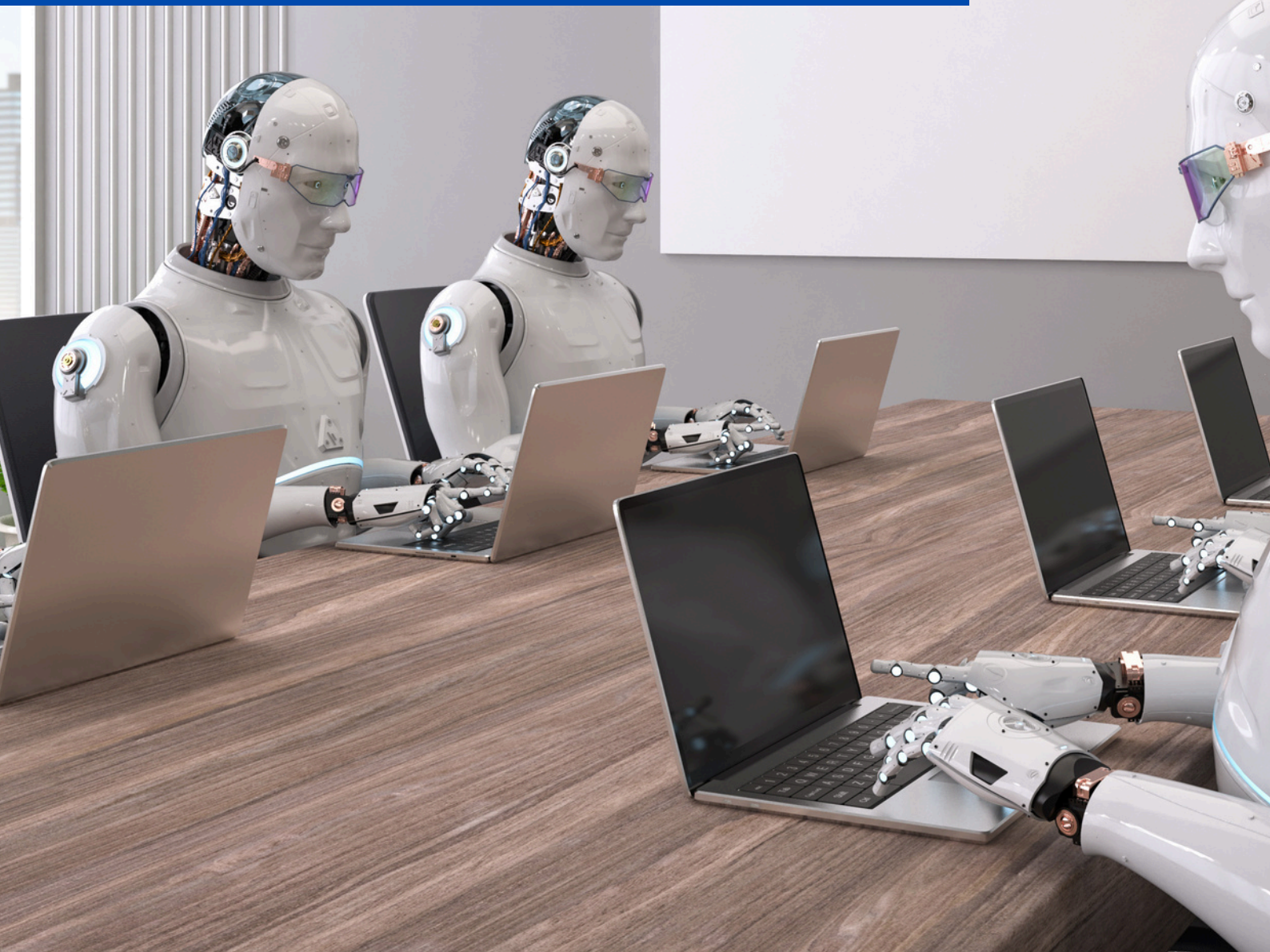


Q1 2024

THE INFORMATION SOCIETY WATCH: ARTIFICIAL INTELLIGENCE IN PERSPECTIVE



'creating a level playing field'



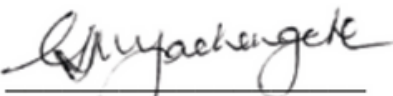
FOREWORD



The development and use of Artificial Intelligence (AI) is accelerating globally. AI is no longer a stranger to us; it has quickly become integral to the Fourth Industrial Revolution (4IR). A world where algorithms can think, learn, and make decisions independently is no longer science fiction; it has already become a reality. Today's debate is no longer a question of if and how AI will impact society; it is now a complex discussion of how we should employ this collection of technologies to run our communities, businesses, and governments in practical yet human-centered ways.

Like other emerging technologies, AI comes with its own challenges and opportunities. Challenges include bias, lack of accountability and privacy concerns which must be addressed through responsible and transparent approaches. Despite these challenges, there are countless possibilities ahead. By embracing AI responsibly, we can unlock a future of seamless connectivity, intelligent networks, and empowered users. Our commitment, as POTRAZ, is to foster education and awareness of emerging technologies and contribute to building a knowledge society in Zimbabwe.

This publication contains three (3) white papers focusing on the state of AI adoption by the postal and telecommunications industry in Zimbabwe, the grey areas of AI, and the global AI policy and regulation landscape. We aim to empower the industry, stakeholders, policymakers, and the general public with knowledge that can drive positive change. This is an invitation to join the conversation to shape a future where technology empowers, fuels innovation, and creates a more connected Zimbabwe for all.



G. K. Machengete (Dr)
Director General

ABOUT THIS REPORT

The Information Society Watch is a quarterly publication by the Postal and Telecommunications Regulatory Authority of Zimbabwe's Research and Development Department. It is a collection of research white papers presenting information, expert analysis, and insights into emerging trends and critical issues as they relate to Information and Communication Technologies. It analyses quantitative and qualitative information gathered by the Authority from service providers, government, end-users, researchers, industry experts, policy experts, as well as reputable physical and online resources.

This quarterly publication of research white papers is in pursuit of the Authority's commitment to building intellectual capital, building knowledge societies, and inciting dialogue on pertinent Information and Communication Technology matters. In today's world, the creation, dissemination, and utilization of information and knowledge are essential, as knowledge is widely regarded as a vital factor of production. Furthermore, the white papers in this publication aim to inform policy on various Information and Communication Technology matters of interest, nationally and globally.

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ARTIFICIAL INTELLIGENCE IN THE POSTAL & TELECOMMUNICATIONS

SECTOR IN ZIMBABWE:

By Lameck Chinodya¹

DEFINING AI:

Technological advancements occur steadily, but occasionally, a transformative shift disrupts the landscape. Two generations ago, the Internet and World Wide Web emerged, fundamentally altering communication and information access. Years later, smartphones and the app economy reshaped how we interact and conduct daily tasks. Now, we stand on the precipice of the Artificial Intelligence (AI) revolution– a paradigm shift in technological capabilities. Artificial intelligence today is no longer a strange concept. It is not the science fiction commonly seen in movies and books anymore. Intelligence is an intricate concept that is defined in many ways. The baseline definitions of intelligence in literature incorporate learning, reasoning, decision-making, problem-solving, and perceptive abilities. McCarthy, considered one of the founders of AI, coined the term "Artificial Intelligence" in 1955 and he defined it as "the science and engineering of making intelligent machines" (Simona et al., 2018). This definition emphasises that AI is about creating machines that can perform specific human tasks and replicating the cognitive processes that underlie human intelligence.

Stuart J. Russel (1995) defined AI as a field of computer science that develops intelligent agents that can reason, learn, and act autonomously to achieve specific goals; these agents mimic and surpass some of the cognitive abilities of humans, such as learning, problem-solving, decision-making, and adaptation to changing environments". Given the many variations, ITU (2023) provides a simplified definition. They define AI as a set of widely different technologies, which can be broadly defined and grouped as self-learning, adaptive systems." According to ITU (2023), there are various approaches to defining AI such as:

- In terms of technologies, techniques, and approaches (e.g., a neural network approach to machine translation);
- In terms of purpose (facial recognition, image recognition);
- In terms of functions and
- In terms of agents or machines or algorithms (e.g., robots, self-driving cars).

Defining AI is complex. This field is so large that it cannot be narrowed down to a specific study area; rather, it is multidisciplinary. The idea of a machine that thinks dates to ancient Greece. However, the birth of the AI conversation was pronounced by Alan Turing's seminal work, "Computing Machinery and Intelligence," published in 1950. In this paper, Turing, often called the "father of computer science," asks, "Can machines think?" and proffers the "Turing Test," where a human interrogator tries to distinguish between a computer and a human text response. The term 'Artificial Intelligence' was then coined by John McCarthy in 1956; later that year, Allen Newell, J.C. Shaw, and Herbert Simon created the 'Logic Theorist,' the earliest AI software program (IBM). The field of AI is constantly evolving; with it, the terminology used to describe different aspects of AI will continue to evolve.

• THE TRANSFORMATIVE POWER OF AI

AI is revolutionarising the world at an unprecedented pace, increasingly influencing various aspects of our lives. In the framework of attaining the Sustainable Development Goals (SDGs) by 2030, the global community has adopted AI to drive progress across all 17 SDGs, as it can speed and scale up interventions for this purpose (FAO, 2021).

The stupendous growth in computational power, cloud and edge computing, data analytics, and the widespread availability of telecommunication access worldwide enables AI growth. These factors are driven by massive investments in telecommunications network infrastructure and deployment of 4G, 5G, and beyond technologies. The market for AI is already large and proliferating, with a Compound Annual Growth Rate (CAGR) of 18.6% and an estimated value of \$900 billion by 2026 (IDC, 2022). According to McKinsey (2021), AI is transforming every sector, including High Tech Automotive, Telecommunications, Retail, Healthcare, Education, Financial Services, Agriculture, and many more as it offers innovative solutions that streamline operational processes for better performance through, but not limited to the following:

- Enhancing customer experience
- Predictive maintenance
- Preventing fraud
- Resource optimization
- Robotics Process Automation
- Predictive Analytics
- Revenue Assurance

McKinsey researchers also projected that Generative AI could add the equivalent of between USD2.6 trillion to USD4.4 trillion annually to the global economy and facilitate labour productivity growth of between 0.1% to 0.6% annually through 2040.

In the postal and telecommunications industries, operations present one of the most challenging and complex areas to manage, and operators who excel in this area typically achieve a higher level of return than their rivals. Considering the escalating cost of electricity globally, it has been natural for operators to employ measures to optimise power consumption in their networks.

