)¹¹; all of which give breadth to a wide range of applications. The anticipated future impact on health care, our economy, climatic changes and education system is enormous. Market Intelligence firm IDC predicted that the worldwide spending on cognitive and AI systems would reach \$77.6 billion by 2022 (Takar, 2018)¹².

It is anticipated that in Africa, major developments in AI will be centered on solving real-world problems affecting ordinary people's lives. These will include policies that favor advancement of AI talent, support operations in industries like telecommunications, encourage research in health and agriculture, guide data collection and protection, and

¹⁰ Anyoha, R., 2017. The History Of Artificial Intelligence - Science In The News. [online] Science in the News. Available at: <<http://sitn.hms.harvard.edu/flash/2017/history-artificial-intelligence/>>.

¹¹ Ajay, V. 2018. Artificial Intelligence – A Blend Of Hype And Opportunities. Available at: <https://thinkpalm.com/blogs/artificial-intelligence-blend-hype-opportunities/>

¹² Takar, J., 2018. Applications Of Artificial Intelligence In Top 10 Areas. [online] Available at: <<https://learntechx.com/blog/applications-of-artificial-intelligence-in-top-10-areas>>

lastly address issues of online misinformation (Nayebare, 2019)¹³. While the philosophical debate on the ethical concerns around AI continues in several circles, we have seen a myriad of business applications of AI such as consumer marketing, identification technologies, intrusion detection, and machine translation.

Below are some of the areas that AI has made a huge impact on various aspects of human daily life (Valluri, 2017)¹⁴:

- **Healthcare:** Companies are applying machine learning to make better and faster diagnosis than the human capability. AI is currently being applied for a range of healthcare needs, including data mining for identifying patterns and then carrying out the more accurate diagnosis and treatment of medical conditions, medical imaging, medication management, drug discovery, and even robotic surgery (Valluri, 2017). The entry of technology giants such as Microsoft, Google, Apple, and IBM in the healthcare sector holds significant importance for the industry. One of the best-known technologies is IBM's Watson, a cognitive computing system that has a myriad range of applications in Healthcare, Finance, retail and other sectors (Forrest, 2020)¹⁵. Watson understands natural language and mines patient data and other available data sources to form hypothesis in Healthcare.
- **Business, Retail and E-commerce:** Robotic process automation is being applied to highly repetitive tasks normally performed by humans. Machine learning algorithms are being integrated into analytics and Customer relationship management (CRM) platforms to perform analytics on how to better serve customers. Chatbots have already been incorporated into websites and e-commerce companies to enhance customer experience. Another example is the product recommendations on Amazon accounts, which are a real-time application of complex AI algorithms to determine which products consumers are more likely to buy. Automation of job positions has also become a talking point among academics and IT consultancies (Valluri, 2017)¹⁶.

¹³ Nayebare, M., 2019. Artificial Intelligence Policies In Africa Over The Next Five Years | XRDS: Crossroads, The ACM Magazine For Students. [online] Dl.acm.org. Available at: <<https://dl.acm.org/doi/abs/10.1145/3368075>>.

¹⁴ Valluriorg. 2020. Artificial Intelligence And Its Applications. [online] Available at: <<https://www.valluriorg.com/blog/artificial-intelligence-and-its-applications/>>.

¹⁵ Forrest, C., 2020. IBM Watson: What Are Companies Using It For? | Zdnet. [online] ZDNet. Available at: <<https://www.zdnet.com/article/ibm-watson-what-are-companies-using-it-for/>>.

¹⁶ Valluriorg. 2020. Artificial Intelligence And Its Applications. [online] Available at: <<https://www.valluriorg.com/blog/artificial-intelligence-and-its-applications/>>.

- **Banking and Financial Services:** The Banking and Financial Services industry is undergoing a massive transformation due to the onset of AI applications. Human agents are increasingly being replaced by intelligent software robots for processing loan applications in fractions of a second. Similarly, Robo-financial advisors sift through multiple levels of data in split seconds to recommend the right investment decisions for customers. Fraud detection is another important application of AI in the finance sector is. For instance, MasterCard uses AI-based Decision Intelligence technology to detect fraudulent transactions by analyzing various data points (Takyar, 2020)¹⁷.
- **Autonomous vehicles:** Just like humans, self-driving cars need to have sensors to understand the world around them and a brain to collect, processes and choose specific actions based on information gathered. Autonomous vehicles are equipped with advanced tools to gather information, including long range radar and cameras. Each of the technologies are used in different capacities and each collects different information. The AI system then processes the information from the various tech and provides further action (Valluri, 2017)¹⁸. This is where AI can be compared to human brain.
- **Manufacturing:** In manufacturing, AI is being employed across several lines and layers of operations, from workforce planning to product design, thus improving efficiency, product quality, and employee safety (Takar, 2018)¹⁹. In factories, machine learning and artificial neural networks are employed to support predictive maintenance of critical industrial equipment, which can accurately predict asset malfunction. It helps the management take timely measures to restore the equipment and prevent costly unplanned downtime.

2.3. LIMITATIONS OF AI

There are many unresolved technological issues and performance limitations that severely affect the development and implementation of AI systems, and its proper and ethical use. The most critical of these problems confronting corporations and institutions and the solutions are explained below:

¹⁷ Takyar, A., 2020. AI Applications Across Major Industries - Dzone AI. [online] dzone.com. Available at: <<https://dzone.com/articles/ai-applications-across-major-industries>>.

¹⁸ Valluriorg. 2020. Artificial Intelligence And Its Applications. [online] Available at: <<https://www.valluriorg.com/blog/artificial-intelligence-and-its-applications/>>.

¹⁹ Takar, J., 2018. Applications Of Artificial Intelligence In Top 10 Areas. [online] Available at: <<https://learntechx.com/blog/applications-of-artificial-intelligence-in-top-10-areas>>

- **Software Standards and Interoperability**

No general standards exist in expert system software and development methodology. AI systems are often developed uniquely with little consideration for interoperability and are usually products of the developers' mind. Recent efforts in defining expert system standards have been actively pursued by a coalition of the American Association of AI (AAAI), the IEEE Computer Society, DARPA (Defense Advanced Research Projects Agency), and other organizations/ unions (Huang et al., 2006)²⁰. Development complexity, biases, costs, and risks could be greatly reduced once widely accepted standards are established and a new generation of expert system tools is in place.

- **Prone to error**

As sophisticated as AI is, like all machines, AI systems can be prone to error and failure. This was showcased when Facebook's bots attained a 70% failure rate and began communicating in unintelligible language in 2017 (Orlowski, 2017)²¹. Machine errors are acceptable, however, for critical AI applications such as autonomous vehicles and healthcare robots, the acceptable error rate has to be minimal (Akrouf, 2018)²².

