ZEGU
ZIMBABWE
EZEKIEL GUTI
UNIVERSITY
Committed to Excellence

Oikos

The Zimbabwe Ezekiel Guti University Bulletin of Ecology, Science Technology, Agriculture, Food Systems Review and Advancement

ISSN 2957-8434 (Print)
ISSN 3007-2883 (Online)

Vol. 3 Issues (1&2), 2024

Published by the Zimbabwe Ezekiel Guti University Press
Stand No. 1901 Barrassie Rd,
Off Shamva Road
Box 350, Bindura
Zimbabwe

Typeset by Divine Graphics
Printed by Divine Graphics

SUBSCRIPTION AND RATES
Zimbabwe Ezekiel Guti University Press Office
Stand No. 1901 Barrassie Rd,
Off Shamva Road
Box 350
Bindura, Zimbabwe
Telephone: ++263 8 677 006 136 | +263 779 279 912
E-mail: zegupress@admin.uz.ac.zw
http://www.zegu.ac.zw/press

About the Journal

JOURNAL PURPOSE

The purpose of *the Oikos - The Zimbabwe Ezekiel Guti University Bulletin of Ecology, Science Technology, Agriculture and Food Systems Review and Advancement* is to provide a forum for scientific and technological solutions based on a systems approach and thinking as the bedrock of intervention.

CONTRIBUTION AND READERSHIP

Natural scientists, engineering experts, technologists, multidisciplinary teams are encouraged.

JOURNAL SPECIFICATIONS

Oikos - The Zimbabwe Ezekiel Guti University Bulletin of Ecology, Science Technology, Agriculture and Food Systems Review and Advancement

ISSN 2957-8434(Print)
ISSN 3007-2883(Online)

SCOPE AND FOCUS

The journal is a forum for the discussion of ideas, scholarly opinions and case studies of natural and physical science with a high proclivity to multidisciplinary approaches. The journal is produced bi-annually.

Guidelines for Authors for the *Oikos* Journal

Articles must be original contributions, not previously published and should not be under consideration for publishing elsewhere.

Manuscript Submission: Articles submitted to the *Oikos - The Zimbabwe Ezekiel Guti University Bulletin of Ecology, Science Technology, Agriculture and Food Systems Review and Advancement* are reviewed using the double-blind peer review system. The author's name(s) must not be included in the main text or running heads and footers.

A total number of words: 5000-7000 words and set in 12-point font size with 1.5 line spacing.
Language: British/UK English
Title: must capture the gist and scope of the article
Names of authors: beginning with the first name and ending with the surname
Affiliation of authors: must be footnoted, showing the department and institution or organisation.
Abstract: must be 200 words
Keywords: must be five or six containing words that are not in the title
Body: Where there are four authors or more, use *et al.*
Italicise *et al., ibid.,* words that are not English, not names of people or organisations, etc. When using more than one citation confirming the same point, state the point and bracket them in one bracket and in ascending order of dates and alphabetically separated by semi-colon e.g. (Falkenmark, 1989, 1990; Reddy, 2002; Dagdeviren and Robertson, 2011; Jacobsen *et al.,* 2012).

Referencing Style: Please follow the Harvard referencing style in that:
— In-text, citations should state the author, date and sometimes the page numbers.
— The reference list, entered alphabetically, must include all the works cited in the article.

In the reference list, use the following guidelines, religiously:

Source from a Journal

Anim, D.O and Ofori-Asenso, R (2020). Water Scarcity and COVID-19 in Sub-Saharan Africa. *The Journal of Infection*, *81*(2), 108-09.

Banana, E, Chitekwe-Biti, B and Walnycki, A (2015). Co-Producing Inclusive City-Wide Sanitation Strategies: Lessons from Chinhoyi, Zimbabwe. *Environment and Urbanisation*, *27*(1), 35-54.

Neal, M.J. (2020). COVID-19 and Water Resources Management: Reframing Our Priorities as a Water Sector. *Water International*, *45*(5), 435-440.

Source from an Online Link

Armitage, N, Fisher-Jeffes L, Carden K, Winter K et al. *(*2014). Water Research Commission: Water-sensitive Urban Design (WSUD) for South Africa: Framework and Guidelines. Available online: https://www.greencape.co.za/assets/Water-Sector-Desk-Content/WRC-Water-sensitive-urban-design-WSUD-for-South-Africa-framework-and-guidelines-2014.pdf. Accessed on 23 July 2020.