One successful case study on the use of AI for improving energy efficiency is by Telefonica, a telecommunications service provider in Spain. According to Treff (2023), Telefónica Spain was the first operator worldwide to use ‘Radio Deep Sleep Mode,’ an energy-saving AI functionality, and achieved energy savings of up to 8% over 24 hours and up to 26% in low-traffic hours.

There have also been successful cases of the use of AI in postal operations. According to Kyle (2021), AI tools improved productivity at the United States Postal Service, enabling the processing of over 20 terabytes of images a day from more than 1,000 processing machines.

According to Nguyen (2020), the UPS hub in Cologne, Germany, implemented the Siemens parcel sorting System, enabling the sorting of up to 19,000 items in an hour; Swiss Post, Australia Post, PostNL, and Deutsche Post AG also implemented AI-based letter and flat sorting systems, enabling processing more than 176 billion letters annually (Nguyen, 2020).



- **RESEARCH EVIDENCE ON THE STATUS OF AI ADOPTION AND USE BY POSTAL & TELECOMMUNICATIONS OPERATORS IN ZIMBABWE:**

The Postal and Telecommunications Regulatory Authority of Zimbabwe (POTRAZ) conducted a survey to determine the status of AI in the postal and telecommunications sector of Zimbabwe in 2023. The survey sought to determine the current state of AI, ascertain the prevalent AI technologies in use and their application in Zimbabwe's postal and telecommunication sector. It also sought ascertain the key drivers as well as barriers to AI adoption, assess the impact of AI as well ascertain historical and projected expenditure on AI solutions by the postal and telecommunications sector players. The findings of the survey were invaluable in providing an evidence base to assess and understand the progress in AI adoption and use, identify gaps as well as proffer recommendations on supporting the responsible and beneficial adoption of AI.

The importance of integrating AI into diverse business operations was underscored by the telecommunications service providers, as 100% firmly agreed that the adoption of AI was key to the growth of the telecommunications sector. Unlike the telecommunications sector, where there was total agreement by service providers on the importance of AI for sector growth, in the postal and courier services sector, 33% of the players were neutral and 67% agreed that it was important. Sentiments expressed by some of the postal and courier operators were that they did not see distinct strategic advantage of adopting AI solutions.

However, evidence from other economies has clearly demonstrated the role of AI technologies in reshaping and growing the postal and courier business. Reports by Kyle (2021) and Nguyen (2020) clearly demonstrate how the United States Postal Service, Deutsche post, Swiss Post, Australia Post amongst others have transformed their mail operations using AI, particularly in processing, sorting, and delivery. This evidence points to the critical importance of AI to e-commerce.



The research also revealed that the AI adoption rate in telecommunications sector was still low as only 40% of the telecommunications companies had incorporated AI tools in some of their business operations as shown in Figure 1 below:

Figure 1: AI Adoption Level for Telecommunications Operators

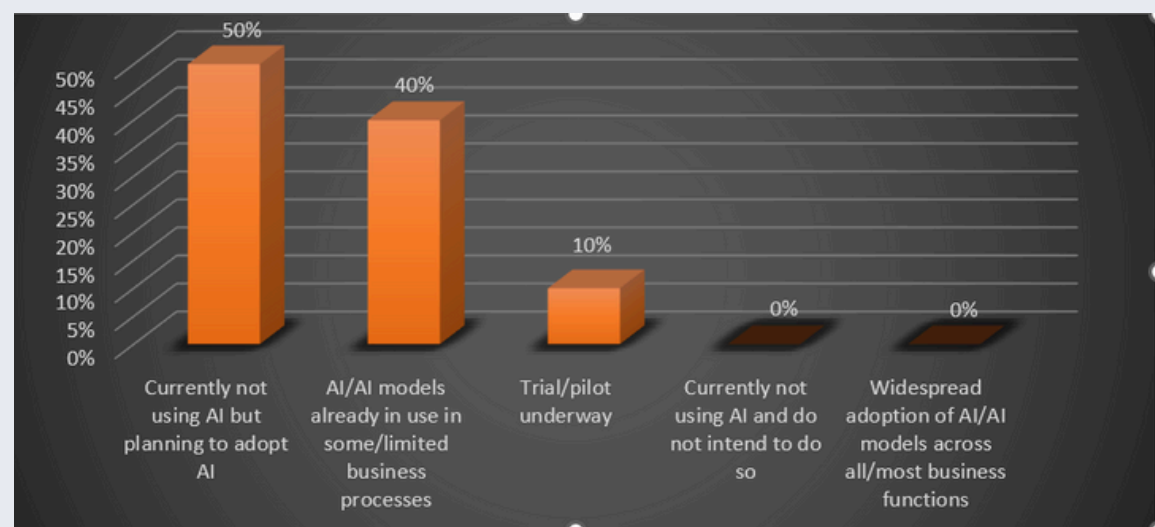
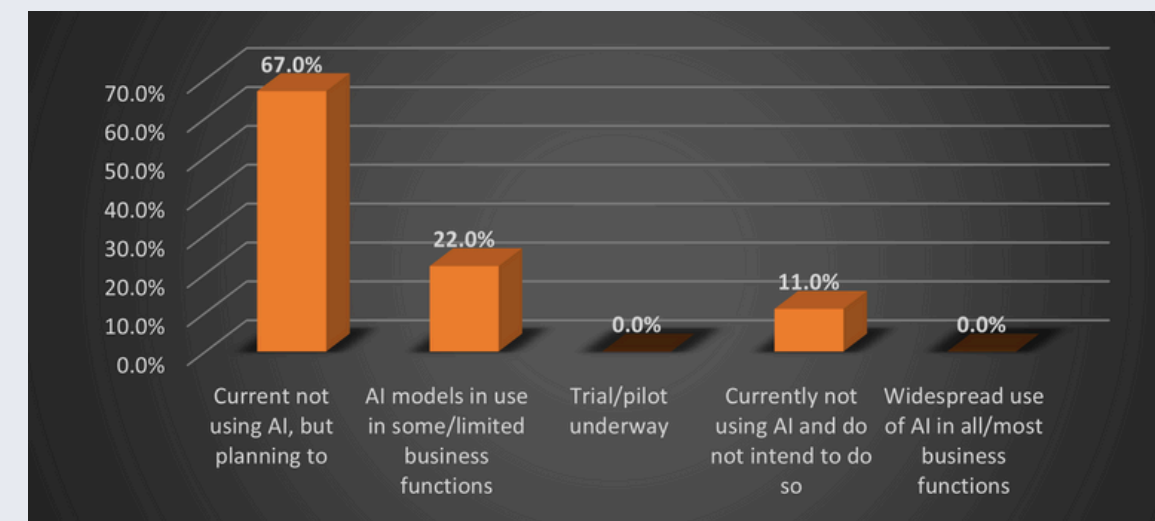


Figure 2 depicts that the adoption level by postal and courier operators was even lower with only 22%, having adopted AI solutions in some of their business operations.

Figure 2: AI Adoption Level for Postal & Courier Operators

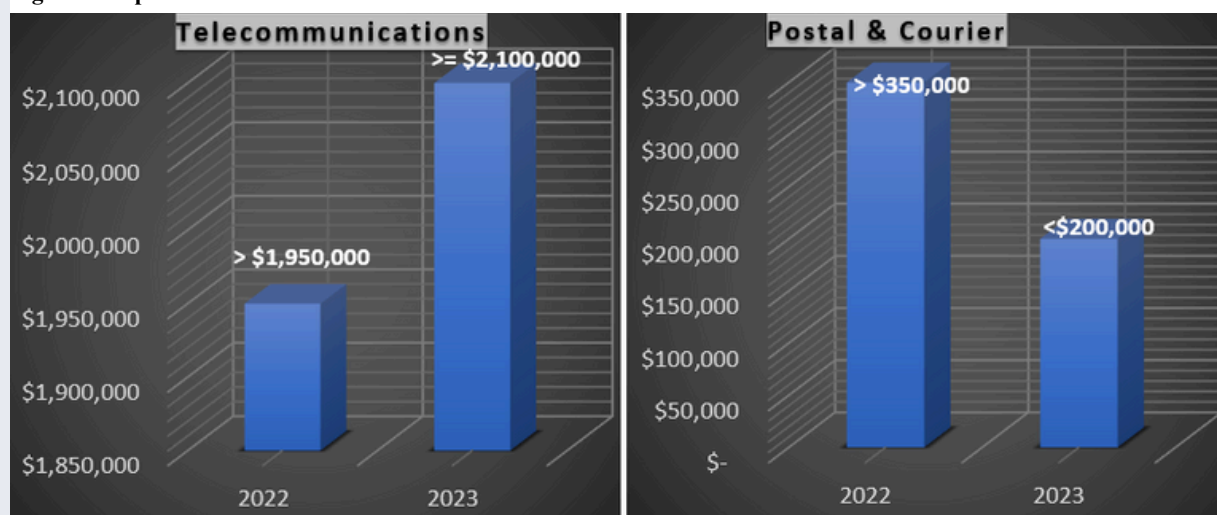


Widespread adoption of AI in most business was not reported by a single operator in both sectors. Although adoption was still relatively low, the intention was there. The average anticipated period of adoption by telecommunication operators who indicated the intention to incorporate AI in their function was less than a year, with plans scheduled for 2024. On the other hand, most postal and courier operators had no anticipated adoption timeframe thereby implying that postal and courier operators did not view AI adoption and use as an urgent matter.

Narrow AI was found to be the most prevalent type of AI incorporated by operators in the postal and telecommunications sector. The main function of AI by telecommunications operators was in customer services, with 40% percent of the operators indicating use of AI in this function through chatbots & virtual assistants; 30% confirmed AI use in networks and infrastructure to facilitate network optimisation, automation, bandwidth filtering and control etc. Other use cases of AI were in sales and marketing (20%) using churn prediction models and recommender systems, security and risk management (20%), 20% of operators used AI tools in the field of innovation, research and development and 10% incorporated AI in finance for prediction and assurance finance. The use of AI solutions by postal and courier operators was evidently not as extensive when compared to telecommunications service providers. The main uses of AI by courier operators were in supply chain and operations as applied in the scanning of proof of deliveries, fleet management and automated processing of courier as well as in sales and marketing where operators made use of algorithms to track trends and mentions.

