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# Accelerators and Inhibitors of Artificial Intelligence Uptake in South Africa: Implication for Social Service Professional Training and Practice

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**Abstract.** Artificial Intelligence (AI) uptake in South Africa's social services sector offers transformative opportunities for improving education, training, and service delivery. However, the social service sector has yet to utilize AI's opportunities and benefits. This paper examined the accelerators and inhibitors influencing AI adoption. Through a scoping review, thirty-five studies were analyzed. The findings highlighted accelerators of AI uptake being supportive policies such as the Windhoek Statement on AI and the National Digital and Future Skills Strategy, which promote digital literacy, innovation, and AI integration in higher education, growing research on AI applications, internet connectivity, and digital literacy. However, inhibitors included socio-economic disparities, lack of adequate infrastructure, ethical concerns regarding data privacy, and fears of AI replacing human jobs. Moreover, according to the findings, social service professionals lack the digital skills and confidence to adopt AI technologies and ethical challenges surrounding AI's role in human-centered fields. The study concludes that South Africa is on the right trajectory towards the uptake of AI, and the social service sectors will benefit through enhanced efficiency, personalized learning for professionals, and administrative improvements. The study recommends increased investment in digital infrastructure, comprehensive training for social service professionals, and developing ethical frameworks that ensure AI is used responsibly and equitably.

**Keywords:** artificial intelligence; ethics; innovation; social service profession; South Africa

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## 1. Introduction

The adoption of Windhoek's statement on AI in Southern Africa in September 2022 marked groundbreaking efforts toward the uptake of Artificial Intelligence (AI) in various sectors in the region and South Africa (UNESCO, 2022). This milestone is a realization of the projections by previous studies that innovation, information and communication technology (ICT), and the internet have a great potential to revolutionize development and spur global social change (Grant, 2018; McAuliffe & Nipperess, 2017; Reamer, 2019). Moreover, the Windhoek Statement on AI aligns with the Sustainable Development Goal 9 (Build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation), which emphasizes the role of technology in supporting strategic decision-making, optimizing resources, and addressing workforce needs (United Nations, 2024). For instance, the social services sector has shown substantial potential for integrating AI to address workforce shortages, improve resource allocation, and make services more accessible (Aktan et al., 2022; Attridge, 2020; Fulmer, 2019).

Notably, research on AI tools and technologies demonstrates how advancement in technology is proving effective in poverty alleviation, expanding humanitarian aid, fostering economic growth, and improving global health and well-being (Hui et al., 2023; Kong et al., 2023; Mannuru et al., 2023). The advancements in AI will have profound implications for both practice and education as part of the Fourth Industrial Revolution and, by extension, the upcoming 5th Industrial Revolution, with even more significant changes expected in the future (Alam et al., 2022; Lubinga et al., 2023; Olaitan et al., 2021; Pather, 2020; Safodien, 2021).

AI refers to computer systems or models capable of performing tasks that require human intelligence (Gamble, 2020; Zhou et al., 2022). It constitutes language processing, pattern recognition, problem-solving, and making recommendations (Gillingham, 2020; Lehtiniemi, 2024). Machine learning has produced increasingly adaptable and efficient AI applications across various fields (Robila & Robila, 2020; Victor et al., 2021). The AI-driven applications, such as predictive analytics, can forecast potential risks for vulnerable populations, support decision-making and interventions (Afzali et al., 2019; Birhane, 2020), and provide training tools, such as virtual reality simulations that can help social services practitioners in handling difficult situations (Victor et al., 2023). These and other studies demonstrate AI's current advantages and future potential for enhancing efficiency and effectiveness in various sectors of human service delivery.