- **Use of big data**

AI is less effective than humans in executing tasks that lack rules or data such as recommending products to new customers or suggesting investment portfolios (Akrouf, 2018)²³. AI systems require large amounts of task-specific data which is difficult, time-consuming and expensive to manage.

- **Inability to perceive causal reasoning**

AI algorithms in general practice reasoning by association in data sets. They do not take into account the relationship between cause and effect which points to a need for a causal framework in the design of AI algorithms in the future (Akrouf, 2018)²⁴.

²⁰ Huang, T., et al. 2006. [online] Courses.cs.washington.edu. Available at: <<https://courses.cs.washington.edu/courses/csep590/06au/projects/history-ai.pdf>>.

²¹ Orlowski, A., 2017. Facebook Scales Back AI Flagship After Chatbots Hit 70% F-AI-Lure Rate. [online] Theregister.com. Available at: <https://www.theregister.com/2017/02/22/facebook_ai_fail/>

²² Akrouf, M., 2018. The Limitations Of AI Today - Prescouter - Custom Intelligence From A Global Network Of Experts. [online] PreScouter. Available at: <<https://www.prescouter.com/2018/06/the-limitations-of-ai-today/>>

²³ Akrouf, M., 2018. The Limitations Of AI Today - Prescouter - Custom Intelligence From A Global Network Of Experts. [online] PreScouter. Available at: <<https://www.prescouter.com/2018/06/the-limitations-of-ai-today/>>

²⁴ Akrouf, M., 2018. The Limitations Of AI Today - Prescouter - Custom Intelligence From A Global Network Of Experts. [online] PreScouter. Available at: <<https://www.prescouter.com/2018/06/the-limitations-of-ai-today/>>

- **Vulnerability to adversarial attacks**

Adversarial attacks are attacks on deep learning neural networks such as AI in the form of inputs that ultimately result in unexpected and unwanted results (Stone, 2020)²⁵. These attacks are easy to hide as they are usually slight modifications that make them appear harmless. This vulnerabilities could result in breach of security ramifications as exhibited when the Wall Street Journal used adversarial attacks to trick the iPhone X's facial recognition feature by creating fake masks (Stern, 2017)²⁶

2.4. ETHICAL AND SOCIETAL IMPACT OF AI

Ethical and social issues both have huge roles to play in the society as they impact us in both individual and collective levels. Ethical issues consist of problems caused by individuals that result in negative impact on the individual or the society while social issues are problems that greatly influence large populations, positively or negatively. Whilst the two are similar as they both affect individuals and sometimes the society, they are different. Unlike ethical issues, social issues affect the society as a whole, are complex and difficult to control and cannot be solved with sanctions/ incentives. Ethical issues in AI design and implementation and Social impact are interconnected and with all the technological advancements, the society will face further challenges in directing and investing in technologies that benefit humanity instead of destroying it or intruding on basic human rights of privacy and freedom of access to information. Social impact involves those who the technology will directly or indirectly impact our life from individual perspective, community and the society at large.

The rapid development and evolution of AI technologies, while unleashing opportunities for business and communities across the world, have prompted a number of important deliberations. Civil society is demanding more accountability in the way AI technologies are used, trying to find a solution to the legal and ethical issues that will be resulted from the growing consolidation of AI in people's daily lives (Ministry for Europe and Foreign Affairs, 2020)²⁷. In spite of the positive impact that these emerging technologies bear on humanity, they

²⁵ Stone, M., 2020. Why Adversarial Examples Are Such A Dangerous Threat To Deep Learning. [online] Security Intelligence. Available at: <<https://securityintelligence.com/articles/why-adversarial-examples-are-such-a-dangerous-threat-to-deep-learning/>>

²⁶ Stern, J., 2017. Iphone X Review: How We Tested (And Tricked) Faceid. [online] WSJ. Available at: <<https://www.wsj.com/articles/iphone-x-how-we-tested-and-tricked-faceid-1509465766>>

²⁷ Ministry for Europe and Foreign Affairs. 2020. Transparency And Accountability : The Challenges Of Artificial Intelligence. [online] Available at: <<https://www.diplomatie.gouv.fr/en/french-foreign-policy/digital-diplomacy/transparency-and-accountability-the-challenges-of-artificial-intelligence/>>

increasingly seem to be characterized by vulnerabilities that hinder accuracy, security, accountability and many others.

2.4.1. ETHICAL IMPACT

Ethics can be defined as a set of principles that guide people's behavior (BBC, n.d)²⁸. Societies around the world have their own unique ethical vocabularies, perceptions and expectations which are all shaped by culture (BBC, n.d)²⁹. Ethical principles such as fairness and privacy might mean different things in Saudi Arabia and the United States. This lends to the notion that AI is highly likely to have different social impacts depending on cultural setting, which influence ethical values. Perceptions of AI, and its use, are also majorly shaped by the regions' local culture and social contexts. This consideration shows the problems inherent in assuming any one ethical standard can be perfect, since how AI is designed and perceived may vary from one region to another. The following highlight the ethical implications of AI.

- **Bias:** Bias can be generally defined as prejudice against one person or a group of people. AI is created by humans, which means it can be susceptible to bias. Systematic bias may arise as a result of the data used to train systems, or as a result of values held by system developers and users. It most frequently occurs when machine learning applications are trained on data that only reflect certain demographic groups, or which reflect societal biases. AI that is biased against particular groups within society can have far-reaching effects. Its use in law enforcement or national security, for example, could result in some demographics being unfairly imprisoned or detained (Future of Science and Technology (STOA), 2020)³⁰. Alternatively, in unique cases such as child online protection, it is actually a good thing for AI to target such groups.
- **Inequality:** one devastating outcome of AI technology is the widening of wealth gap. Whilst AI driven companies will make all the money the technology reduces the human workforce in different companies, thereby less revenue is generated amongst the populace due to loss of earnings. This effect can augment the social inequality and amplify the gap between low and higher end

²⁸ BBC. n.d. BBC - Ethics - Introduction To Ethics: Ethics: A General Introduction. [online] Available at: <http://www.bbc.co.uk/ethics/introduction/intro_1.shtml>

²⁹ BBC. n.d. BBC - Ethics - Introduction To Ethics: Ethics: A General Introduction. [online] Available at: <http://www.bbc.co.uk/ethics/introduction/intro_1.shtml>

³⁰ STOA, 2020. [online] Europarl.europa.eu. Available at: <[https://www.europarl.europa.eu/RegData/etudes/STUD/2020/634452/EPRS_STU\(2020\)634452_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/STUD/2020/634452/EPRS_STU(2020)634452_EN.pdf)>.

job earnings. (Madrakis, 2017). Potentially, AI might widen gaps between countries, reinforcing the current digital divide (Bughin et al., 2018)³¹. On the positive side, AI could also lessen the digital divide. According to ITU, AI can help bridge the digital divide and create an inclusive society by integrating human ability into its solutions (Stewart, 2018)³².