The total expenditure of AI solutions by operators in the postal and telecommunications sector in the 2022 and 2023 is shown in Figure 3 below:

Figure 3: Expenditure on AI



As shown above in Figure 3 above, telecommunications operators expensed at least USD1.9 million in AI solutions in 2022. The telecommunications industry total rose to at least USD2.1 million in 2023. On the other hand, courier operators spent over USD350,000 on AI in 2022; but, this figure declined to less than USD200,000 in 2023. The investments are expected to have a more notable positive trajectory going forward because more operators indicated that they were planning to implement AI solutions in 2024.

- **BARRIERS TO AI ADOPTION & USE**

Several barriers to the adoption of AI were cited by postal and telecommunications players in Zimbabwe. These include budgetary constraints; this further exacerbated by taxation, particularly customs duties in the importation of high-performance computing equipment. The ‘lack of AI experienced talent’ locally to build and deploy AI solutions was cited as a major barrier by 50% of telecommunications operators. This is a global phenomenon, not unique to Zimbabwe. A survey by McKinsey (2023) revealed that of 3.5 million job postings focusing on technology trends such as AI, many of the skills in greatest demand have less than half as many qualified practitioners. This points to the need for organisations to cover the skills gap by upskilling and reskilling their employees as well as partnering with academia to cover the skills demand-supply gap.



Cyber security risks were also identified as a notable barrier as AI implementation brings cybersecurity and privacy risks. The research also revealed a clear lack of strategy by players in the sector. The proportion of organisations that had existing AI strategic plans/blueprints was low, with only 10% of the operators confirming that they had organisational plans to harness AI in place. None of the postal & courier operators had AI strategies in place.

CONCLUSSION AND RECOMMENDATIONS

The transformative capabilities of Artificial Intelligence in the postal and telecommunications are abundant. The adoption of AI by players in the postal and telecommunications sector in Zimbabwe is still nascent and the current use cases are still limited in scale and scope, focusing mainly on customer service functions.

The players are largely consumers, they are yet to be actively involved in the commercial development and production of AI solutions. Nevertheless operators, particularly in the telecommunications sector, are intent on strategically embracing AI as evidenced by the historical and planned capital expenditure on AI solutions.

To facilitate the growth of AI, there may be need to:

- establish a multi-stakeholder AI and or/Big Data Steering Committee to drive cross-sectoral planning.
- facilitate the availability of Data for AI as big data is the backbone of AI use.
- Raise awareness on AI, to encourage responsible, productive use by industry and the public.
- Light-touch regulatory framework for the development and use of responsible Artificial Intelligence (AI).
- National focus on research, innovation & skills development centred on emerging technologies such as AI.



REFERENCES

- Christopher Manning. (2020). ‘Artificial Intelligence Definitions’, <https://hai.stanford.edu/sites/default/files/2020-09/AI-Definitions-HAI.pdf>
- IBM, What is Artificial Intelligence (AI) ? | IBM. <https://www.ibm.com/ph-en/topics/artificial-intelligence>
- International Telecommunications Union (ITU) Publications. (2022). United Nations Activities on Artificial Intelligence (AI)
- ITU, <https://www.itu.int/en/mediacentre/backgrounders/Pages/artificial-intelligence-for-good.aspx>
- Jessica, R. (2023). The opportunities and challenges of artificial intelligence for communications networks and consumers: Washington, DC: July 13, 2023
- Kyle, W. (2021). <https://venturebeat.com/business/how-ai-is-helping-nvidia-improve-u-s-postal-service-delivery/>
- McKinsey Global Institute. (2017). Artificial Intelligence, The Next Digital frontier? Discussion paper June 2017: www.mckinsey.com/mgi.
- McKinsey Global Institute. (2023). Technology Trends Outlook 2023 <https://www.mckinsey.com/capabilities/mckinsey-digital/our-insights/the-top-trends-in-tech#/>
- Nguyen, N. (2020). https://www.theseus.fi/bitstream/handle/10024/354064/Thesis_Nguyen_Anh.pdf?sequence=2&isAllowed=y
- Parminster, K. (2023). International Journal for Research in Applied Science & Engineering Technology (IJRASET) ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538 Volume 11 Issue X Oct 2023.
- Pacific Publications | FAO Regional Office for Asia and the Pacific | Food and Agriculture Organization of the United Nations. <https://www.fao.org/asiapacific/resources/pacific-publications/en/>
- Sharma, R.R. (2008). Emotional Intelligence from 17th Century to 21st Century: Perspectives and Directions for Future Research. Sage Journals. Vol. 12.
- Stuart, J., and Peter, N. (2010). “Artificial Intelligence. A Modern Approach” Third Edition: 2010, 2003, 1995 by Pearson Education, Inc., Upper Saddle River, New Jersey 07458
- Treff, D. (2023). <https://www.netaxis.be/2023/05/04/artificial-intelligence-ai-is-rapidly-transforming-the-telecommunications-industry/>

AI AND ETHICS: TRAVERSING THE GREY AREAS

By Cryford Mhaka¹

Introduction

AI is a frontline technology that offers tremendous potential to improve various areas of our lives, from healthcare, finance, transportation, and education, helping in the realization of a more equitable and sustainable future. It is astounding that AI generated some of the earliest alerts about the COVID-19 pandemic, even before it was confirmed, and its analytical capacity also helped accelerate the discovery of COVID-19 vaccines (UNESCO, 2021). While the benefits of AI have been well documented, its dark side has also come to light. In its diverse applications, AI is giving rise to equally diverse concerns: algorithmic bias, transparency, accountability and responsibility, privacy, and beyond. These are the linchpin issues to be discussed in this paper. As we embrace these transformative technologies, we must also confront the ethical challenges that come hand in hand.

• Algorithmic Bias

According to Friis and Riley (2023), algorithmic bias occurs when algorithms make decisions that systematically disadvantage certain groups of people. This can have disastrous consequences when applied to critical areas such as healthcare, criminal justice, credit scoring, and employment, thus perpetuating existing biases, leading to unfair decisions, and exacerbating social inequalities. Algorithms for AI may unintentionally show prejudice against particular groups if trained on biased datasets (Comninos et al., 2019). Algorithmic bias often occurs because specific populations are under-represented in the data used to train AI algorithms or because pre-existing societal prejudices are ingrained in the data. Wilson et al. (2019) proposed the concept of ‘predictive inequity’ in their study on object identification. The study revealed that AI self-driving cars performed worse at detecting people with dark skin than those with light skin, thus putting the lives of dark-skinned pedestrians at risk. This behaviour suggests that future errors made by self-driving cars may not be evenly distributed across different demographic groups, with vehicle-pedestrian collisions skewed towards darker-skinned people.

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• Algorithmic Bias Cont..

Other studies have also identified bias in using AI for natural language processing in customer service applications and assistive tools for people with disabilities. When trained on language datasets, AI systems used for natural language processing may display biases, leading to skewed answers to or interpretations of user inquiries, negatively affecting the user experience (Wang et al., 2021).

A study by researchers at Stanford University in the United States of America on five state-of-the-art ASR systems developed by Amazon, Apple, Google, IBM, and Microsoft found bias in performance (Koencke et al., 2020). The research demonstrated significant racial disparities across all five Automatic Speech Recognition (ASR) systems, with an average word error rate (WER) of 0.35 for black speakers compared with 0.19 for white speakers. This raised concern about accuracy and responsiveness, mainly in using such systems in emergencies.

Various case studies have demonstrated that AI algorithms can encode, amplify, and propagate gender biases in recruitment. In 2015, Amazon had to cease using a Human Resources Recruitment Algorithm after discovering it was not rating candidates for software developer jobs and other technical posts gender-neutrally, inherently discriminating women (Dastin, 2018). Amazon's models were trained to screen applicants by observing patterns in resumes received by the company over ten years; most applications were received from men, a sign of male dominance across the tech industry, a trend further propagated by the recruitment tool.

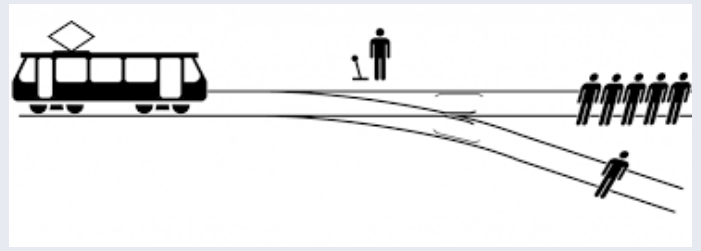
These are just some of the real-life case studies of algorithmic bias by AI; more exist. However, it is reassuring to note that humans write algorithms; humans also select the data used by algorithms as well as the application of the algorithms. Hence, data scientists must test their models to identify potential bias, which AI inherently automates and perpetuates.



• The Trolley Problem

Advances in robotics mean autonomous vehicles and industrial robots will be more capable, independent, and pervasive over the next 20 years; this is exacerbated by the fact that AI systems increasingly outperform humans in various tasks (Bathla et al., 2022). However, it is known that AI fails to capture or respond to intangible human factors that go into real-life decision-making, i.e., the ethical, moral, and other human considerations that guide the course of business, life, and society. This raises the question of how much autonomy we should grant them in critical decision-making scenarios. This ethical dilemma can best be explained by the "Trolley Problem."

The Trolley Problem is a well-known thought experiment in psychology, ethics, and moral philosophy, which presents a hypothetical scenario in which a person is standing near a set of railroad tracks and sees a runaway trolley (or train) approaching. Multiple people are tied up and unable to move on the tracks, and the trolley is heading straight to them. The person standing nearby can pull the lever and divert the trolley onto a different track, where only one person is tied up. The moral dilemma arises when one must decide whether to act and pull the lever, causing the trolley to switch tracks and potentially save the lives of many at the cost of one life, or not intervening, allowing the trolley to continue on its current path, resulting in the deaths of multiple people.



This is a classic moral dilemma because there is no easy answer. As discussed in the World Economic Forum (2022), meeting paper by Lee Kai-Fu, as AI systems become more sophisticated, they face situations similar to the trolley problem. For example, AI-driven medical diagnoses in healthcare may raise ethical concerns when determining the allocation of limited medical resources. This is exacerbated by 'brittleness,' a phenomenon where AI can only recognize a previously encountered case, meaning that when exposed to new patterns, AI can become easily deceived, leading to incorrect conclusions (Lee Kai-Fu, 2022). For instance, a slight modification to medical scans can lead to misdiagnoses. These and other scenarios pose a significant challenge to the dependability of AI systems.