Despite the global progress in the uptake of AI, African countries, South Africa notwithstanding, face significant challenges in leveraging AI's potential (Gwagwa et al., 2022; Lubinga et al., 2023; Mannuru et al., 2023; Patel & Ragolane, 2024; Prieto-Gutierrez et al., 2023). Consequently, these countries are missing key opportunities to use AI to advance social, educational, and economic outcomes. African-based studies on AI report various factors for the sluggish and non-uptake of AI (Arakpogun et al., 2021; Gaffley et al., 2022; Gwagwa et al., 2022; Safodien, 2021). The 2022 UNESCO report highlighted that AI was not systematically supported in the Southern African region with frameworks to

guide the potential and implementation of ethical projects and products. The report cited significant knowledge and data gaps that hinder the development and application of AI (UNESCO, 2022). However, recent studies in South Africa show that AI has substantial benefits, such as improved administrative efficiency, personalized learning, and data-driven decision-making (Carrim, 2022; Opesemowo & Adekomaya, 2024; Patel & Ragolane, 2024).

Notably, the adoption of AI is often impeded by challenges such as inadequate infrastructure, socio-economic disparities, and ethical issues related to data privacy and algorithmic bias (Coeckelbergh, 2020; Patel & Ragolane, 2024). Nonetheless, research shows that South Africa is making ambitious plans to optimize AI for industrial, service delivery, and higher education (Mashau & Nyawo, 2021; Mavuso & Olaitan, 2024; Ofosu-Ampong, 2024; Pisica et al., 2023; Sanasintani, 2024).

This study examined the accelerators and inhibitors influencing the adoption of AI in South Africa and the implications for the training and practice of social service professionals. The following questions were answered: What are the accelerators of AI uptake in South Africa? What are the inhibitors of AI uptake in South Africa? How do these factors impact the training and practice of social service professionals? Analyzing these factors is significant in strategically investing in AI structures and informing policy decisions for incorporating AI in social service delivery and training professionals. This study provides a unique opportunity to integrate high-level technology in the traditionally human-to-human professions, such as social work.

## **2. Theoretical Framework**

This paper utilized the Technology Acceptance Model (TAM) (Davis, 1989) to illustrate and provide a foundation for understanding the variables, mechanisms, and conditions that influence the adoption of AI in the social service sector in South Africa. TAM suggests that two primary factors – perceived usefulness and ease of use – influence an individual’s intention to adopt and use new technology (Davis, 1989; Marikyan & Papagiannidis, 2023). This model helps examine how social service professionals view AI tools in terms of utility and usability. In South Africa, TAM could help understand whether social service professionals perceive AI as beneficial in improving service delivery and whether they feel confident in its integration into practice. Identifying such factors could guide the design of training programs emphasizing ease of use and highlighting practical benefits.

The diffusion of innovations theory (DOI) is another important theory for this study. This theory explains how, why, and at what rate new ideas and technology spread through cultures (Rogers, 2003). It explains the role of social networks, communication channels, time, and social system structure in technology adoption. In South Africa, understanding how AI diffuses among social service professionals could highlight the role of early adopters, organizational support, and the broader societal and regulatory factors that may accelerate or inhibit AI uptake. Therefore, policymakers and educators can structure interventions that

enhance communication channels and promote AI adoption among early and late adopters by understanding diffusion mechanisms.

### **3. Methodology**

This paper focused on integrating AI tools and technologies in education and social services practices across the globe and drawing implications for South Africa. A scoping literature review methodology was adopted to scan through relevant studies and synthesize themes for analysis and discussion. Unlike systematic reviews, which concentrate on a specific research question and strict protocols (Tricco et al., 2018), a scoping review is a broader approach to searching the available studies on a particular topic of interest (Peters et al., 2015), as in this context, the AI social service sector. A scoping review informs policymakers and practitioners about pertinent societal issues (Arksey & O'Malley, 2005). This is critical in identifying current practices, knowledge, and gaps (Thomas et al., 2019), such as in AI and social service provision in South Africa. The following five steps were followed in this review: identifying the research question, mapping or identifying relevant studies, selecting studies, charting the data, and summarizing and reporting the results (Arksey & O'Malley, 2005).

#### **3.1 Search Strategy**

The studies were searched on the Web of Science, Scopus, EBSCOhost, and Google Scholar. These databases were accessible and are considered credible for quality publications. The search strings were based on the following keywords or a combination of them thereof: "Artificial Intelligence adoption", "AI uptake and social services", "South Africa AI accelerators" or "inhibitors/barriers" and "AI in social service training or education or professional development". The screening and selection of papers followed three key steps. Step one entailed title and abstract screening, where articles were assessed based on relevance to titles and abstracts. Secondly, the full-text review was undertaken to confirm eligibility based on the set inclusion criteria. Thirdly, a quality assessment was conducted by evaluating the methodology, data rigorousness, relevance, and focus of the studies.