Source from a Published Book

Max-Neef, M. (1991). Human Scale Development: Concepts, Applications and Further Reflections, London: Apex Press.

Source from a Government Department (Reports or Plans)

National Water Commission (2004). Intergovernmental Agreement on a National Water Initiative. Commonwealth of Australia and the Governments of New South Wales, Victoria, Queensland, South Australia, the Australian Capital Territory and the Northern Territory. Available online:https://www.pc.gov.au/inquiries/completed/water-reform/national-water-initiative-agreement-2004.pdf. Accessed on 27 June 2020.

The source from an online Newspaper article

Herald, The (2020). Harare City Could Have Used Lockdown to Clean Mbare Market. *The Herald*, 14 April 2020. Available online: https://www.herald.co.zw/harare-city-could-have-used-lockdown-to-clean-mbare-market/. Accessed on 24 June 2020.

Socio-economic Implications and Challenges of AI implementation in Zimbabwe

WAYNE MOYO[1], EUSTICE GANDE[2], AND STELIA CHIKAKA[3]

Abstract

In today's environment characterised by the rapid rise of artificial intelligence (AI), debate abounds concerning the socio-economic implications of its adoption and implementation. This research paper critically explores the role and place of AI technology pin the socio-economic development of any developing country, with particular reference to Zimbabwe. Utilising a mixed research methodology, this study aims to comprehensively examine the societal implications of AI adoption in Zimbabwe. Despite the immense potential impacts of AI adoption to the socio-economic development of Zimbabwe, findings of this study indicate that AI implementation in Zimbabwe is still at formative stage. This research contributes to the existing body of knowledge on the socio-economic implications and challenges of technological innovations and AI, specifically tailored to the Zimbabwean context. The findings inform policymakers, researchers, and stakeholders in shaping policies, strategies, and interventions which are aimed at maximising the benefits of technological

[1] Department of Social Work and Applied Psychology, Zimbabwe Ezekiel Guti University, Bindura, Zimbabwe, ORCID ID 0009-0004-8164-2693, wmoyo@staff.zegu.ac.zw

[2] Humanities and Societal Advancement, Zimbabwe Ezekiel Guti University, Bindura, Zimbabwe, ORCID ID 0009-0001-9856-4036, eusticegande@gmail.com

[3] Humanities and Societal Advancement, Zimbabwe Ezekiel Guti University, Bindura, Zimbabwe, ORCID ID 0009-0008-9739-6692, chikakastelia@gmail.com

advancements while mitigating any of the associated potential challenges. This research also ascertains the implications of AI on societal ethics.

Keywords: development, innovation, Africa, technology, developing countries

INTRODUCTION

The advancement in Artificial Intelligence (AI) as a technology has created a breeding storm and necessitates that each sovereign country introspects on its efficacy, impact and pitfalls.. In developing countries, where technology is lagging behind and often misconstrued, many questions arise concerning the socio-economic implications and potential challenges that could be faced in the everyday adoption and implementation of AI.

AI technology appears to touch every facet of our being and contact with society- from small daily chatting intelligent robots to large industry and government-level assisted offices- it is quietly changing life patterns around the world (Li *et al*., 2017). The term artificial intelligence (AI) refers to an artificial creation of humanlike intelligence that can learn reason, plan, perceive, or process natural language (Burell, 2016). It is a sub-discipline of computer science dedicated to the development of data processing systems and the execution of functions that match human intelligence. AI is designed to serve humans in making best decisions and smoothen work. Progressively, AI is becoming an indispensable technological tool for daily social life and economic activities (Naimi-Sadigh *et al*., 2021). Its tremendous contribution to sustainable economic development in all industries is rapidly becoming evident, leading it to become an instant focus of attention at the industry, academic and even government levels (Heylighen, 2017). AI-related activities could become the driving force for further economic development and result in fundamental

shifts in the structure and approach to production and is a vital cog in the quantity and quality of consumption (Vyshnevskyi *et al*., 2019).