- **Algorithmic accountability**

Accountability is a fundamental concept in human morality, underpinning the rule of law and guiding how restitution is calculated across all sectors globally. It is a necessary component of professional activities in business and government (Cooper et al., 2022). However, who is accountable when an AI model makes mistakes that result in a negative impact? A scan of existing legal frameworks shows that AI systems are not recognised as entities capable of legal agency or moral responsibility. This gap in the law presents a significant challenge when attributing liability in cases where AI-generated work leads to unfavourable outcomes. Identifying the responsible party can thus be a convoluted task as many stakeholders are involved. Is it the AI developer who coded the system? Is it the user who relied on the AI's advice? Is it the AI vendor? Is it the provider of the data with which the algorithms were trained or the company that owns the AI system? Is it the regulatory bodies that have the overarching accountability for establishing and enforcing regulations and protecting public interests? Or, from an even more radical point of view, should the AI system itself be held accountable?

The multi-agent nature of AI systems leads to the 'many hands' problem; this is the impossibility of pinpointing individual responsibilities in systems that involve multiple actors and resources (Cooper et al., 2022). This creates sub-optimal equilibrium in which distributed responsibility means that nobody may feel obliged to prevent negative consequences (Floridi, 2016). This evidently leads to the absence of efforts to reduce the risks of undesirable outcomes and of effective redress for victims. For example, in a situation where an AI system incorrectly predicts market trends, leading to significant business losses, it may be tempting to pin the blame solely on the AI developers and vendors but data providers who fed incorrect or biased data into the system could also share responsibility. Additionally, regulatory bodies would need to assess whether regulations were violated, and AI users may bear some accountability for trusting and acting on the AI system's recommendations without additional scrutiny. This challenge is further compounded by the complexity and opacity of some AI systems, particularly deep learning models. Specific AI algorithms lack transparency, which makes it challenging to determine the root cause of issues, allocate blame and attribute responsibility (Wang et al., 2021). Without a clear understanding of how an AI system arrives at a particular decision or outcome, it becomes challenging to pinpoint the responsible party and hold them accountable.

- **The Privacy Paradox: AI as the Big Brother**

The spotlight on data privacy has intensified in recent years, as evidenced by the promulgation of data privacy regulations, both nationally and internationally. In Zimbabwe, the Cyber and Data Protection Act [Chapter 12:07] was promulgated in 2021 to increase data protection and build confidence and trust in the secure use of ICTs by data controllers, their representatives, and data subjects. Although the promulgation of cyber and data protection legislation is a positive move, it is vital to be cognisant of AI's rapid and ever-evolving nature.

According to Sher and Benchlouch (2023), AI's privacy dilemma rests on the technology's insatiable appetite for extensive personal data to feed its machine-learning algorithms and its remarkable capacity to analyse data and make complex analysis. This raises privacy concerns about data storage, usage, and access. AI models' reliance on vast volumes of data to learn is at odds with critical principles of data privacy, such as data minimisation, purpose limitation, and privacy by design and default principles (Bretous, 2023).

The privacy problem is compounded by the ability of AI algorithms to "learn" and make predictions about us from personal data collected from our digital footprints, creating virtual profiles that mirror real-life persona. Individuals may not be aware that their image, voice, or other samples of their biometric information located on public websites such as social media are being used to feed generative AI technology to create synthetic media depicting their likenesses known as 'deepfakes' (Helmus, 2022). The use of 'deepfakes' can potentially create a zero-trust society where people cannot distinguish truth from lies as 'deepfakes' are increasingly becoming difficult to detect by the human eye and by existing detection technologies.

The most recent famous case study is the 2022 deepfake video of Ukrainian President Volodymyr Zelensky calling on his soldiers to surrender in the Russo-Ukrainian war, which spread across all global media, including national broadcasting channels. It is vital to balance the benefits of AI and data processing and safeguarding individuals' privacy rights. As technology evolves, data protection laws must keep up with these advancements to protect privacy rights effectively. With the potential for identity theft and cyber-attacks, AI presents a unique challenge that demands immediate proactive solutions.



- **Job Losses: Progress vs Social Responsibility**

Historically, the path of technological progress has produced many head-on collisions between innovation and the labour market, from the scribes put out of work by the printing press to the factory workers displaced by robots and call centre agents displaced by chatbots. Many scholars have raised concern that using AI may result in job losses (Comninou A. et al., 2019). McKinsey & Company (2023) predicted that, depending upon various adoption scenarios, automation will displace between

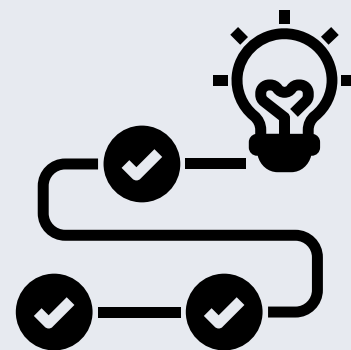


400 and 800 million jobs by 2030, requiring as many as 375 million people to switch job categories entirely. This inadvertently causes fear and concern, especially for the world's vulnerable countries and population. For example, if efficiently implemented, AI can reduce the size of the workforce in the postal and courier services by automating mail handling, sorting and processing operations. The telecommunications sector is also no exception. However, some scholars have dismissed these fears as, historically, every technological shift has created more jobs than were destroyed. According to McClelland (2023), the advent of personal computers in the 1980s spurred “computerphobia,” with many fearing computers would replace their jobs, but this was not so; what changed were the skills required for jobs, rather than replacing jobs altogether. Thus, technological change may eliminate specific jobs, but it has always created more in the process. Hence, fears may be understandable but unwarranted. In the Wall Street Journal, Kessler (2016) wrote:

“.. jobs that robots can replace are not good jobs in the first place. As humans, we climb up the rungs of drudgery- from physically tasking or mind-numbing jobs to jobs that use what got us to the top of the food chain, our brains.”

This implies that beyond the anticipated job creation, future jobs will be more intellectually engaging, than manual and routine. Given the opposing positions, the net impact of AI on the labour market is neither black nor white, it is still a grey area. Nevertheless, the exponential acceleration of digital transformation demands continuous reskilling to meet the ever-changing world.

CONCLUSION AND RECOMMENDATIONS



As discussed in this paper, AI in its diverse applications, is giving rise to diverse concerns such as algorithmic bias, transparency, accountability and responsibility, privacy, and beyond. By addressing these grey areas head-on, we can harness the potential of AI for societal progress while upholding ethical principles that prioritize the greater good. To navigate these grey areas effectively, we must:

- **Develop Ethical Guidelines:** Establishing clear ethical guidelines and standards for AI development and deployment is essential to ensure responsible practices.
- **Engage in Multidisciplinary Collaboration:** Collaboration among technologists, ethicists, policymakers, and other stakeholders is crucial to strike a balance between innovation and ethics.
- **Promote Diversity and Inclusion:** Diverse perspectives in AI development can help mitigate bias and ensure technology benefits all members of society.
- **Continuous Monitoring and Evaluation:** Regularly assessing AI systems for biases and ethical implications will help identify and rectify potential issues.
- **Educate and Raise Awareness:** Educating the public about AI's ethical considerations fosters a collective understanding and drives informed decision-making.

Let's shape an AI-powered future that reflects our shared values and aspirations. We can only fully realize AI's transformational potential while defending our core beliefs and securing a future in which technology responsibly serves humanity by taking a proactive and collaborative approach.



REFERENCES

- Bathla, G., Bhadane, K., Singh, R.K., Kumar, R., Aluvalu, R., Krishnamurthi, R., Kumar, A., Thakur, R.N. & Basheer, S. (2022). Autonomous vehicles and intelligent automation: Applications, challenges, and opportunities. *Mobile Information Systems*, <https://www.hindawi.com/journals/misy/2022/7632892/>
- Bretous, M. (2023). How AI Has Exacerbated Data Privacy Concerns. <https://blog.hubspot.com/ai/data-privacy-concerns>
- Comninos, A., Muller, E.S., & Mutung'u, G. (2019). Artificial intelligence for sustainable human development. *Association for Progressive Communications (APC)*, Article, 19.
- Cooper, A.F., Moss, E., Laufer, B., & Nissenbaum, H. (2022). Accountability in an algorithmic society: relationality, responsibility, and robustness in machine learning. In: *2022 ACM Conference on Fairness, Accountability, and Transparency*, 864–876. <https://doi.org/10.1145/3531146.3533150>
- Dastin. (2018). Insight - Amazon scraps secret AI recruiting tool that showed bias against women, <https://www.reuters.com/article/idUSKCN1MK0AG/>
- Floridi, L. (2016). Faultless responsibility: On the nature and allocation of moral responsibility for distributed moral actions. *Philos Trans Roy Soc A* 374(2083):20160112. <https://doi.org/10.1098/rsta.2016.0112>
- Friis, S., and Riley, J. (2023). <https://hbr.org/2023/09/eliminating-algorithmic-bias-is-just-the-beginning-of-equitable-ai>
- Helmus, T.C. (2022) *Artificial Intelligence, Deepfakes, and Disinformation: A Primer*. Santa Monica, CA: RAND Corporation. <https://www.rand.org/pubs/perspectives/PEA1043-1.html>.
- Kessler, A. (2016). The Robots Are Coming. Welcome Them, <https://www.wsj.com/articles/the-robots-are-coming-welcome-them-1471907751>

Koenecke, A., Nam, A., Lake, E., Nudell, J., Quartey, M., Mengesha, Z., ... & Goel, S. (2020). Racial disparities in automated speech recognition. *Proceedings of the National Academy of Sciences*, 117(14), 7684-7689.

Lee Kai-Fu (2022). Davos Agenda, <https://www.weforum.org/agenda/2022/05/ai-s-trolley-problem-debate-can-lead-us-to-surprising-conclusions/>

McKinsey & Company. (2023). Generative AI and the future of work in America, <https://www.mckinsey.com/mgi/our-research/generative-ai-and-the-future-of-work-in-america>.

McClelland, C. (2023). The Impact of Artificial Intelligence - Widespread Job Losses, <https://www.iotforall.com/impact-of-artificial-intelligence-job-losses>

Wang, Y., Skeete, J.P., & Owusu, G. (2021). Understanding the implications of artificial intelligence on field service operations: A case study of BT, *Production Planning & Control*, DOI: 10.1080/09537287.2021.1882694.