The inclusion criteria were studies published between 2010 and 2024 (less than fifteen years old), qualitative and quantitative methodology studies, peer-reviewed articles, studies focusing on AI in education and social service delivery, and studies published in English. The studies which did not meet these criteria were excluded. The relevant studies were identified by reading their titles and abstracts, and after being found fit, subsequent in-depth reviews of the findings and conclusions were undertaken. The search yielded various studies that formed the sample after removing duplicate and other unqualifying studies. Thus, the total number of studies included for analysis in this study was thirty journal articles and five organizational reports.

#### **3.2 Data Synthesis and Analysis**

By summarizing the findings from the studies included, themes were developed. Following the research questions and the aim of the study, the themes were categorized into those supporting the accelerators of AI Uptake, such as

institutional support, access to training resources, and positive attitudes toward AI benefits. Secondly, the inhibitors of AI Uptake, such as limited resources, low levels of digital literacy, ethical concerns, and lack of supportive regulatory guidelines, were presented.

The limitation of this study is that it focused on factors accelerating or inhibiting the uptake of AI in South Africa, especially in the social service sectors. The study does not investigate the actual implementation of AI or the actual impact it has created over time. Therefore, future research needs to focus on the impact of AI implementation and integration in specific social services agencies in South Africa.

## **4. Findings**

The first part of the findings presents the accelerators for AI uptake, and the second part discusses the inhibitors of AI uptake. After that, a comprehensive discussion on the main themes and implications for training and professional development for social service professionals in South Africa is provided.

### **4.1 Accelerators of AI Uptake in South Africa**

#### *4.1.1 Emerging AI-supportive policies and legislation*

The groundbreaking AI-supportive policy development in South Africa is demonstrated by the Windhoek Statement on AI (UNESCO, 2022). Along with other South African-based policies and legislations, the following areas for AI development and adoption were promoted: digital literacy, ICT, 4IR strategy, e-learning, e-government, and e-health. The National Digital and Future Skills Strategy aims to equip South Africans with digital and AI-related skills. The plan acknowledges AI as a critical area for workforce development and emphasizes training in data science, machine learning, and AI technologies (Department of Communication and Digital Technologies, 2020).

Moreover, the Presidential Commission on the Fourth Industrial Revolution (PC4IR), established in 2019, plays an instrumental role in shaping South Africa's approach to AI and other emerging technologies (Department of Telecommunication Postal Services, 2019). The Commission developed a comprehensive framework (The National Artificial Intelligence [AI] Policy) to promote AI adoption, foster innovation, and drive socio-economic transformation. Further, the Commission recommended creating AI hubs, fostering public-private partnerships, and implementing regulatory frameworks supporting innovation while addressing ethical concerns.

The data protection and privacy laws, such as the Protection of Personal Information Act (POPIA), enacted in 2021, align with global data protection standards, enabling the safety and privacy of AI users. These laws regulate how personal data is collected, stored, and used, directly impacting AI applications, particularly those involving machine learning requiring large datasets. Compliance with these laws is essential for AI-driven businesses and innovators in South Africa.

#### 4.1.2 *Potential and actual efficiency in education and training*

The analysis revealed a growth in research and application of AI in higher education (Singh, 2023; Timea & Veres, 2023). So far, research indicates that AI has improved the effectiveness of course content (Kamukapa et al., 2024), collaborative and personalized learning (Woldegiorgis, 2022), intelligent tutoring opportunities, innovative content, and teacher support, and efficiency in administrative processes (Kamukapa et al., 2024). Furthermore, AI provides accessible and inclusive education and cost reduction (Woldegiorgis, 2022). Adopting AI in training has shown the potential to address course attrition rates, promoting successful throughput in institutions of higher learning. Literature on AI in South Africa has documented a few AI success stories, though on a small scale (Sanders & Mukhari, 2024; Singh, 2023). Overall, in education, the potential benefits of AI outweigh the potential risks (Gaffley et al., 2022).