There is, in general, scepticism regarding the role AI plays in the life of the everyday man. Some scholars posit that the widespread application of AI causes a short-lived economic boost during the initial stages (Goertzel *et al*., 2017) and that, in the long term, society's overreliance on AI is likely to create many potential pitfalls (McClure, 2017). The full adoption and implementation of AI elicits concerns regarding high unemployment rates, moral and ethical risks and personal privacy. (Kak, 2018).

This article aims to critically examine the effects and consequences of technological advancements, particularly in the field of artificial intelligence (AI), on the Zimbabwean society at large. The article aims to analyse how the adoption of these innovations impacts various societal facets such as the economy, education, healthcare, and agriculture. The article discusses the existing technological advancements and AI implementation in various sectors of Zimbabwe, some of the types of technologies being utilised, and the potential upstarts that can be adopted in these sectors of economy.

The overarching objective of this study is to identify the potential benefits of AI adoption. This entails exploring the positive impacts that AI can bring to Zimbabwe. It also encompasses examining how AI can enhance productivity and improve service delivery in such economic spheres like agriculture, healthcare, manufacturing, and education. This research also seeks to explore the challenges and risks associated with technological innovations and AI. Pursuant to the main objective of this article, focus will be had on understanding the potential negative consequences and risks that may arise from the adoption of AI in Zimbabwe. In the same trope, the realisation of the aforementioned main objective may involve analysing the impact of AI

on aspects such as job displacement, ethical concerns, data privacy and security, and the digital divide among different segments of society. Another objective of the article occasions examining existing government policy and other regulatory framework. This objective entails analysing the existing policies and regulations governing technological innovations and AI in Zimbabwe. It may also involve evaluating the adequacy and effectiveness of the current framework in addressing societal implications and ensuring responsible and ethical use of AI.

Based on the findings from this research, the third objective is to provide recommendations and potential solutions aimed at addressing the socio-economic implications of AI implementation in Zimbabwe. This may involve suggesting policy reforms, guidelines for responsible AI deployment, strategies for upskilling the workforce, and initiatives to bridge the digital divide.

By fulfilling these research objectives, the article aims to contribute to the understanding of the societal implications of AI implementation in Zimbabwe and provide insights for policymakers, researchers, and stakeholders to utilise in making informed decisions regarding AI's adoption and its socio-economic ramifications on the Zimbabwean society.

LITERATURE REVIEW

With AI increasingly becoming a part of our daily lives, a growing body of literature highlights the transformative potential of technological innovations and AI in Africa. Studies have underscored the role of technology in driving economic growth, improving service delivery, and enhancing productivity across various sectors (Acharya and Verhoeven, 2020). However, concerns have also been raised regarding the unequal distribution of technological benefits, existing

socioeconomic disparities, ethical considerations, and data privacy (Aluko and Mtsweni, 2021; Tshoaedi *et al*., 2022).

Zimbabwe stands to gain significantly from the adoption of AI, particularly in sectors such as mining, agriculture, and manufacturing, that are crucial to the country's economy. Researches have shown that AI-driven precision farming techniques can optimize resource use and increase agricultural productivity (Jack and Bagh, 2024), while adoption of AI in healthcare can improve service delivery and accessibility (Udegbe *et al.*, 2024).

Technological innovation in Zimbabwe and most African countries is in its early stages and the socio-economic potential of this technology are still to be harnessed. ICT infrastructure is largely undeveloped and require huge investment. This is mainly due to the impact of economic problems experienced in the country that created harsh macro-economic climate that, in turn, resulted in low adoption and usage of ICTs in the country. The government and various organizations have been actively promoting digital inclusion and technological development to foster economic growth and address social challenges. For instance, the government of Zimbabwe has a fully-fledged Ministry in charge of ICTs whose main mandate includes developing appropriate policies and strategies that enhance provision of information and communication technological innovations and spearhead the development of appropriate regulatory frameworks that facilitate the promotion of ICTs in the country. There has seen a general acceptance and embracing of technological advancements across various sectors of the Zimbabwean society. The government has also been investing in initiatives aimed at promoting innovation and research in technology related fields.