UNESCO. (2021). AI for Good Webinar: Addressing the Dark Sides of AI <https://events.unesco.org/event?id=1017644186&lang=1033>

POLICY & REGULATION: THE INEVITABLE BALANCING ACT

By Rumbidzai Panavanhu¹

The rising tide of AI Regulation

Although regulation ordinarily lags behind technological innovation, it is finally catching up with AI, including machine learning, deep learning, and neural networks. This is in light of the ethical concerns, as expounded in the second paper of this Information Society Watch publication. So serious are the concerns that even prominent AI proponents are advocating for its regulation. As in the words of Elon Musk, “AI regulation will be annoying but, ultimately, having a referee is a good thing to reduce the threat to mankind globally” (Bloomberg, 2023). In March 2023, thousands of signatories, including Elon Musk, Steve Wozniak, and Tristan Harris, amongst other prominent AI experts, signed an open letter that called for policy action to avoid extreme risks and the cessation of training of AI systems more potent than GPT-4, for at least six months. The open letter reads:

"...Contemporary AI systems are now becoming human-competitive at general tasks, and we must ask ourselves: Should we let machines flood our information channels with propaganda and untruth? Should we automate away all the jobs, including the fulfilling ones? Should we develop nonhuman minds that might eventually outnumber, outsmart, obsolete, and replace us? Should we risk loss of control of our civilization? Such decisions must not be delegated to unelected tech leaders. Powerful AI systems should be developed only once we are confident that their effects will be positive, and their risks will be manageable..."

Traditionally, technology firms have been known to be anti-regulation; however, with AI, even global giants such as Google are pro-regulation. According to Google CEO Sundar Pichai, "AI is too important not to regulate and too important not to regulate well." This implies that as much as regulation is pertinent, the nature and form of regulation should be progressive and not stifling.

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The Rising Tide of AI Regulation cont.

Although the AI ecosystem may seem like the unruly, unregulated Wild West, there are several laws in force today in some countries. According to Stanford University's 2023 AI Index, thirty-seven various AI-related guidelines and regulations were passed in 2022 alone. Most of these regulations call for better analysis and understanding of AI and its potential risks and making stakeholders in the AI value-chain accountable for their actions. This paper explores regulatory provisions in first mover jurisdictions such as the European Union, China, and the United States of America, looking at laws already passed, as well as those expected to be promulgated in the near future.

People's Republic of China:

Over the past two years, China has rolled out some of the world's first binding national regulations on Artificial Intelligence (Sheehan, 2023). China's Internet regulator, the Cyberspace Administration of China (CAC, 2023), has established a series of regulations for advanced algorithms. These include:

1. **Regulation on Recommendation Algorithms (March 2022):** The provisions focus on recommendation algorithms' roles in disseminating information, requiring providers to ensure that they do not endanger national security or the public interest. It also confers accountability and responsibility to providers of recommendation algorithms and addresses algorithmic monopolistic behaviour.
2. **Provisions on the Administration of Deep Synthesis Internet Information Services (November 2022):** The provisions focus on deep synthesis technology. Commonly known as "deepfake," deep synthesis technology uses powerful machine learning and AI techniques to edit visual and audio data that can thus produce 'fake' content (Zhang, 2023). The deep synthesis provisions set out comprehensive responsibilities for Deep Synthesis Service (DSS) providers and their technical supporters concerning data security and protection, transparency, consent, and content management, amongst other issues.

3. Measures for the Management of Generative AI Services (August 2023): These are the latest AI rules from China, focusing on developers and deployers of generative AI. It has been termed 'ground-breaking' as it is the first law, globally, that explicitly targets Generative AI (Sheehan, 2023). It introduced new restrictions for companies providing these services to consumers regarding the training of data used and the ethicality of the outputs produced.

It is important to note that all three regulations require developers to file with China's Algorithm Registry. China's regulation on recommendation algorithms created the algorithm registry, a government repository that gathers information on how algorithms are trained and requires them to pass a security self-assessment (Sheehan, 2023). Structurally, the regulations hold lessons for policymakers internationally.

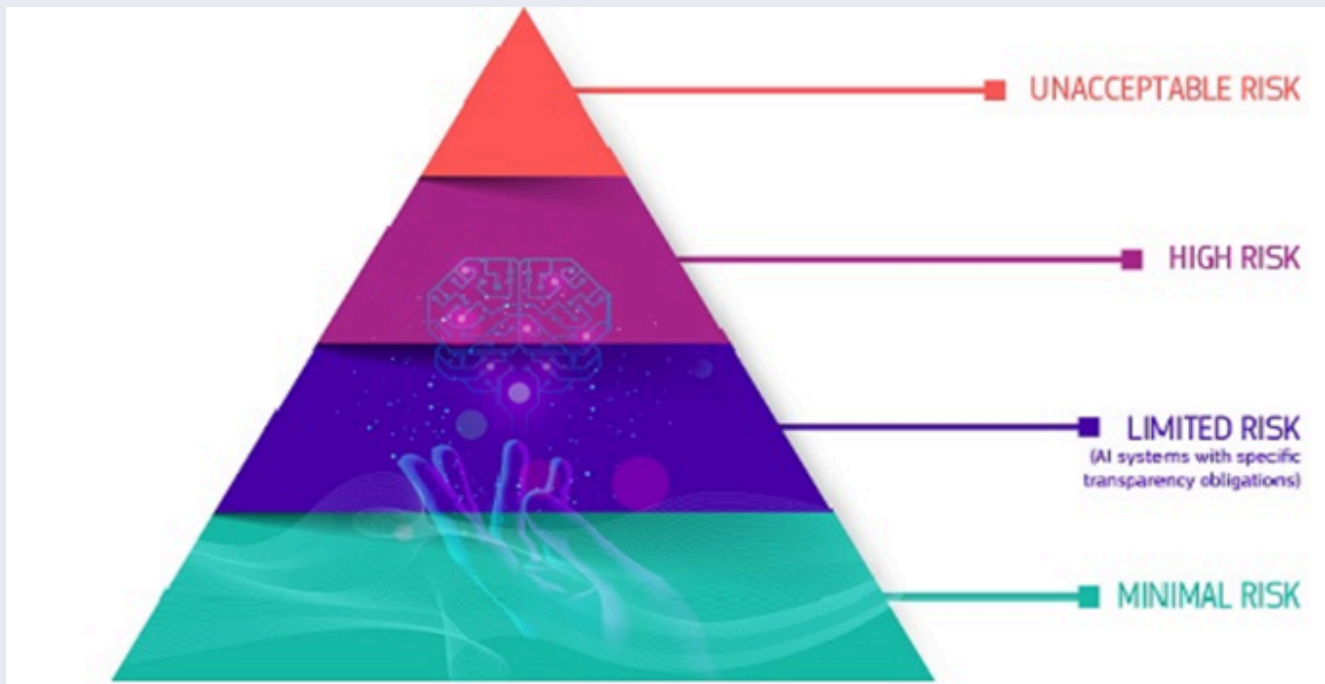
EUROPE

The European Union (EU) took a regional approach to Artificial Intelligence Regulation, similar to the General Data Protection Regulation (GDPR). On 8 December 2023, the European Parliament and Council reached a political agreement on the European Union's Artificial Intelligence Act (EY, 2023). Various authors have regarded the EU AI Act as a landmark in global AI regulation, creating a far-reaching and comprehensive legal framework for regulating AI systems across the EU. The Act creates new regulatory arrangements in all 27 European Union member states and establishes a new 'AI Office' attached to the European Commission, with the mandate to enforce and supervise AI rules; the EU Commission, the AI Office, will have a strong link with the scientific community, opening the door for researchers to help shape the AI ecosystem (Nature, 2024).

EUROPE cont.

According to the EU Commission (2023), the rules will be uniformly applied across all EU Member States, following a risk-based approach. The EU AI Act identifies four risk categories for AI systems as follows:

Figure 1: AI Risk Categories



According to provisions of the Act, all AI systems considered to pose an unacceptable risk will be banned; those considered to pose a high risk will be subject to strict obligations before being released on the market; these include biometric identification systems, AI systems considered to pose limited risk will be subject to transparency obligations while the Act allows the unrestricted use of minimal-risk AI.

The Act imposes punitive fines for non-compliance ranging from €35 million or 7% of global annual turnover (whichever is higher) for violations of banned AI applications. Once in force, the Act will likely influence a wave of AI legislation globally, similar to the wave of privacy regulations after the promulgation of the EU General Data Protection Regulations (GDPR).

UNITED STATES OF AMERICA

The regulation of AI in the United States has been largely decentralised, with some states having passed laws regulating AI use in specific use cases such as police investigations, personnel recruitment, and others (Rozen and Deitsh, 2023). These state-level AI laws demonstrate the growing recognition of the importance of AI regulation and the need for solutions to address the unique challenges and risks associated with AI technology. At the Federal level, US President Joe Biden issued an executive order on Safe, Secure, and Trustworthy Artificial Intelligence on the 30th of October 2023.

According to the American Bar Association (2021), an Executive Order is a published directive from the President of the United States that manages federal government operations. Executive Orders are regulations rather than legislation and remain in force until they expire or are revoked. According to the White House (2023), the Executive Order establishes new standards for AI safety and security, protects Americans' privacy, advances equity and civil rights, protects consumers and workers, promotes innovation and competition, and advances American leadership worldwide. An essential aspect of the Executive Order is the role given to the National Institute of Standards and Technology (NIST) to develop guidelines and best practices for “developing and deploying safe, secure, and trustworthy AI systems (EY, 2023).

The US executive order also incentivizes innovation and competition by attracting international talent. It mandates setting up educational programs to develop AI skills within the US workforce. According to Seamans (2023), various AI bills have also been tabled and are currently under consideration in the USA. These include the June 2023 bill to establish an AI Commission with the mandates to conduct a review of the “Federal Government’s current approach to AI oversight and regulation, recommend government structures necessary to oversee and regulate [AI] systems and develop a “binding risk-based approach to regulate and oversee Artificial Intelligence applications. This “risk-based approach” mirrors the European Union approach and is expected to shape global AI laws.