#### 4.1.3 *Promotion of digital literacy*

Digital skills and literacy are significant barriers to adopting and implementing AI in industrial production and service delivery (Madden & Kanos, 2021). The Future of Work in Africa 2021, a report from the World Bank, showed that, on average, citizens in South Africa possess a higher level of digital skills than the rest of sub-Saharan Africa (Choi et al., 2020). Inspired by the Sustainable Development Goals formed by the UN, the World Bank has formed the Digital Economy for Africa (DE4A) initiative to digitally leverage every African individual, business, and government by 2030 (World Bank, 2021).

#### 4.1.4 *Development in ICT and AI-related infrastructure*

The literature analysis has shown increased internet connectivity and mobile penetration in South Africa over the past decade (World Bank, 2021). This is synchrony with general continental growth in internet penetration from an estimated 10% in 2010 to 28% in 2019 (International Telecommunications Union, 2021). Investments in infrastructure such as fiber-optic cables, cell towers, and mobile broadband have enabled access to the internet and more connectivity for commercial and personal use. Availability and affordability of smart devices and computers have been a landmark in the adoption of technology-based development and service delivery across many sectors. According to the World Bank, 80% of the urban population in sub-Saharan Africa has access to electricity compared to 28% in rural sub-Saharan Africa (World Bank, 2021). Although the percentage of access to electricity in rural areas was low in rural areas, the high access in urban areas was a positive development towards supporting AI uptake in South Africa.

Foondamate is a remarkable ICT development for Rural South Africa. It is an AI-enabled technology that leverages WhatsApp to provide internet resources to students with limited internet access at an affordable cost (Playton, 2024). This enables students to benefit from online learning and other training tasks. The interactive AI deploys chatbots to teach research skills, set homework, and assist with tests. The chatbots can solve mathematics equations, define terms, and send past papers to students almost instantaneously (Playton, 2024). This motivates

young learners to embrace technology and incorporate AI into their learning needs.

#### 4.1.5 *Research and development in South Africa and Africa in general*

Research institutions are investing in AI projects, which indicates a positive direction towards adopting AI in Africa. For instance, projects and centers on AI in Africa, such as the Artificial Intelligence Research Center in Congo Brazzaville, are a cornerstone for African AI development (UNSECO, 2022). Notably, the interest of tech giant entities like Google, Microsoft, and IBM has led to establishing AI research labs in Africa. South Africa is a beneficiary, and the local startup ecosystem has begun to grow (UNESCO, 2022). The local startups are addressing local problems in agriculture, healthcare, and education (Khoalenyane & Ajani, 2024). Computer software projects such as Bhala, an innovative keyboard application to support spell-checking local languages like Ndebele, Shona, Swati, Swahili, Xhosa, and Zulu, were examples of home-grown technology that met the needs of local populations (Khoalenyane & Ajani, 2024). Filling a gap overlooked by more prominent ICT players in the local contexts provides confidence that AI can solve local problems.

## 4.2 **Inhibitors of AI Uptake in South Africa**

The literature analysis revealed the following issues as factors hindering the uptake of AI in South Africa.

### 4.2.1 *Fear of AI replacing human jobs*

The literature reveals that the greatest fear among working individuals is that AI will render them useless, hence losing their jobs and related livelihoods (Eke et al., 2023). Various studies indicated that if AI design neglected local interests and knowledge of minority groups, there would likely be resistance to its acceptance and adoption (Ofosu-Ampong, 2024; Sanders & Mukhari, 2024; Timea & Veres, 2023). Moreover, what has been termed AI colonialism is an important inhibitor. AI will likely promote isolation and individualization, technology addiction, and increasing inequality, especially among the digital elites and the digital illiterates (Birhane, 2020).

The fears about AI are not only about employees losing their jobs but also the uncertainty of whether they will have the skills they need to succeed in the AI era (Mavuso & Olaitan, 2024). Globally, employees are reporting high stress levels, and the adoption of AI is likely exacerbating it (Ratanjee & Royal, 2024). The workers' discomfort can negatively affect their desire and engagement with the new technology, especially AI (Choi et al., 2020). Individual attitudes are fundamental in utilizing or refusing to adopt new knowledge and skills (Aktan et al., 2022). Research shows that most practitioners in social service professions do not feel prepared for AI and are skeptical of AI's potential in their jobs (Ofosu-Ampong, 2024).