- **Privacy, human rights and dignity:** AI will have profound impacts on privacy in the next decade. The privacy and dignity of AI users must be carefully considered when designing service, care and companion robots, as their presence in homes means they will be privy to intensely private moments. Although generally, AI is seen to infringe on privacy, it could also solve other social issues. For example, facial recognition cameras in cities could breach privacy by storing imagery of the public, but that imagery could be used in solving crimes and identification of criminals. (Future of Science and Technology (STOA), 2020)³³.
- **Environmental impact:** AI can be used in waste management and pollution reduction, through reduction of greenhouse emission and traffic congestion by autonomous vehicles, and deep learning technology for enhancement of biodiversity and local conservation efforts (World Economic Forum, 2018)³⁴. This however, is a double edged sword as AI and robotics utilize a considerable amount of energy due to computing power which could further deteriorate the environment, rather than solving issues (World Economic Forum, 2018)³⁵.

2.4.2. SOCIETAL IMPACT

AI has the potential to bring significant and diverse benefits to society and may be capable of tackling a number of the most difficult global issues, and thus improve countless lives. However, whilst AI has the potential for bringing a great number of benefits, it may also be

³¹ Bughin, J. et al. (2018). *Notes from the AI frontier: Modeling the impact of AI on the world economy*. Retrieved from: <https://www.mckinsey.com/featured-insights/artificial-intelligence/notes-from-the-ai-frontier-modeling-the-impact-of-ai-on-the-world-economy>

³² Stewart, U., 2018. AI Can Help To Bridge The Digital Divide And Create An Inclusive Society. [online] ITU News. Available at: <<https://news.itu.int/ai-can-help-to-bridge-the-digital-divide-and-create-an-inclusive-society/>>.

³³ STOA, 2020. [online] [Europarl.europa.eu](http://europarl.europa.eu). Available at: <[https://www.europarl.europa.eu/RegData/etudes/STUD/2020/634452/EPRS_STU\(2020\)634452_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/STUD/2020/634452/EPRS_STU(2020)634452_EN.pdf)>.

³⁴ World Economic Forum. 2018. *Harnessing Artificial Intelligence For The Earth*. Available at: <http://www3.weforum.org/docs/Harnessing_Artificial_Intelligence_for_the_Earth_report_2018.pdf>

³⁵ World Economic Forum. 2018. *Harnessing Artificial Intelligence For The Earth*. Available at: <http://www3.weforum.org/docs/Harnessing_Artificial_Intelligence_for_the_Earth_report_2018.pdf>

disruptive, with uneven and hard-to-predict implications for the society, as highlighted below in various societal dimensions (Future of Science and Technology (STOA), 2020)³⁶:

- **Economic impact of AI:** AI technology is already bringing about an industrial revolution with immense impact on manufacturing industries, professional services, financial services, and wholesale and retail. Price Waterhouse Coopers (PwC) estimates that AI could add as much as \$15.7 trillion to the global economy by 2030 (Business Insider, 2017)³⁷. A number of factors such as automation, innovation, and new competition, affect AI-driven productivity growth. Countries such as China and the United States are already starting to take an advantage of the opportunities presented by AI and have achieved breakthrough and beneficial utilization of the technology (Sherman, 2019)³⁸. In a dire view, the negative effect AI has economically is its implications for Income Distribution. AI increases the disparity of wealth between the richest and poorest in the society since only people that can afford and access AI systems and have the skillset/know-how can use it for economic gain (Daws, 2018)³⁹.
- **Public Health:** AI and robotics are rapidly moving into the field of healthcare and will increasingly play roles in diagnosis and clinical treatment. For example, currently, robots are being used in the diagnosis of patients such as the IBM Watson solution (Forrest, 2020)⁴⁰. Alternatively, as robots become more prevalent, the potential for future harm will increase, particularly in the case of, assistive robots and drones, which will face decisions that have real consequences for human safety and well-being. (Lin et al., 2017)⁴¹. According to a study carried out on adverse events in Robotic Surgery, 144 deaths, 1,391 injuries and 8,061 device malfunctions were reported over the course of 14 years in the

³⁶ STOA, 2020. [online] Europarl.europa.eu. Available at: <[https://www.europarl.europa.eu/RegData/etudes/STUD/2020/634452/EPRS_STU\(2020\)634452_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/STUD/2020/634452/EPRS_STU(2020)634452_EN.pdf)>.

³⁷ Business Insider, (2017). *How 9 industries are being transformed by UK innovation around the world*. Retrieved from:

<https://www.businessinsider.com/sc/artificial-intelligence-companies?IR=T>

³⁸ Sherman, N., 2019. *Is China Gaining An Edge In Artificial Intelligence?*. [online] BBC News. Available at: <<https://www.bbc.com/news/business-50255191>>

³⁹ Daws, R., 2018. *Report: AI Will Increase The Wealth Inequality Between The Rich And Poor*. [online] AI News. Available at: <<https://artificialintelligence-news.com/2018/01/11/ai-wealth-inequality/>>

⁴⁰ Forrest, C., 2020. *IBM Watson: What Are Companies Using It For?* | Zdnet. [online] ZDNet.

Available at: <<https://www.zdnet.com/article/ibm-watson-what-are-companies-using-it-for/>>].

⁴¹ Lin, P. & Jenkins, R. & Abney, K.. (2017). *Robot ethics 2.0: From autonomous cars to artificial intelligence*. 10.1093/oso/9780190652951.001.0001.

United States (Alemzadeh et al., 2016)⁴². Another case of harm due to AI is an accident that occurred in 2017, in Quebec Canada, when a UAV drone collided with an aircraft carrying 8 passengers who as a result suffered injuries (Kuksov, 2019)⁴³.

- **Impact on the labor market:** AI has seen to the rise of machines that are performing functions that previously required human intervention. Increasing automation has a big impact on employment which could have a big effect on the public's collective mental health, with regions where jobs have been lost when factories close down facing increased risk of suicide, substance abuse and depression (Lufkin, 2017)⁴⁴. However, the rapid deployment of AI will also lead to the creation of new and specialized jobs which points to a need for retooling and reskilling of the workforce to work with AI (Dignum, 2018)⁴⁵.
- **Security:** AI (AI) is a field of research with the potential to radically change society's use of information technology, particularly how personal information will be interconnected and how private lives will be accessible to cybercriminals. Although AI could be used in securing premises through facial recognition, the systems could also be hacked and used maliciously by cybercriminals. There is also the matter of the possible use of lethal autonomous weapon systems at any time in the future. The security implications of AI systems are a huge concern as control over them can easily be hacked and changed and a third unauthorized party can get accessibility over the technology (Veruggio, 2006)⁴⁶.