AI applications have appeared in diverse fields like banking, education, healthcare, agriculture and industry. To this effect, AI plays

an increasingly important role in enhancing efficiency and effectiveness (Hyder *et al.*, 2019). The AI models are powerful in decision-making with uncertainties and as well they are useful for detecting relationships between factors representing causes and effects (Chowdury and Sadek, 2012). AI is embedded into many applications such as automation, reasoning, decision-making and predictions which have immensely benefitted people in Zimbabwe with significant convenience as it can work as search engines, code writing assistants, and chatbots.

Mobile banking and digital payment solutions are becoming increasingly popular, with banks having introduced mobile banking platforms that allow users to perform financial transactions using their mobile devices. This has greatly improved financial accessibility, particularly in remote and rural areas (Shambira, 2020). In Zimbabwe AI has also changed the finance industry by introduction of smart digital currencies for example the bit coin. AI is also viewed as one of the most significant technologies disrupting the traditional accounting profession (Leitner-Hanetseder *et al.*, 2021). This is so because AI applications are able to perform accounting tasks like auditing, expense management, payable processing and others and even events hidden in the workflow data can be detected.

AI is capable of detecting diseases in early stages, assisting in diagnosis and cutting time and cost of medical research thereby enabling healthcare systems to work more efficiently and effectively (Yang, 2022). Zimbabwe has seen the emergence of healthcare technology solutions aimed at improving medical services and accessibility. From interpreting X-rays to MRI scans, AI-driven diagnostic systems can enhance diagnostic capabilities leading to improved healthcare outcomes and patient care.

Agriculture is the cornerstone of many a developing country. Zimbabwe stands to benefit greatly from the adoption of AI in its agricultural operations resulting in enhanced crop yields through such innovations as weather prediction, fertilisation and pest control. Research (Yang, 2022) has shown that automation using AI improves productivity. These innovations help farmers make informed decisions, optimize crop yields, and address food security challenges.

Fourie and Geldenhuys (2019) posit that technological innovations have contributed to economic growth by creating new industries, generating employment opportunities, and attracting foreign investment. Technology has played a crucial role in bridging the digital divide and increasing digital inclusion. Mobile banking, affordable smartphones, and internet connectivity initiatives have empowered previously marginalized communities by providing access to financial services, education, and information. Innovations in sectors like healthcare and agriculture have improved service delivery and enhanced the quality of life. Remote healthcare services have expanded access to medical services, and innovative agricultural technologies have increased productivity and income for farmers.

Despite these positive impacts, challenges such as cybersecurity threats, data privacy concerns, and unequal access to technology still exist. The digital divide remains a concern, as not all communities and people have equal access to technology (Bozic, 2020). Ensuring equitable distribution of technological benefits remains a critical issue. In healthcare, issues to do with robotic devices has aroused significant concerns about ethics and trust (Cartolovni *et al*., 2022). People are said to be worried that AI can harm human physical and mental integrity and reduce human autonomy as espoused by O'Sullivan *et al.* (2019).

STUDY DESIGN AND METHODOLOGY

In the context of Zimbabwe, the purview of this study is aimed at exploring and analysing the socio-economic implications and challenges of AI implementation. The study is also aimed at critically examining how these technological advancements are impacting various sectors of society, including the economy, education, healthcare, agriculture, and social as a whole. It seeks to understand the opportunities and challenges posed by these innovations and their implications for different stakeholders in Zimbabwe. An extensive review of relevant academic papers and other academic literature was conducted on the topic to gain a comprehensive understanding of the socio-economic implications and challenges of AI implementation in Zimbabwe.

FINDINGS

The findings of the study reveal a complex interplay of factors shaping the societal implications of technological innovations and AI in Zimbabwe. AI adoption, indeed, has the potential to drive economic growth, enhance service delivery, and promote social inclusion. Concerns have been raised regarding AI and its connection to issues of job displacement, digital exclusion, ethics and privacy.