OTHER JURISDICTIONS:

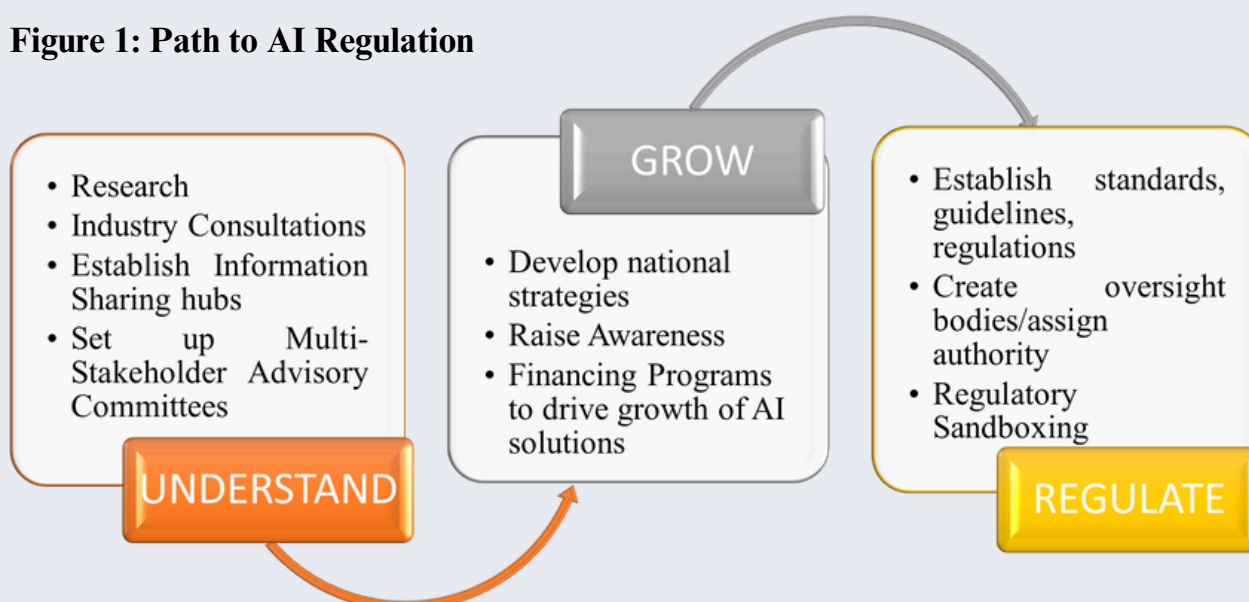
Other jurisdictions, such as the United Kingdom, Malta, Australia, and Canada, have also made some strides in formulating AI safeguards targeted at principles such as accountability, responsibility, and transparency, amongst others. Although India has no codified laws, statutory rules, or regulations on AI, The Indian government, through the Telecommunications Regulatory Authority of India (TRAI), conducted consultations on developing regulations and guidelines related to Artificial intelligence AI in 2023. The culminating recommendations from the consultation process include the establishment of an independent regulatory authority known as the Artificial Intelligence and Data Authority of India” (AIDAI), the establishment of a multi-stakeholder body that will act as an advisory body to the regulatory authority, using a risk-based framework and regulating AI according to broad principles of Responsible AI (TRAI, 2023).

OBSERVED REGULATORY TRENDS:

1. Bottom-Up Approach: Understand, Grow then Regulate!

Most countries have approached AI with a similar set of policy responses. The patterns in which policy instruments were introduced reveal the same overall pathway to regulation. Nearly all countries seem to be following a similar process of understanding, then growing, then regulating, as illustrated in Figure 1 below:

Figure 1: Path to AI Regulation



Although there is reasonable cause for government action to govern AI, there is the risk of regulatory misalignment if policymakers rush to regulate without regard for their action's unintended consequences (Guha et al., 2023). This implies that premature regulation may stifle growth. Hence, it is pertinent for the government to understand the ecosystem and the nature of its development domestically before imposing restrictions and obligations.

2. Application of Risk-based approach to AI Regulation

The assessment shows that although country frameworks may differ in whether they provide voluntary guidance or impose mandatory rules, most jurisdictions are implementing the risk-based approach to AI regulation. This approach entails tailoring or modulating regulations to the risks posed by specific AI-related activities to strike a sound balance between mitigating risks while encouraging responsible development and use of AI (EY, 2023). This approach also makes policymakers more responsive to fast-moving AI innovations, enabling them to maintain this critical balance between risks and rewards. Risk-based approaches assign compliance obligations according to the AI system's intended use and risk profile. The most exhaustive compliance requirements apply to those systems categorised as high-risk, whereas AI systems categorised as not posing any significant risk do not need to comply with obligations. Risk assessments help identify the AI systems that need to be regulated, and the nature of regulation is proportional to the risk and not the type of technology. This approach promotes light-touch regulation and diverges from the 'one-size fits all' approach.

3. Pragmatism: Adopting flexible, evolving regulatory frameworks

Countries are adopting flexible frameworks, which are adaptable in addressing the diverse landscape of AI technologies, giving due consideration to the need to facilitate innovation. According to Woloszyk (2023), although pre-emptive regulation could safeguard against AI risks, it could do so at the cost of slowing down technological breakthroughs. Pragmatism has been the trend, characterised by flexible, evolving regulatory frameworks that allow AI to grow within defined ethical and safety boundaries, adapting as the technology and its societal implications evolve.

To ensure adaptability and strike a balance between innovation and safety, studied jurisdictions are using regulatory sandboxing. Regulatory AI Regulatory Sandboxing is a process where authorities engage firms to test innovative services that challenge existing legal frameworks, and participating firms obtain waivers from specific legal provisions during the testing and review process (OECD, 2023).

4. Dual Implementation of Sector-Agnostic and Sector-Specific Rules

Jurisdictions are adopting a dual approach of promulgating sector-specific rules in addition to sector-agnostic regulation. This is in recognition that sector-specific considerations need to be factored into AI policymaking since AI can pose unique or greater risks in some sectors than others (PWC, 2023). For example, financial service regulators may require specific and unique rules related to banks' use of AI, targeting potential risks to consumer lending, money laundering, etc. PWC (2023) adds that the cross-sectoral approach provides for a baseline framework of fundamental safeguards, regardless of the sector in which AI is being developed or used; the sector-specific approach then establishes additional guidelines or obligations for the use of AI to address risks and vulnerabilities within specific sectors. This approach calls for collaboration amongst regulators in various economic sectors.

AI REGULATORY OUTLOOK

Artificial intelligence (AI) is not just a technological construct; it poses significant societal, industrial, political, structural, and economic impacts. As such, regulation is inevitable to manage the upside opportunities and potential problems arising from the implementation of the technology. 2023 was an active year for AI regulation, but 2024 looks even busier as AI continues to stand out as a dominant and pervasive topic. As countries enact regulations globally, regulation strategies will likely differ worldwide, with some countries taking a government-led approach while others opt for self-regulation by the industry. Furthermore, considering that countries are at different points in their development, with different economic and social circumstances, it might be expected to see similar clusters of policies emerge.

AI REGULATORY OUTLOOK cont....

Protecting individuals from the harms of AI use will be the main focus of regulation. Hence, any AI system that has a material impact on humans will be the target of regulation. Regulatory activity will focus on principles that include accountability, transparency, fairness and safety, accuracy, and human oversight. Global collaboration on AI governance will surge, marked by increased international AI summits and the release of proposed frameworks and guiding principles. Closer home to Africa, delving into AI regulation may not be an immediate priority in many countries in 2024, as the region still needs to catch up on AI development and use. According to the 2023 Government AI Readiness Index by Oxford Insights, the African region had the lowest average score of any world region in the index, signifying serious challenges to AI adoption.

The main focus in Africa will be on strengthening the foundational regulations on data governance, as the implementation and enforcement of data protection regulations is regarded as the first step towards AI regulation. This is because data protection laws guide the processing of personal data, the extent of such processing activities, and the rights of individuals; these are some aspects relevant to AI development and use. However, we may see growing discussions at the African regional and sub-regional level, which may set the tone for regional positions and principles on various AI matters. Despite many countries refraining from delving into regulating AI in the short run, we will witness the development of national AI strategies by various African countries, including Zimbabwe, and the setting up of AI task forces and multi-sector advisory councils to foster growth.

REFERENCES

- American Bar Association. (2021). https://www.americanbar.org/groups/public_education/publications/teaching-legal-docs/what-is-an-executive-order-/
- Bloomberg, T.S. (2023). <https://fortune.com/2023/11/02/elon-musk-ai-regulations-uk-prime-minister-sunak-ai-safety-summit/>
- CAC. (2023). http://www.cac.gov.cn/2023-07/13/c_1690898327029107.htm
- EY. (2023). Key takeaways from the Biden administration executive order on AI, https://www.ey.com/en_us/public-policy/key-takeaways-from-the-biden-administration-executive-order-on-ai
- Guha, N., Christie, M.L., Lindsey, A., Gailmard, K.T., Rodolfa, F.S., Rishi, B., Inioluwa, D.R., Mariano, F.C., Colleen, H., Percy, L., Daniel, E.H. (2023). The AI Regulatory Alignment Problem, <https://hai.stanford.edu/sites/default/files/2023-11/AI-Regulatory-Alignment.pdf>
- OECD (2023). Regulatory sandboxes in artificial intelligence: OECD Digital Economy Papers, No. 356, OECD Publishing, Paris, <https://doi.org/10.1787/8f80a0e6-en>.
- Rozen, C., and Deutsch, J. (2023). Regulate AI? How US, EU and China Are Going About It, <https://www.bloomberg.com/news/articles/2023-10-30/ai-regulation-what-biden-s-new-rules-might-mean-in-the-us>
- Seamans, R. (2023). AI Regulation Is Coming To The U.S., Albeit Slowly, <https://www.forbes.com/sites/washingtonbytes/2023/06/27/ai-regulation-is-coming-to-the-us-albeit-slowly/?sh=9ced81e7ee14>

REFERENCES cont.

Sheehan, M. (2023). China's AI Regulations and how they get made, https://carnegieendowment.org/files/202307-Sheehan_Chinese%20AI%20gov.pdf

TRAI. (2023). Recommendations on Leveraging Artificial Intelligence and Big Data in Telecommunication Sector, https://trai.gov.in/sites/default/files/Recommendation_20072023_0.pdf

Woloszyk, W. (2023). AI Regulation: Balancing Innovation and Control, https://www.linkedin.com/pulse/ai-regulation-balancing-innovation-control-woloszyk-wo%C5%82oszyk--wddic/?trk=article-ssr-frontend-pulse_more-articles_related-content-card



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1. In your opinion, is Zimbabwe ready for the AI revolution, should it be a national priority?