2.5. REGULATORY STANDPOINT

Although most Legislative and governing Bodies are looking to regulate this technology, there has been continuous struggle to strike the right balance between risk mitigation and stifling innovation, while promoting innovation and ensuring security and trust. In this era that has seen the rise of AI and IoT cybersecurity, it is important to break

⁴² Alemzadeh, H., Raman, J., Leveson, N., Kalbarczyk, Z. and Iyer, R., 2016. Adverse Events in Robotic Surgery: A Retrospective Study of 14 Years of FDA Data. PLOS ONE, 11(4), p.e0151470. Available at: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4838256/>

⁴³ Kuksov, I., 2019. Air Alert: 8 Dangerous Drone Incidents. [online] Kaspersky.com. Available at: <https://www.kaspersky.com/blog/drone-incidents/29000/>

⁴⁴ Lufkin, B. (2017). *Why the biggest challenge facing AI is an ethical one*. Retrieved from: <https://www.bbc.com/future/article/20170307-the-ethical-challenge-facing-artificial-intelligence?referer=http%3A%2F%2Fsitn.hms.harvard.edu%2Fflash%2F2017%2Fhistory-artificial-intelligence%2F>

⁴⁵ Dignum, V., 2018. [online] Itu.int. Available at: https://www.itu.int/dms_pub/itu-s/opb/journal/S-JOURNAL-ICTF.VOL1-2018-1-PDF-E.pdf.

⁴⁶ Veruggio, G., 2006, December. The euron roboethics roadmap. In Humanoid Robots, 2006 6th IEEE-RAS International Conference on IEEE.

silos and foster collaboration of the Quadruple Helix Innovation model comprising of the Academia, the Industry, Government and Society to share ideas. AI developers and Regulators have to ensure AI system algorithms consider ethics and are inclusive.

To ensure the most effective and secure AI regulation, there needs to be increased public awareness of the technology and the coordinated efforts from Policy-makers, the Industry and Regulators (Kodjo, 2018)⁴⁷. The only way to curtail potential negative implications of AI is through constant effort on ethically- inclined policy engagements with stakeholders. Worldwide, Governments are implementing rules and regulations to help safeguard the use of data, most notably the European Union's General Data Protection Regulation (GDPR) and the California Consumer Privacy Act (CCPA). Many countries are currently attempting to develop laws to govern AI, however, many are in the development stage. In countries like India, Nigeria, and many other African nations, AI is an emerging technology, while more developed countries are already making great strides in the field on AI regulation. According to the Cognilytica research on Worldwide Country AI Strategies and Competitiveness, the countries with the strongest overall AI strategies are France, Israel, United Kingdom, and United States, followed closely behind by China, Canada, Germany, Japan, and South Korea (2020)⁴⁸. The cases below will be used to shed light on the detailed efforts of various coalitions and countries to regulate AI:

- **European Commission (EU):** In June 2018 the European Commission set up an independent High-Level Expert Group on AI to provide guidelines on how AI can achieve trustworthiness and conclusively published a paper in 2020 that identified the most pressing risks that need to be addressed regarding AI (European Commission, 2020)⁴⁹. The Commission has set out legal requirements that any regulatory framework must cover to ensure that AI remains trustworthy and respectful of the values and principles of the European Union. Currently, the Union does not have any specific legislative instrument or standard to regulate the use and development of AI. However, these requirements are likely to set the stage for future legislation, similar in scope and effect as the General Data Protection

⁴⁷ Kodjo, T., 2018. Artificial Intelligence For Good - ITU PP-18 - Plenipotentiary Conference. [online] ITU Plenipotentiary Conference 2018 (PP-18). Available at: <https://www.itu.int/web/pp-18/en/backgrounder/artificial-intelligence-for-good>.

⁴⁸ Cognilytica. 2020. Worldwide Country AI Strategies And Competitiveness 2020 | Cognilytica. [online] Available at: <<https://www.cognilytica.com/2020/02/07/worldwide-country-ai-strategies-and-competitiveness-2020/>>.

⁴⁹ European Commission. 2020. On Artificial Intelligence - A European Approach To Excellence And Trust. [online] Available at: https://ec.europa.eu/info/sites/info/files/commission-white-paper-artificial-intelligence-feb2020_en.pdf.

Regulation (GDPR) for privacy, therefore indicating that the European Union may be on the cusp of providing for specific and unique AI regulatory legislation (Findlay, 2020)⁵⁰.

- **INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE):** in 2017, IEEE, the world's largest technical professional organization dedicated to advancing technology for humanity, and the IEEE Standards Association (IEEE SA), announced the approval of a new standard project, Standard for Personal Data AI (AI) Agent(IEEE, 2017)⁵¹. The aim of the Standard is to ensure AI is developed ethically. They also champion an approach that enables a personalized human-in-the-loop AI agent to act as a proxy for machine-to-machine decisions, conferring individual rights and agency in systems of shared social norms, ethics and human rights, to enable individuals to safely organize and share their personal information at a machine-readable level (IEEE, 2017)⁵².
- **INTERNATIONAL TELECOMMUNICATIONS UNION (ITU):** In 2017, ITU and XPRIZE Foundation launched their annual action oriented, global and inclusive United Nations Platform on AI- AI for Good Global Summit wherein 35 UN agencies and other global stakeholders strategize to ensure AI technologies are developed in a safe and inclusive manner, whilst maximizing their benefits (ITU, 2020)⁵³. ITU also maintains the only global repository on AI that is readily available for AI researchers and designers to contribute information on how AI can be leveraged with positive impact (Kodjo, 2018)⁵⁴. AI and Machine Learning are gaining more traction in the ITU standardization work programme (ITU News, 2020)⁵⁵. ITU also provides a neutral platform for Government, Industry and Academia to build a common understanding of the

⁵⁰ Findlay, B., 2020. Artificial Intelligence And The Regulatory Landscape | Lexology. [online] Lexology.com. Available at: <<https://www.lexology.com/library/detail.aspx?g=4c845762-e954-4f47-8809-f5ad0f5d3716>>

⁵¹ IEEE. 2017. IEEE Global Initiative For Ethical Considerations In Artificial Intelligence (AI) And Autonomous Systems (AS) Drives, Together With IEEE Societies, New Standards Projects; Releases New Report On Prioritizing Human Well-Being. [online] Available at: <https://standards.ieee.org/news/2017/ieee_p7004.html>.

⁵² IEEE. 2017. IEEE Global Initiative For Ethical Considerations In Artificial Intelligence (AI) And Autonomous Systems (AS) Drives, Together With IEEE Societies, New Standards Projects; Releases New Report On Prioritizing Human Well-Being. [online] Available at: <https://standards.ieee.org/news/2017/ieee_p7004.html>.

⁵³ ITU, AI for Good Global Summit. Available at: <https://aiforgood.itu.int/about-us/>

⁵⁴ Kodjo, T., 2018. Artificial Intelligence For Good - ITU PP-18 - Plenipotentiary Conference. [online] ITU Plenipotentiary Conference 2018 (PP-18). Available at: <https://www.itu.int/web/pp-18/en/backgrounder/artificial-intelligence-for-good>.