AI has found application across various sectors in Zimbabwe, amongst others the healthcare where AI is being utilised for such purposes as medical imaging analysis and disease diagnosis. For instance, the Zimbabwean start-up Dr CADx has developed a diagnostics system that is harnessing the power of AI to help doctors remotely diagnose medical images more accurately and at low cost (Jackson, 2020). In the same vein, Patana AI is being utilised in the diagnosis of Parkinson's disease through the use of accelerometers that are assess a patient's posture, gait and hand tremors. The Herald (2022) notes that Patana AI is especially suited to the Zimbabwean environment as the application is engineered to work in low light conditions and, in the

case of power outage, one can still manage to collect data. In agriculture, AI is used for crop monitoring, disease detection, and yield prediction. Agriculture is very critical to Zimbabwe's socio-economic growth since the agricultural sector employs the majority of the country's working society and contributes immensely to the country's gross domestic product (GDP).

Potential benefits of AI adoption include the AI-driven automation that can improve efficiency in various sectors, leading to faster and more accurate decision-making. The usage of AI can drive innovation in product development and service delivery, fostering economic growth. In terms of healthcare advancements, AI can enhance disease diagnosis, drug discovery, and personalised treatment plans. The major challenge is that there is a shortage of AI experts and data scientists, leading to a skills gap that needs to be addressed. Ensuring ethical behaviour during AI development and use is also a concern; while automation through AI could lead to job displacement in certain sectors, necessitating reskilling and upskilling programmes. In healthcare, the use of robotic devices has elicited significant concerns about ethics and trust Cartolovni *et al.* (2022).

Zimbabwe faces significant disparities in access to technology and the internet. The digital divide between urban and rural areas, and among different socioeconomic groups, hinders the equitable adoption of technology and AI. Insufficient ICT infrastructure, including limited broadband access and unreliable electricity supply, presents substantial challenges. Data privacy and security concerns undermine trust in technology and AI. The risk of data breaches, misuse of personal information, and unauthorized access inhibits individuals and businesses from embracing digital solutions fully. Without proper protections, people could have their personal information used for surveillance, and other malicious purposes. It is reported (Gravett, 2023) that sometime in March 2018, the Zimbabwean government

signed a strategic partnership with a Chinese start-up Cloud walk Technology to begin a largescale facial recognition programme on the country. This development brings to the fore concerns that the adoption and deployment of AI may not be sensitive to African societies' ethical and cultural contexts. AI driven decisions may not align with local values and norms.

Technological innovations, particularly those related to artificial intelligence (AI), have brought about significant changes across various sectors of society, including economy, education, healthcare, and governance. While these innovations offer numerous benefits, they also raise important ethical, social, and economic questions that require careful consideration. Maleka and Maidi (2024) contend that job displacement is a concern as automation and AI systems increasingly take over routine and repetitive tasks. This can lead to job losses in certain industries, potentially creating unemployment and economic disruption leading to social instability. Moreover, the evolving technological landscape demands new skill requirements. This is in line with research by Maleka and Maidi (2024), who proffer that workers need to adapt and acquire skills that complement AI systems and automation.

As AI and technological innovations become more integrated into daily life, ethical concerns may also arise. The decisions made by AI systems can have far-reaching consequences, raising questions about accountability and transparency. This assertion is buttressed by Trabelsi (2024) where points out that ethical guidelines and frameworks are essential to ensure that AI technologies are developed and deployed responsibly. Privacy and data security are significant social implications in the digital age. AI systems often rely on vast amounts of personal data to function effectively. However, the collection and use of such data raise concerns about individuals' privacy rights and potential misuse. Striking a balance between

utilising data for technological advancement and safeguarding privacy rights is crucial (Aiello, 2024).

The rapid pace of technological change necessitates robust policy and regulatory frameworks. Governments and organisations must collaborate to develop guidelines that address the challenges posed by AI and technological innovations. Regulations should encompass areas such as data governance, algorithmic transparency, and accountability for AI-driven decisions (OECD, 2019). In a ground breaking move aimed at propelling Zimbabwe into the digital age the government has recently put in place three pivotal Information Communication Technology (ICT) policies. These policies, namely the Reviewed Zimbabwe National Policy for Information Communication Technology, the Zimbabwe National Broadband Plan, and the Smart Zimbabwe 2030 Master Plan, signify a strategic shift towards harnessing the power of technology to drive economic growth and development.

The Government of Zimbabwe (2024) stresses the fact that the Smart Zimbabwe 2030 Master Plan aims to achieve a digital economy through sector-focused pillars such as Smart Government, Smart Cities, Smart Agriculture, and Smart Health. This comprehensive strategy recognizes the transformative potential of digital technologies in driving economic activity and enhancing efficiency across various sectors.