Artificial Intelligence (AI) is considered to be one of the most transformative technologies in the last 60 years, often compared to electricity as a key driver of the fourth industrial revolution. To assess Zimbabwe's readiness for AI, I will use the UNESCO Readiness Assessment Methodology (RAM), which comprises five dimensions: Legal/Regulatory, Social/Cultural, Economic, Scientific/Educational, and Technological/Infrastructure. In November 2021, Zimbabwe was among the 193 Member States of UNESCO that signed the Recommendation on the Ethics of Artificial Intelligence. This was the first global normative instrument in AI's domain, and it serves as a comprehensive and actionable framework for AI's ethical development and use, covering the entire range of human rights. Here is a brief analysis of Zimbabwe's readiness for AI across five key dimensions, based on the UNESCO Readiness Assessment Methodology:

- **Legal &Regulatory:**

Zimbabwe's strengths lie in the promulgation of legislation such as the Access to Information & Protection of Privacy Act [Chapter 10:27], 2003-10. This is a legislation that grants members of the public the right to access records and information that is held by public bodies. It also aims to make public bodies accountable by giving individuals the right to request the correction of misrepresented personal information. The Act seeks to prevent the collection, use or disclosure of personal information by public bodies without authorization in order to protect personal privacy. Additionally, it provides for the regulation of mass media, the establishment of a Media and Information Commission, and addresses other matters connected therewith or incidental to the foregoing. The National Information and Communication Technology Policy (2018) also outlines a vision for digital transformation, including AI development. The Cyber and Data Protection Act Chapter 12:07 of 2021 also addresses data privacy concerns, though its implementation remains nascent.

However the weaknesses in the legal landscape lie in the lack of comprehensive AI-specific legislation, leading to uncertainty for developers and investors; absence of ethical frameworks for AI development and deployment and limited enforcement of existing regulations, particularly regarding data privacy. In that regard i recommend the development of a national AI strategy and regulatory framework that addresses ethical considerations, data governance, and liability. There is also need to strengthen the enforcement of existing data protection laws and foster public dialogue and promote ethical AI principles through awareness campaigns and educational initiatives.

2. Social/Cultural:

Zimbabwe's strengths lie in the growing public interest in AI and its potential applications, a strong ICT-focused youth population with an entrepreneurial spirit and existing initiatives to bridge the digital divide and promote digital literacy. However, there are also societal concerns about potential job displacement due to AI automation, there is limited awareness of AI ethics and potential biases in algorithms and a lack of diversity and inclusion in the AI development and research landscape. In that regard there is need to invest in public education and awareness campaigns to

demystify AI and address concerns. There is need to promote responsible AI development practices that prioritise inclusivity and address potential biases and encourage the participation of women and marginalised groups in AI development and decision-making processes.

3. Economic

There is a growing presence of tech start-ups in the economy and the number of innovation hubs is increasing. Government efforts to open up the ICT sector and attract foreign investment are a positive step. However, there is limited access to capital and funding for AI start-ups and research. The lack of skilled AI talent and workforce development programs is also apparent. The economy suffers from a brain-drain of the available skilled AI talent to developed countries. The insufficient infrastructure and connectivity also hinders AI adoption, particularly in rural areas. In that regard, the establishment of funding mechanisms and incentives for AI research and development is recommended, coupled with the development of comprehensive AI skills development programs for individuals and businesses. The need to bridge the digital divide by expanding access to affordable internet and digital infrastructure can not be over-emphasized.

4. Scientific/Educational:

There is an abundance of universities offering computer science and technology related programs and research interest in AI among academics and researchers is evidently growing. Government initiatives to promote STEM education and research collaborations are also commendable. However, resources and funding for AI research are limited, particularly in universities. There is also a lack of specialised AI training programs and curricula. There is need to increase funding for AI research and development projects at universities and research institutions, develop specialised AI training programs, integrate AI modules into existing curricula and implement initiatives to attract and retain skilled AI talent in Zimbabwe.

5. Technological:

The growing mobile phone penetration and internet access in Zimbabwe, particularly in urban areas, and the growing presence of cloud computing and data centre services are important drivers of AI adoption. Government efforts to improve ICT infrastructure and connectivity are also commendable. However, there is still limited access to high-

speed internet in rural areas. There is also a lack of advanced computing resources and data storage facilities. The high cost of internet access and digital technologies is also a major barrier. There is need to invest in developing robust and affordable national broadband infrastructure, implement policies to improve the affordability of internet access and digital technologies and foster public-private collaboration private sector to establish advanced computing facilities and data centres.

Overall, Zimbabwe possesses some promising elements for AI development, but significant challenges remain across all five dimensions. Addressing these challenges through a comprehensive and multi-pronged approach is crucial for Zimbabwe to harness the potential of AI for sustainable and inclusive development.

2. How would you describe the current AI adoption and development in Zimbabwe? In your opinion how do we fare regionally (Africa) and globally.

Zimbabwe is in the early stages of AI adoption and development, with strategic plans to integrate AI into its economic growth. We are also the second country in Africa to have a supercomputer for accelerating AI adoption, since 2015. What makes this journey exciting is Zimbabwe's approach to AI implementation, which spans across various sectors such as agriculture, healthcare, finance, and education. Zimbabwe's greatest advantage is its young and tech-savvy population at the forefront of embracing AI technologies. This unique demographic characteristic places Zimbabwe in an advantageous position for adopting and adapting to new technologies. The focus is not just on utilising AI but also on encouraging research and development in this area, a move that is further bolstered by government support through the Research Council of Zimbabwe.

Regarding the broader context of Africa, Zimbabwe's efforts are noteworthy. It is no secret that the African continent trails behind the rest of the world in AI adoption. The variance in AI adoption among African countries underscores the need for cross-continental collaboration. Here, Zimbabwe's efforts stand out, setting a welcome precedent for other countries in the region. However, it is also important to take note of the global stage. While precise rankings are not readily available, it is clear that Zimbabwe, like many African countries, is still working

towards catching up with AI leaders like the US and China. But what matters is not where Zimbabwe currently stands, but the direction it is moving. The country's determination to harness the potential of AI is evident. It is making strides in the right direction, but the journey is far from over. Continued support from the Government and the development of the necessary infrastructure is crucial for Zimbabwe to effectively adopt and develop AI technologies. It is also important to highlight that the journey towards AI adoption is not just about technology. It's about people and their willingness to embrace change. Zimbabwe's young and tech-savvy population is a testament to this fact. Their enthusiasm and technology openness drive the country's move towards AI.

3. How can AI be leveraged to address socio-economic challenges in Zimbabwe, what opportunities exist?

Imagine a Zimbabwe where maize crops never fail, where miners discover diamond seams with a glance, where tourists can experience the thrill of wildlife safaris from the comfort of their homes, and Government of Zimbabwe (GoZ) can help every Zimbabwean in need. This might sound like a dream, but it's a potential reality with the help of AI. AI is like a powerful helper, ready and able to take on the complex tasks we humans find challenging. AI has the potential to revolutionise our farming practices. Picture a Zimbabwe where farmers can access accurate weather forecasts, pest detection tools, and crop optimisation techniques. This increases the yield and makes farming more sustainable, reducing our environmental footprint.

AI can analyse geological data in the mining industry, making finding new mineral deposits faster and more efficient. This leads to significant cost savings and increased revenue for mining companies, boosting the economy, and creating jobs. In the tourism sector, AI can enhance customer experiences, offering personalised recommendations and ensuring the safety of our visitors. With AI, we can streamline operations, attract more tourists, and drive revenue growth. For the GoZ, AI offers a powerful tool to analyse vast GoZ datasets, enabling them to identify areas that need immediate attention. This can benefit public health, environmental monitoring, and humanitarian aid sectors, ensuring no one is truly left behind.

The beauty of AI is that it doesn't require you to be a tech wizard. It's a tool, just like a tractor for a farmer, a chisel for a miner, or a map for a tourist. It's here to make our lives easier, our work more efficient, and our impact more significant. However, to harness the power of AI, we must invest in technology, foster a culture of innovation and inclusivity, train our workforce, promote data-driven decision-making, and ensure ethical AI usage. With these steps, we can leverage AI to address our socio-economic challenges and drive Zimbabwe towards a prosperous future.

4. *What gaps/bottlenecks exist? What do you see as the biggest challenges to AI realisation in Zimbabwe?*

As the dawn of the digital revolution breaks across the globe, Zimbabwe stands on the precipice of an exciting opportunity. Integrating and utilising AI can potentially transform the nation's socio-economic landscape. However, the realisation of this potential is not without its challenges. Zimbabwe's first hurdle in its AI journey is limited access to advanced technologies. To harness the transformative power of AI, the country must endeavour to bridge this technological gap. A national initiative promoting the availability and affordability of advanced technologies could be a viable solution, fostering an environment conducive to AI innovation.

In addition to technological limitations, Zimbabwe grapples with infrastructural inadequacies that could impede the seamless operation of AI technologies. Therefore, a robust effort to upgrade and expand existing infrastructure becomes pivotal. The focus should be on physical infrastructure like power and internet connectivity and digital infrastructure that supports data collection, storage, and analysis. The lack of skilled AI professionals presents another significant challenge. The country must invest in education and training programs to cultivate a new generation of AI-savvy professionals prepared to navigate the intricacies of AI development and implementation. Partnerships with international institutions could also help build a capable and competitive AI workforce.

The advent of AI brings with it the risk of job displacement. To mitigate this, Zimbabwe must strategically adapt to the changing employment landscape. This could involve the retraining and reskilling workers in sectors likely to be impacted by AI, ensuring that the workforce remains relevant in the era of AI. A robust and comprehensive policy framework is the backbone of any successful AI strategy. Zimbabwe's policy framework must be designed to guide AI adoption, ensure ethical use, and manage potential threats. It should also provide clear data privacy and security guidelines, intellectual property rights, and accountability mechanisms. Collaboration is the lifeblood of a thriving AI ecosystem. Zimbabwe must foster an environment where policymakers, researchers, and businesses work together to drive AI innovation. This collaboration should aim at sharing knowledge, expertise, and resources, thereby creating a symbiotic relationship that propels the nation forward.

Zimbabwe must tread the tightrope between AI's risks and benefits. While AI offers numerous economic opportunities, it also presents certain risks, such as data breaches and ethical dilemmas. As such, Zimbabwe needs to develop strategies that balance these risks and benefits, ensuring that the nation reaps the rewards of AI without compromising its security, ethical standards, and cultural heritage. While the path to AI realisation in Zimbabwe may be strewn with challenges, these hurdles are not insurmountable. With strategic planning, collaboration, and a focus on capacity building, Zimbabwe can successfully navigate the AI revolution and emerge as a tech-savvy nation ready to harness the power of AI for social and economic development.