⁵⁵ ITU News. 2020. International Standards For An AI-Enabled Future. [online] Available at: <<https://news.itu.int/international-standards-for-an-ai-enabled-future/>>

capabilities of emerging AI technologies and consequent needs for technical standardization and policy guidance.

- **Australia:** Australia has been an active participator in the AI regulation discussion with a number of bodies seeking comment on how to best approach AI regulation. In April 2019, the Department of Industry, Innovation and Science (in conjunction with Data61, an arm of the Commonwealth Scientific and Industrial Research Organization (CSIRO)), released the AI Ethics Framework and the AI Technology Roadmap setting out Australia's core principles in relation to AI (Dawson, 2019)⁵⁶. Currently however, Australia has no specific regulatory framework for the development and use of AI and so is relying on current legislation and standards until new standards are developed (Findlay, 2020)⁵⁷.
- **United Kingdom:** Recently, in February 2020, the Committee on Standards in Public Life published 'AI and Public Standards' commenting on the role of public standards in the AI sector (The Committee on Standards in Public Life, 2020)⁵⁸. According to the Committee, the current tools and principles established in the UK are sufficient to encapsulate the risks that come with AI development. It is not a matter of establishing new regulatory bodies and laws, but instead clarifying and tweaking current laws and standards so they can be more clearly applied to circumstances involving AI. The UK government also recently established the Centre for Data Ethics and Innovation (CDEI) as a specific statutory body aimed at researching issues of AI and its regulation (CDEI, 2020)⁵⁹. They are tasked by the UK Government to connect policymakers, industry, civil society, and the public to develop the right governance regime for data-driven technologies. The CDEI often publishes papers and reports on the status of AI regulation within the UK on their website (Findlay, 2020). In addition, the UK Government is guided on its deliberations on AI by the AI Council which is an independent expert committee, provides advice to Government and high-level

⁵⁶ Dawson, D et al., 2019. Artificial Intelligence: Australia's Ethics Framework. Data61 CSIRO, Australia. Available at: https://consult.industry.gov.au/strategic-policy/artificial-intelligence-ethics-framework/supporting_documents/ArtificialIntelligenceethicsframeworkdiscussionpaper.pdf

⁵⁷ Findlay, B., 2020. Artificial Intelligence And The Regulatory Landscape | Lexology. [online] Lexology.com. Available at: <<https://www.lexology.com/library/detail.aspx?g=4c845762-e954-4f47-8809-f5ad0f5d3716>>

⁵⁸ The Committee on Standards in Public Life, 2020. 'AI and Public Standards'. Available at: <https://www.gov.uk/government/news/artificial-intelligence-and-public-standards-committee-publishes-report>

⁵⁹ CDEI, 2020. Available at: <https://www.gov.uk/government/organisations/centre-for-data-ethics-and-innovation/about>

leadership of the Artificial Intelligence (AI) ecosystem (AI Council, 2020)⁶⁰.

- **Kenya:** In 2018, the Kenya government formed a fourteen member Blockchain and AI task force comprised of experts who work for companies like Safaricom, Cisco, IBM Research Africa, the African Development Bank as well as tech entrepreneurs and consultants, including representatives from academia, research institutions, and the local technology sector (Kenyan WallStreet, 2018)⁶¹. The purpose of the task force is to provide the roadmap to contextualize on the application of these emerging technologies in the area of overall public service delivery. The task force is also to make recommendations on how the Government can leverage on the emerging technologies in the next five years, with other key milestones in 2027 and 2032 (Regulation of AI, 2020)⁶². Following the submission of their report in July 2019, these are some of their recommendations to the Kenyan Government (Mpala, 2020)⁶³.
 - Help draft a digital asset framework that will enable Kenyan citizens to raise funds through initial coin offerings (ICOs).
 - Create a digital locker (complementing a digital ID) for every citizen to securely store official documents like credit reports and birth certificates.
 - Use Blockchain to track agricultural produce from end-to-end (from seeds to marketplace) and to use AI and analytics to detect fraud, trace unsafe products.
 - Distribute farming subsidies through a Blockchain controlled agri-token.
 - Introduce Blockchain technology to enable customers to trace the supply chain of medication.
 - Develop a health token incentive to reward citizens who maintain a healthy lifestyle.
 - Use Blockchain supply-chain networks to flag and report counterfeit goods.
 - Develop legal sandboxes where new ideas will be incubated in collaboration with Regulators.
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- **Nigeria:** In 2018, the Nigerian Government approved the establishment of a new Agency for robotics and AI (RAI) (Alajemba

⁶⁰ AI Council, 2020. Available at: <https://www.gov.uk/government/groups/ai-council>

⁶¹ Kenyan Wallstreet. 2018. Kenya Govt Unveils 11 Member Blockchain & AI Taskforce Headed By Bitange Ndemo - Kenyan Wallstreet. Available at: <https://kenyanwallstreet.com/kenya-govt-unveils-11-member-blockchain-ai-taskforce-headed-by-bitange-ndemo/>

⁶² Loc.gov. 2020. *Regulation Of Artificial Intelligence*. [online] Available at: <https://www.loc.gov/law/help/artificial-intelligence/africa.php>.

⁶³ Mpala, D. 2019. Kenyan taskforce calls for state to regulate AI and blockchain. Available at <https://ventureburn.com/2019/08/kenya-report-blockchain-ai/>

and James, 2018)⁶⁴. The Nigerian Government is also set to establish the center for AI and robotics under the National Informational Technology Development Agency (NITDA) which is anticipated to focus on Emerging Technologies in various areas such as research and development, communication security and networking (CGTN, 2020)⁶⁵. Furthermore, there is an ongoing private sector driven Robotic and AI Technology Hub and Research Centre called Robotics and Artificial Intelligence Nigeria (RAIN) that carries out physical and virtual classes, build intelligent machines, train, and certify youth on ultra-modern courses in automation, robotics, 3D printing, CNC machining, artificial intelligence (AI), data science, and machine learning (RAIN, 2019)⁶⁶.



⁶⁴ Alajemba, N. and James, C., 2018. Nigeria To Set Up New Agency For Robotics And Artificial Intelligence - Itedgenews.Ng. [online] ITEdgeNews.ng. Available at:

<<https://itedgenews.ng/2018/08/06/nigeria-set-new-agency-robotics-artificial-intelligence/>>.

⁶⁵ CGTN Africa. 2020. Nigeria To Establish Artificial Intelligence, Robotics Center. [online] Available at: <<https://africa.cgtn.com/2020/09/03/nigeria-to-establish-artificial-intelligence-robotics-center/>>.

⁶⁶ RAIN. 2019. Available at <https://rainigeria.com/about-us>

3. METHODOLOGY

3.1. RESEARCH DESIGN

This Research study is descriptive in nature and gives a picture of what is happening in the society in terms of an ethical and social perspective of the impact of AI. The research design is of a mono-method qualitative study which involves a single data collection method and corresponding analysis procedures, which in this study is analytical deduction.