The Zimbabwe National Policy for Information Communication Technology outlines priority areas for improvement, including infrastructure and services, digital skills, investment and funding, innovation, inclusiveness, and partnerships. The National Broadband Plan sets forth a vision of a highly connected Information Society, facilitated by universal and reliable broadband networks, services, and

applications by 2030. Key objectives include increasing investment in broadband infrastructure, ensuring non-discriminatory access to broadband across all provinces, and enhancing network security and resilience. Technological innovations and AI have far-reaching societal implications that span economic, social, and policy domains. Job displacement, income inequality, skill requirements, ethics, privacy, data security, and regulatory considerations are critical areas that require careful attention as we navigate the evolving technological landscape.

CONCLUSION AND RECOMMENDATIONS

This article has provided an overview of the current technological landscape in Zimbabwe, highlighting the growth and adoption of AI and other innovative technologies in various sectors such as healthcare, finance, agriculture, and more. The article further discusses the positive impacts of technological innovations and AI in Zimbabwe. The challenges and inequalities arising from technological advancements were highlighted.

To harness the potential of technology for societal advancement, there is need for a collaborative effort by stakeholders including government, academia, industry and civic society and thus ensure investment in research and development, educational initiatives, and public engagement efforts. There is need for public awareness and engagement to educate citizens about AI's potential, risks, and benefits, thus fostering a more informed and supportive public. The government would do well to develop a comprehensive national AI strategy that outlines the country's vision, goals, and priorities for AI development and adoption. A call is also made to establish a national AI governance framework aimed at ensuring responsible and ethical AI development, including guidelines for data privacy, security, and accountability. By adopting these policy recommendations, Zimbabwe

can harness the potential of technological innovations and AI while addressing challenges and promoting sustainable and inclusive development. It is important to tailor these recommendations to the specific needs and context of the country while maintaining a forward-looking approach to navigate the evolving landscape of technology.

REFERENCES

Acharya, N and Verhoeven, M. (2020). *The Impact of Artificial Intelligence on South Africa's Economy*. Washington DC: World Bank.

Aiello, S. (2024). Privacy Principles and Harms: Balancing Protection and Innovation. *Journal of Cybersecurity Education, Research and Practice*, *2024*(1), 15-23.

Aluko, O. and Mtsweni, J. (2021). Addressing the Digital Divide in South Africa: Policy Implications for Universal Access. *Telecommunications Policy, 45*(1), 101991-102015

Bozic, V. (2023). Artificial Intelligence as the Reason and the Solution of Digital Divide. *Language, Education and Technology, 3*(2), 96-109.

Cartolovni, A., Tomicic, A. and Lazic Mosler, E. (2022). Ethical, Legal, and Social Considerations of AI-based Medical Decision-support Tools: A Scoping Review. *International Journal of Medical Informatics, 161*, 104738–104738.

Chowdhury, M and Sadek, A.W. (2012) Advantages and Limitations of Artificial Intelligence, *Artificial Intelligence Applications to Critical Transportation Issues 6*(3), 360–375.

Fourie, J and Geldenhuys, J. (2019). *Artificial intelligence in South Africa: Exploring the landscape. South African Journal of Science, 115*(11-12), 1-4.

Gravett, W.H. (2023). Digital Colonizer? China and Artificial Intelligence in Africa. In: Hokayem, E. (ed.) *Survival December 2020-January 2021: A World After Trump.* (pp. 153-177). Routledge

Herald, The. (2022). New Tech to Transform Health Delivery. *The Herald,* 22 September, 2022. Available online: https://www.herald.co.zw/new-tech-to-transform-health-delivery/. Accessed on 07 August 2024.

Heylighen, F. (2017). Towards an Intelligent Network for Matching Offer and Demand: From the Sharing Economy to the Global Brain. *Technological Forecasting and Social Change, 114,* 74–85.

Hyder, Z., Siau, K and Nah, F. (2019) Artificial Intelligence, Machine Learning, and Autonomous Technologies in Mining Industry, *J. Database Manag. 30*(2), 67–79.