5. How do we move Zimbabwe and the African region from just being AI users to being developers to effectively participate in the AI revolution?

Zimbabwe stands at a pivotal point in the ever-evolving technological landscape. As we navigate the age of AI, the time has come for us to transition from mere AI users to AI forerunners. Our first step is to craft a comprehensive national AI strategy. This strategy will serve as our blueprint, detailing the direction and milestones we aim to achieve in AI development. It will outline the roles of various stakeholders, fostering a collaborative effort to propel Zimbabwe into the AI age.

To ensure the effective execution of this strategy, I propose the establishment of a dedicated Office for AI. This has been implemented in other jurisdictions such as the United Arab Emirates, the United Kingdom amongst others. The mandate will be to manage and coordinate AI policies, setting the stage for uniform AI advancement across the nation. The Office will also play a crucial role in facilitating dialogue between various sectors, encouraging a synergistic approach to AI development, using AI to enhance economic growth and social benefits and harness AI in ways that directly impact the lives of our citizens, from improving healthcare and education to optimising public services. Moreover, the economic potential of AI is immense, by integrating AI into all our industries, we can help boost productivity, innovation, and economic growth.

Fostering a culture of innovation and entrepreneurship in the AI field is imperative to our success. Zimbabwe has to be committed to creating an environment that encourages creativity and risk-taking, equipping our tech entrepreneurs with the tools and support they need to thrive. These efforts will, in turn, stimulate AI development and contribute to our economy. Investing in education and training should be another vital aspect of our strategy. Zimbabwe must equip our people with the skills necessary for AI development. By integrating AI education into our curriculum and offering specialised training programs, we can nurture a workforce ready to take on the AI revolution.

6. Many individuals and enterprises have been sceptical about AI due to ethical grey areas. In your opinion, what ethical considerations do you believe are most pressing in the deployment and adoption of AI technologies and how can we navigate these ethical issues?

As we embrace the digital revolution, Zimbabwe is at the forefront of adopting and deploying AI technologies. Yet, as we leap forward, addressing the ethical challenges that come with these advancements is crucial. AI technologies thrive on data; the more, the better. However, this voracious appetite for data can infringe on personal privacy. We must implement robust protection measures to ensure that data collection does not become data invasion. We should advocate for 'data minimalism' - collect only necessary information and ensure individuals are informed and consented.

The second consideration is bias and discrimination. AI systems learn from data, and if that data carries societal biases, the AI will, too. Think of it as a child learning from its environment; if all it sees is prejudice, it will become prejudiced. To prevent AI from reflecting societal biases, we need to ensure that the training data is as diverse as the society we live in. Then comes the challenge of transparency and explainability. AI systems can often seem like magic, making decisions that even their creators can't explain. This 'black box' phenomenon can be particularly concerning in sectors like healthcare and finance, where AI decisions may significantly impact individuals. We're tackling this by promoting Explainable AI (XAI) techniques to make AI decisions more understandable.

Next is the issue of accountability and responsibility. If an AI system causes harm, who is to blame? The developers who created it, the users who deployed it, or the AI system itself? There should be clear guidelines and regulations around AI responsibility in Zimbabwe to address this concern. Lastly, we have the fear of job displacement. As AI becomes more prevalent, there's a growing concern about job loss in certain industries. To address this, developing strategies for re-skilling and up-skilling workers and ensuring that social safety nets are in place for those impacted will be vital.

Tackling these ethical issues requires a multi-pronged approach. In Zimbabwe, we're creating ethical guidelines for AI development and use, fostering a culture of ethics and responsibility within the AI community, developing robust laws and regulations around AI, and conducting ongoing dialogue with all stakeholders, including the public.

7. Based on your expertise, what recommendations do you have for industry and policymakers, academia to accelerate AI development in Zimbabwe effectively?

The first step is to pump up investment in AI research and development. Think of it as sowing seeds for a high-yielding harvest. We aren't just talking about financial contributions. This involves creating a vibrant ecosystem where ideas can thrive, concepts can take shape, and innovation isn't just a buzzword but a way of life.

Next in line is education. We must cultivate a love for AI and technology in our children from a young age. Incorporating AI-related courses in schools and universities isn't just about churning out tech wizards. It's about empowering the next generation with the tools to shape tomorrow. The more we invest in our human capital, our future will look brighter. AI isn't just about technology; it's about creating an environment that nurtures it. That's where AI-friendly policies and legislation come in. It's like building a playground for AI to frolic and grow, where AI can be free from the shackles of red tape and bureaucracy. It's about fostering a conducive environment that encourages growth and innovation.

We can't talk about growth without mentioning start-ups. They are the lifeblood of AI innovation. By establishing AI incubators, we won't just be encouraging start-ups but nurturing them. It's like providing a greenhouse where these young saplings can grow to become mighty trees of innovation. Collaboration is the key that can unlock Zimbabwe's AI potential. Academia, industry, and government must join hands to create synergies that propel us forward. Together, they can solve problems, innovate, and transform Zimbabwe into a hotbed of AI innovation. Zimbabwe is blessed with a wealth of natural resources. We can revolutionise industries by applying AI to these sectors and even create new ones. It's like using a secret weapon that can give us an edge over our competitors. Finally, we must harness the power of AI to transform the public sector. By automating processes and improving service delivery, we can make the Government efficient, responsive and citizen-friendly. Imagine a Zimbabwe where public services are quick, efficient, and hassle-free. That's the power of AI.

8. What developments or trends do you anticipate in the local and global AI landscape over the next 5-10 years?

The realm of AI is currently experiencing an unprecedented boom. With continuous advancements in machine learning algorithms and computational power, AI has moved from being a nascent technology to a major business disruptor. As AI continues to evolve, it becomes increasingly critical for Zimbabwean businesses and individuals alike to keep abreast of the latest trends. Understanding AI's trajectory can equip stakeholders with the knowledge and tools to harness its potential and navigate the challenges it might bring.

Over the next decade, Zimbabwe's AI landscape is poised for a transformative journey. This evolution will be fuelled by a blend of human creativity, machine intelligence, and a progressive approach to technology adoption.

i) Increased Pace of AI Evolution

The pace at which AI is evolving is beyond exponential. Today, AI is not just about automation but is moving towards emulating human intelligence capabilities, known as Artificial General Intelligence (AGI). This evolution is driven by advancements in computing power, the development of sophisticated algorithms, and the availability of vast amounts of data. In addition, the breakthroughs in Quantum Computing will usher in the greatest AI acceleration we have ever known.

This rapid evolution of AI has profound implications for businesses and individuals. For businesses, it means a need for continuous adaptation and the ability to quickly leverage new AI capabilities. For individuals, it will mean job transformations and the need for lifelong learning. Governments that will leverage AI will experience consistent double-digit GDP growth per annum by optimisation of industrialisation. Countries will use AI capabilities for military power and deterrence comparable to nuclear weapons. The new Superpowers will be those with more advanced AI capabilities.

ii) The Rise of Generative AI

One emerging trend in the AI evolution journey is Generative AI. This technology goes beyond understanding and interpreting information to creating new content. It's a significant leap from reactive AI models to proactive ones that can generate novel ideas. Large Language Models (LLMs), such as ChatGPT, are built on the Transformer Architecture, which has a limit on the size of sequential tokens it can handle. However, a new type of LLM architecture called Mamba State Space Models is emerging as a replacement for Transformers. These new models are highly efficient and perform well, especially when dealing with long sequences of data. Mamba allows for linear scaling with token sequence length, resulting in

significantly improved efficiency compared to traditional transformer models. This efficiency is particularly crucial when processing large amounts of data, as is often the case in language, audio, and genomics. This represents a significant advancement in AI.

iii) Industrialisation of Data Science

As we delve deeper into the age of information, a new trend is taking shape - the industrialisation of data science. In essence, this refers to transforming data science from a craft-based activity, often carried out by individual data scientists, into a standardised, repeatable AI process. The goal is to streamline the production of data science models and algorithms similar to the manufacturing lines in industries. The need to accelerate data science model production cannot be overstated. Businesses must keep pace in a world where data grows exponentially to gain insights and make data-driven decisions. Faster model production means quicker insights, enabling businesses to stay ahead of the curve and maintain their competitive edge.

Several leading companies have already embarked on industrialising their data science processes. For example, tech giants like Microsoft and Google have invested heavily in creating automated, end-to-end data science platforms. These allow for faster, more efficient model building and deployment, enabling these organisations to leverage their vast data resources effectively.

iv)Regulatory Changes due to AI Integration

The integration and adoption of AI across various sectors is transforming businesses' operations and leading to significant regulatory changes. As AI becomes an integral part of our society, governments worldwide realise the need for comprehensive regulations to ensure its safe and ethical use. Regulation is critical in balancing leveraging AI's potential and mitigating its risks. Regulations must address these concerns and build public trust in AI technologies, from data privacy and security to AI biases and transparency.

However, formulating and implementing AI regulations comes with its own set of challenges. The rapid pace of AI development and its widespread applications make it difficult to create one-size-fits-all regulations. Moreover, striking the right balance between encouraging innovation and ensuring safety and fairness is daunting. Potential solutions will include a more flexible, risk-based approach to AI regulation, involving all stakeholders in the regulatory process, including businesses, consumers, and the AI community. Regularly reviewing and updating regulations to keep pace with AI advancements is also crucial. Ultimately, the goal will be to create a regulatory environment that fosters innovation while protecting society from potential AI harm.

v) Transformative Impact of AI on Human Life and Industries

The trend of AI transformation is not only observable but pervasive. Digitisation and automation have become the norm, and AI is at the heart of these advancements. We are witnessing an unprecedented acceleration of digital transformation across all sectors, driven by AI technologies. AI is speeding up human life and fundamentally changing behaviours. AI is there from how we communicate, shop, learn, and even navigate the world. AI Personal assistants will be integral to simplifying our lives, recommending what to watch, where to eat, and who to date.

Integrating AI into our lives enhances efficiency and will continue to pose questions about our relationship with technology and privacy. Industries undergoing significant transformations due to AI include healthcare, where AI is used in diagnosis and treatment plans; automotive, with AI-powered autonomous vehicles; and finance, where AI helps in fraud detection, credit scoring, and algorithmic trading. The manufacturing sector also leverages AI for predictive maintenance and process automation.

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