3.2. RESEARCH APPROACH

This Research adopts an interdisciplinary desk-research methodology using the following methods: analysis of synthesis, introduction, deduction, investigation of literature. This Research will also address a gap in the literature by conducting a systematic literature review research on current knowledge of AI within the context of ethical consideration in its regulation.

3.3. RESEARCH STRATEGY

Research strategies may be used for descriptive, explanatory and exploratory research and no research strategy is superior or inferior to any other. The research purpose of this study is exploratory as it aims to explore the emerging technology of AI in terms of ethical and societal impact and its regulatory implications. The most important thing to consider when choosing a research strategy is if it will enable you to answer your research questions and objectives (Saunders, Lewis and Thornhill, 2007)⁶⁷.

3.4. INSTRUMENT OF DATA COLLECTION

The data used in this Research was collected through extensive desktop Research. Desktop research entails the collection of relevant data from the following pre-existing sources:

- Online journals, magazines and books
- Government Published data

3.5. RESEARCH OBJECTIVES

This Research paper aims to dissect AI, its impact on society and the ethical considerations concerning its wide deployment and its regulatory implications.

3.6. RESEARCH QUESTIONS

This study will focus on and answer the following research questions:

- 1) How does AI impact the society?
- 2) What are the ethical considerations related to AI?

⁶⁷ Saunders, M., Lewis, P. and Thornhill, A. (2007). Research methods for business students. Harlow, England: Financial Times/Prentice Hall.

3) Can AI be regulated? If so, how?

3.7. LIMITATIONS

This topical field of this study is new and understudied hence there is limited information. The social and ethical challenges of AI weigh heavily upon multifaceted fields, such as international humanitarian law, intellectual property, data protection, and ethical enquiries, such as governance, ethical research, fairness, or transparency. The scope of the study cannot encompass all the various fields due to time and resource constraints, hence it is limited to general interdisciplinary survey of literature.

3.8. RESEARCH SIGNIFICANCE

Due to the constant development of the ICT sector, AI continuously undergoes change cycles that result in new emerging ethical, social and legal issues. This study would provide the Nigerian Communications Commissions with informed recommendations of measures that would see to the safe and ethical deployment and regulation of AI in Nigeria.

4. CHAPTER 4: RESULT AND FINDINGS

4.1. RESEARCH QUESTION 1: How does AI impact the society?

AI affects everyone in the society, both individually and collectively. It has various applications that cut across different sectors of the economy: it can perform very complex and data-intensive actions such as in cyber security, medical diagnoses and stock trading. However, current perception on AI applications and impacts vary amongst experts and there is no general consensus on its societal impact.

In line with the literature review, it has been highlighted that AI systems are a double edged sword that impact the society in both positive and negative ways as with most emerging technology. The technology can tremendously impact the society based on how it is used. For example, whilst AI systems can help secure the society by using city wide facial recognition on cameras in crime investigations, it can also be said that it ethically threatens the public's sense of privacy.

Such systems can also be hacked by cybercriminals to be used for their nefarious activities. This issue is so pervasive that even systems that were designed to have positive societal impact still result in unwanted outcomes, such as use of burner phones, which were designed for low cost, temporary use, being used for anonymity in crimes.

Although the development of strong and responsible AI's remains at the helm while discussing benefits of the technology, it is also noteworthy that these systems still have to be under human control. Design of systems that could potentially develop its own will through self-improvement might make it super intelligent and far superior to human intellect. Although such super intelligence would help humanity eradicate war, poverty and disease, it might overpower humanity itself. Hence, it is important that the goals of AI systems are cohesively aligned with humanity's to avoid this phenomenon. It is also important to ensure that AI systems are not used as replacement for humans in important and sensitive job roles, for example, policy, but rather as a tool for supporting job roles.

On a sanguine note, in recent times, the worries of the loss of jobs, the reinforcement of biases, and infringements on data privacy appear to have been set aside since the onset of the COVID 19 pandemic as AI-infused technologies have been employed to mitigate the spread of the virus. BlueDot, HealthMap, and Metabiota, AI systems, have reportedly flagged the virus in Wuhan China, nine days before it was announced by WHO, and have been fairly accurate in predicting its spread (Paul,

2020)⁶⁸. There has been an acceleration of the use of robotics to do the jobs of humans who have been ordered to stay at home or who have been redeployed within the workplace. Robots, for example, are taking over cleaning in grocery stores and sorting at recycling centers. AI is also fostering an increased reliance on chatbots for customer service at companies such as PayPal and on machine-driven content monitoring on platforms such as YouTube. Robotic telepresence platforms are providing students in Japan with an “in-person” college graduation experience. Robots are even replicating the noise fans make in stadiums during baseball games in Taiwan. In terms of data, AI has been an important contributor in monitoring infection rates and contact tracing. Companies that have adopted robots during the COVID-19 pandemic might think that a significant percentage of their human employees are not needed anymore (Borenstein & Howard, 2020)⁶⁹.

Generally, this research study concludes that AI, just like most technology, is and will continue to mostly positively impact the society, as long as it is used ethically, which is to be guided and monitored by continuous policy making and multi stakeholder efforts, as the technology itself evolves. Just like how the industrial revolution did not result in massive unemployment, but created more jobs that required the re-tooling and re-skilling of the human workforce, AI is also more likely to do so. Rather than replacing people in job roles, AI systems should be used to support repetitive and non-creative tasks. An example is chat bots that are frequently used in customer relationship management. However, although these AI systems can reasonably engage with consumers, they lack the emotional capabilities necessary to detect and appropriately respond to the emotional states of consumers for building rapport. Nonetheless, as Society progresses and technologies increase, some changes must habitually occur and even when robotics and AI do not fully replicate human efforts, their effectiveness for routine work, in times of crisis and their capacity to help ginger further global innovations are critical in an ever changing world with new appetites.

4.2. RESEARCH QUESTION 2: What are the ethical considerations related to AI?

Just as every creation, AI and its encompassing technologies comprise of and perpetuate biases of their human creators. Microsoft learned

⁶⁸ Paul, E., 2020. AI Regulations And COVID-19: What African Countries Can Learn. [online] Techpoint Africa. Available at: <<https://techpoint.africa/2020/03/24/ai-regulations-covid-19-african/>>.

⁶⁹ Borenstein, J. and Howard, A., 2020. AI, Robots, And Ethics In The Age Of COVID-19. [online] MIT Sloan Management Review. Retrieved from: https://sloanreview.mit.edu/article/ai-robots-and-ethics-in-the-age-of-covid-19/?gclid=EAIaIQobChMIgc-25YaY6gIVyoeyCh33swhcEAAyASAAEgIqvD_BwE

this lesson in 2016 when the company designed a chatbot called Tay to interact with Twitter users. A group of those users took advantage of a flaw in Tay's algorithm to corrupt it with racist and otherwise offensive ideas and within 24 hours of launch, the chatbot had said the Holocaust was made up, expressed support for genocide, and had to be taken offline (Drew, Tysiac and White, 2018)⁷⁰. This case is a great way to see one problem in which AI might have provided a solution, but it also presents some ethical dilemmas. This consideration shows the problems inherent in assuming any one ethical standard can be perfect.