Jack, W. and Bagh, S. (2024). *Revolutionising Agriculture: AI-Powered Crop Yield Forecasting and Precision Farming for Optimal Harvests* (No. 11942). Available online: https://easychair.org/ publications/ preprint/Jmp6/open. Accessed on 09 August 2024.

Jackson, T. (2020). *Hot Startup of the Month: Zimbabwe's Dr CADx*. Available online: https://www.connectingafrica.com/author .asp?section _id=781&doc_id=762679. Accessed on 07 August 2024.

Goertzel, B., Goertzel, T and Goertzel, Z. (2017). The Global Brain and the Emerging Economy of Abundance: Mutualism, Open Collaboration, Exchange Networks and the Automated Commons. *Technological Forecasting and Social Change, 114*, 65–73.

Government of Zimbabwe (2024). Smart Zimbabwe 2030 Master Plan. Ministry of ICT, Postal and Courier Services.

Kak, S. (2022). Number of Autonomous Cognitive Agents in a Neural Network. *Journal of Artificial Intelligence and Consciousness, 9*(02), 227-240.

Leitner-Hanetseder, S., Lehner, O.M. Eisl, C. and Forstenlechner, C. (2021). A Profession in Transition: Actors, Tasks and Roles in AI-based accounting, *J. Appl. Account. Res. 22* (3) (2021) 539–556.

Maleka, M.S. and Maidi, C. (2024). *The Societal Implications of Technological Innovations and AI in South Africa, 1-23. https://www.researchgate.net/profile/Stevens-Maleka-2/publication/379907825_The_Societal_Implications_of_Technological_Innovations_and_AI_in_South_Africa_-15_April_2024_The_Societal_Implications_of_Technological_Innovations_and_AI_in_South_Africa_-15/links/66214a8266ba7e2359e85b53/The-Societal-Implications-of-Technological-Innovations-and-AI-in-South-Africa-15-April-2024-The-Societal-Implications-of-Technological-Innovations-and-AI-in-South-Africa-15.pdf.*

McClure, P. K. (2017). "You're fired", Says the Robot: The Rise of Automation in the Workplace, Technophobes, and Fears of Unemployment. *Social Science Computer Review, 36*(2), 139–156.

Naimi-Sadigh, A., Asgari, T and Rabiei, M. (2021). Digital Transformation in the Value Chain Disruption of Banking Services. *Journal of the Knowledge Economy, 13(2), 1212-1242.*

OECD. (2019). OECD Principles on Artificial Intelligence. Available online: https://www.oecd.org/en/topics/policy-issues/artificial-intelligence.html.

O'Sullivan, S., Nevejans, N., Allen, C., Blyth, A., Leonard, S., Pagallo, U., Holzinger, K. Holzinger, A., Sajid, M.I and Ashrafian, H. (2019) Legal, Regulatory, and Ethical Frameworks for Development of Standards in Artificial Intelligence (AI) and Autonomous Robotic Surgery. *The International Journal of Medical Robotics and Computer Assisted Surgery, 15(1), 1-12.*

Shambira, L. (2020) Exploring the Adoption of Artificial Intelligence in the Zimbabwe Banking Sector. *European Journal of Social Science Studies 5*(6), 110-124.

Trabelsi, M.A (2024). The Impact of Artificial Intelligence on Economic Development. *Journal of Electronic Business & Digital Economics,* 3(2), 142-155.

Tshoaedi, L., Letsholo, M. and Motsaathebe, G. (2022). Bridging the Digital Divide: Lessons from South Africa. *Journal of Global Information Technology Management, 25*(1), 1-19.

Udegbe, F.C., Ebulue, O.R., Ebulue, C.C. and Ekesiobi, C.S. (2024). The Role of Artificial Intelligence in Healthcare: A Systematic Review of Applications and Challenges. *International Medical Science Research Journal*, *4*(4), 500-508.

Vyshnevskyi, O., Liashenko, V. and Amosha, O. (2019). The Impact of Industry 4.0 and AI on Economic Growth. *Scientific Papers of Silesian University of Technology Organization and Management Series, 9*, 391–400.

Yang, C.H. (2022). How Artificial Intelligence Technology Affects Productivity and Employment: Firm-level Evidence from Taiwan. *Research Policy, 51*(6), 104536.