Although several organizations have reflected on a set of principles for developers to adhere to while designing, developing, integrating or using AI systems, the Institute of Business Ethics (IBE), defined an encompassing framework of 10 fundamental values and principles for the ethical use of AI to eliminate negative consequences for the public use of the emerging tech (IBE, 2018)⁷¹. These values, created to minimize the risk of ethical lapses due to improper design of AI, include:

- **Accuracy:** AI systems need to be free from biases and systematic code errors.
- **Respect of privacy:** AI systems need to have in-built safe guards to ensure the public's right to privacy.
- **Transparency:** AI systems need to be transparent to help the public on how it works to improve trust and prevent unjustified fears.
- **Interpretability:** Interpretable and explainable AI will be essential for business and the public to understand, trust and effectively manage 'intelligent' machines.
- **Fairness:** Fairness and justice, remain paramount for ethical businesses when dealing with AI to tackle fallouts of AI deployment such as long-term unemployment, social inequality and lack of trust from customers in the way AI is utilized.
- **Integrity:** When designing or selling an AI system, it is important to ensure that the use of AI solutions by third parties is restricted to the intended purpose.
- **Control:** To have full control over AI systems, it is important that both companies and algorithm designers only work with technology that they fully understand. Being able to explain the functionalities of a technology of which they appear to be in

⁷⁰ Drew, J., Tysiac, K. and White, S (2018). *Ethical implications of artificial intelligence* Retrieved from: <https://www.fm-magazine.com/issues/2018/dec/ethical-implications-of-artificial-intelligence.html>

⁷¹ IBE. 2018. Business Ethics And Artificial Intelligence. [online] Available at: <https://www.ibe.org.uk/uploads/assets/5f167681-e05f-4fae-ae1bef7699625a0d/ibebriefing58businessethicsandartificialintelligence.pdf>

control of is essential to build trust with employees, customers and all stakeholders.

- **Impact:** measuring the potential impact that a new technology can have before adopting it, can identify undesired side-effects and consequent ethical risks. Therefore, testing the algorithms and AI implementations in difficult situations is necessary to gauge a clear idea of unwanted outcomes.
- **Accountability:** Machines, as such, are not moral agents and therefore they cannot be held responsible for their actions. There should always be a line of responsibility for business actions to establish who has to answer for the consequences, hence, each of the parties involved in the design and deployment of AI systems should be held ultimately responsible for violation of ethical values.
- **Learning:** To maximize the potential of AI, people need to learn how it works and what are the most efficient and effective ways to use it. Stakeholders need to be empowered to take personal responsibility for the consequences of their use of AI and they need to be provided with the skills to do so. This should include an understanding of the potential ethical implications that it can have.

Bias remains the key challenge surrounding ethical considerations in the design of AI systems, and they can affect the society in a bad light. Many AI systems have their algorithms built around data set models that are selected by human engineers, hence, the algorithms might reflect the unconscious biases of the human creators. This might translate to further widening of the digital divide and alienation of vulnerable groups of the society from benefitting from the emerging tech. AI is undergoing iterative cycles and constantly evolving, affecting many aspects of our environments. This makes it virtually impossible to accurately envisage its potential impact on ethical and societal areas of trepidation. Considering the fast rate at which AI is being entrenched in our daily lives, consideration of the ethical and consequential social impact of these systems have to move at the same pace to ensure their safe deployment. In order to stay on top of these issues, policy makers and Regulators have to be prudent and proactive in continuous multi-stakeholder and cross-institutional engagements to put responsive mechanisms in place. A good place to start for Governments and Regulators is to ensure that the 10 fundamental values and principles for the ethical use of AI as defined by the Institute of Business Ethics (IBE), form an integral part of an AI ethics framework.

4.3. RESEARCH QUESTION 3: Can AI be regulated? If so, how?

AI is slowly becoming entrenched in our daily lives and has not yet reached the point of maximum exploitation. This points to an anticipated New Industrial revolution in which AI may fully replicate human perception and actions in the future. However, since we are not at that stage and it is hard to replicate human character, it can be concluded that AI cannot fully replace human workers in all job roles and hence, should be used as a tool to supplement human effort.

As highlighted in the literature, AI systems have immense direct and indirect impact on the society in general, both positively and negatively. Regulators must create favorable environments for development and deployment of responsible AI that does not cause harm and infringe on the rights of the general public. Although the role of policy makers is important, the society in general must also be prepared to shoulder the responsibility for the impact of the technology. By this, Researchers and AI system designers must be aware of their responsibility of developing ethically sound AI since they have direct impact on the society to curtail the negative aspects. AI technologies are neither ethical nor unethical, with the real issue being around the use that businesses make of AI, which should never undermine human ethical values. Designers run the risk not just of creating unsafe machines but of absolving humans of ethical responsibility of the actions taken by autonomous systems, ranging from cars to weapons (Markoff, 2020)⁷².

The key issues surrounding how and if Artificial Intelligence can be regulated include:

- From the ancient days till now the peoples are governed by law, so if any person commits a crime then he will be punished under the law and if any person is affected or caused damage by another person he may get compensation under the law. AI is designed by human beings but they are not governed by any laws. Concrete guidelines for responsible design of AI are non-existent.
- The industry has to arrive at a general consensus on these guidelines to enable policy makers to devise accurate legislations (Walch, 2020)⁷³. There is a need for appropriate law and control mechanisms for AI because in the upcoming future, there will be an increase in the use of AI. AI applications such as autonomous

⁷² Markoff, J., 2020. A Case For Cooperation Between Machines And Humans. [online] Nytimes.com. Available at: <<https://www.nytimes.com/2020/05/21/technology/ben-shneiderman-automation-humans.html>>.

⁷³ Walch, K., 2020. This Is The Year Of AI Regulations. [online] Forbes. Available at: <<https://www.forbes.com/sites/cognitiveworld/2020/03/01/this-is-the-year-of-ai-regulations/#6396d2647a81>>.

vehicles and healthcare robots have already made significant changes in the society but are not governed.

- To ensure that the impacts of AI systems positively and constructively impact the society, it is essential that we build in certain standards and precautions. One of the biggest issues in AI regulation is standardization. There is a need for in-built mechanisms in AI algorithms that would enable AI systems with reasoning and behavioral skills that mirror human values and ethics. AI systems should be able to connote societal values, moral and ethical considerations and execute accordingly but an issue concerning this is that AI systems are currently limited with deep-learning mechanisms that are unable to fully link decisions to input and so, cannot completely replicate human reasoning which might be resolved as the technology continues to evolve. It becomes vital going forward to develop and utilize consistent international standards as it will provide commonality in language, ethics and tools for coordination and participation of various parties for AI development (ITU 2018).
- It's also important for AI and other autonomous systems to incorporate appropriate security and privacy measures to ensure they operate ethically and within the law, as well as protecting them from external hacks or other intrusions. (Hinchey, 2017)⁷⁴.
- In terms of legalities, Policy makers must determine how responsibility should be regulated. For example, in the event of accidents concerning autonomous vehicles, there is a vague sense of who should be responsible for the repercussions. Hence, discussions such as this must be pivotal in creation of Regulations to ensure fairness when delegating responsibilities. The most critical thing for Regulators is to address ethical and security concerns with the AI systems without stifling its development and deployment.

Difficulty in uniformity of Regulations by Developers and Governments since perception of values and ethics is influenced by culture and other regional factors. To combat this challenge, it is necessary to deeply study and understand how different regions and societies live and work with AI systems to develop accurate ethically informed frameworks.

Conclusively, the best way to ensure the flourishing of AI systems while attenuating their negative potential impacts is through international standardization and constant ethically informed policy engagement. Standardization focuses on providing uniformed international

⁷⁴ Hinchey, M., 2020. AI And Ethics — Where To Draw The Line?. [online] ITU News. Available at: <<https://news.itu.int/ai-and-ethics-where-to-draw-the-line/>>

standards on globally accepted ethical and societal expectations. This should be further buttressed by continuous policy engagement at the International levels such as the ITU, the UN, other global AI bodies, amongst the relevant regional and national Bodies, and Civil Societies to ensure all the positive benefits accruable from regulations are maximized for societal good. Therefore a continuous system of multi-stakeholder consultation that result in dynamic, predictive, and responsive AI policies and processes which would guide the development and application of accurate, representative, legal, ethical and secure AI systems is highly envisaged, anticipated and welcomed.

5. CHAPTER 5: CONCLUSION AND RECOMMENDATIONS

5.1. CONCLUSION

AI is one of the most discussed, revered and anticipated current Emerging Technology with inspiring and advantageous use cases growing on a regular basis. The use of AI is growing more widespread with diverse applications and benefits. Organizations around the world realize the immense benefits that could be reaped by adopting this technology and well-known brands such as Google, Amazon, Facebook and Tesla have been showcasing the successful application of AI systems (Wakefield, 2016)⁷⁵. However, this technology also comes as a double edged sword, with rising concerns over its harmful effects and ethical implications such as security concerns, lack of standardizations and accountability, and bias.

It is apparent from this Research study that the transformative effect of AI on countries can have far-reaching economical, legal and regulatory implications that reinforce the fact that there are always unexpected and unwanted consequences when new technology is introduced. Human intelligence influences AI and iteratively, in the near future, AI will improve human intelligence by reeducation of humanity to understand the technology's mechanisms and consequences. In order to accomplish that, there has to be a shift in human ability to interact with AI in sustainable terms to yield positive impact. Coupled with thorough ethical examination of AI systems to ensure moral codes, privacy, fairness and safety, the use of AI systems will revolutionize many industries in the future and might change the future as we know it.

Cries from the public and Researchers alike for regulations on AI research and development are gaining traction and it is the duty of Regulators to govern artificial power. It is also the responsibility of programmers and engineers to ensure ethical and security concerns are addressed during initial design of these systems. Hence lawmakers and developers and other stakeholders must cooperate to decide where to draw the line between liberty and protection of the general public by ensuring policies and safeguards in the deployment and use of AI. Conclusively, it is important to note that AI is constantly changing, hence, the legal and regulatory environment is also ever- evolving. This means that policy and regulation concerning AI should embody an iterative system, involving all crucial stakeholders. The future of AI will ultimately be set by the ability of the world to strike a balance between

⁷⁵ Wakefield, J., 2016. *Google, Facebook, Amazon Join Forces On Future Of AI*. [online] BBC News. Available at: <<https://www.bbc.com/news/technology-37494863>>

reaping its benefits and addressing its fallouts; and this balance is dependent on adaptable regulatory structures that can ensure the prosperity of the Industry.

5.2. RECOMMENDATIONS FOR THE NCC

Regulators have an obligation to brave new regulatory frontiers to drive the benefits unleashed by new and emerging technology. In order for the Nigerian Communications Commissions to drive for a safe and enabling environment for the deployment of AI systems to maximize its potentials while curtailing its negative effects, the following recommendations are emphasized:

1. With the increasing emergence of AI enabled technology, there has to be a set of requirements to ensure only authorized businesses/ service providers would offer AI enabled services to the public. This would not only ensure the safety and security of customer data, but also serve as a monitoring mechanism to make sure only ethically and legally compliant AI systems are deployed, whilst limiting third-party use of the technology. The Commission can achieve this via the Licensing Department, by formulating a new class of license to be made available for AI providers. Ideally, licenses would provide an avenue for regulatory examinations which would force the providers to guarantee security compliance and eliminate errors, bias.
2. The Commission should drive collaboration toward informed and effecting regulation with relevant stakeholders such as Ministry of Communications & Digital Economy, NOTAP and NITDA. Constant collaboration would establish information sharing and boost stakeholder involvement.
3. Considering the plans to establish an Agency for robotics and AI (RAI), the Commission can establish a partnership to confer and deliberate on the regulatory needs for a RAI license for AI in the future.
4. In order to keep up with the continuous challenges and solutions concerning AI in terms of societal and ethical impact, the Commission should study and localize international best practices by other Nations to enforce global standardization.
5. The Commission should consistently engage with the ITU on AI standardization efforts for replication at the National level.
6. The Commission can render support and collaboration to center for Robotics and AI upon its launch, in order to carry out a holistic

needs and challenges review, as well as the creation of a White paper on Robotics and AI for Nigeria.

7. Collaborate and partner with Academia and Research Institutions to drive constant and intensive research in the field of Emerging Technologies such as AI. This partnership would also foster sensitization and educational reform of Nigerian school curriculums to include ICT and digital skills for retool and reskill of Nigerians for this new era of emerging technology.
8. The ITU regulatory Tracker⁷⁶ was launched by the organization to aid Regulators analyze the ICT sector for their regulatory environments. NCC can use this tool, via the Research Department to identify, monitor and resolve gaps in existing regulations in the area of Emerging Technology.
9. The Commission should drive Public- Private Partnerships (PPP) via a roundtable with captains of the ICT Industry in the field of Emerging Technologies to encapsulate information sharing and foster inclusive collaboration in policy formulation.

⁷⁶ ITU ICT Regulatory Tracker. Available at <https://www.itu.int/net4/itu-d/irt/#/tracker-by-region/regulatory-tracker/Arab%20States>

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