#### 4.2.2 *Lack of adequate datasets*

Another issue plaguing the effective adoption of AI in Africa is the lack of data accessible to African researchers and the relevance of this data to African problems in domains such as agriculture, health care, and voice/text recognition (Adams et al., 2020; Gillingham, 2020). Machine learning relies on vast amounts of data to train algorithms. If this data is sparse and unrepresentative, the resulting algorithms will be less effective and could cause harm to vulnerable populations (Adams et al., 2020).

#### 4.2.3 *Structural and infrastructural inequalities*

For a long time, South Africa has suffered economic inequality, which continues to manifest in the digital divide (Woldegiorgis, 2022). Many people, such as social service providers, lack digital literacy, making providing technology-based services difficult. They will likely fear adopting superior technology, such as AI, to deliver their services in such cases.

#### 4.2.4 *Ethical and data privacy concerns*

Despite the benefits associated with AI in all sectors of manufacturing and service delivery, concerns remain about ethical issues (Kundi et al., 2023; Min, 2023), personal data privacy (Phillips, 2017; Sinha & Larrison, 2021; Terry & Gunter, 2018), and the fundamental nature of social service provision, which traditionally emphasizes empathetic and responsive human interactions (Gough & Spencer, 2019). These concerns underscore the need to balance AI's benefits with safeguards that preserve the human-centered values fundamental to the social service profession. Thus, these risks and potential bias and discrimination are fundamental factors for social service professionals to adopt AI in their day-to-day activities (Coeckelbergh, 2020).

#### 4.2.5 *Limited funding and resources*

Despite some studies showing increased interest in AI research and projects, South Africa is experiencing insufficient funding for digital literacy and a lack of funding for data infrastructure (Lubinga et al., 2023; Patel & Ragolane, 2024). Research on digital skills in Africa has revealed that sub-Saharan Africa has the lowest percentage of citizens equipped with digital skills globally (Madden & Kanos, 2021). This means that most of the population who should consume the services provided through AI are yet to be capacitated and empowered to embrace high-end technology outcomes.

## 5. Discussion

Irrefutably, AI is the technology of the moment for the manufacturing and service industries. The findings indicated a mixture of issues towards the uptake of AI in South Africa. While there were indications of favorable factors towards adopting AI in education and social service provision sectors, there were reservations due to fear of AI colonialism and the replacement of human labor, as well as the lack of enough resources to implement AI in all development sectors.

The application of AI in higher education in South Africa has great potential in reimagining and transforming training social services professionals, which



traditionally has been based on the human-to-human interface (Le Grange, 2018; Twikirize & Spitzer, 2019). However, researchers argue that its uptake will likely fail unless organizations cultivate a culture supporting AI implementations (Mavuso & Olaitan, 2024; Motala & Menon, 2020; Mpungose, 2020). Cultivating a culture of AI support, especially in the South African social services sector, is critical. International reports indicate that workplaces were not adequately prepared for AI adoption, yet global spending on AI development will likely grow to over \$600 million by 2028 (Ratanjee & Royal, 2024). For instance, institutions of Higher Education in South Africa are investing in AI subscriptions, but the utilization of such tools is minimal in teaching and learning (Chan & Hu, 2023; Pisica et al., 2023). The gaps may exist because the employees are not well-informed about their universities' plans and strategies for implementing AI and lack adequate training to use it effectively. Therefore, these conditions are detrimental to the uptake of AI. Notably, it is important to eliminate uncertainty and fears about AI replacing employees by prioritizing the sociocultural component of AI adoption and digital transformation (Eke et al., 2023).

South Africa's emerging AI-supportive policies and legislation reflect efforts and strategies to promote innovation for economic growth while addressing key concerns around AI ethics (Akgun & Greenhow, 2022; Gaffley et al., 2022; Wareham, 2021), privacy, and inclusivity (Adams et al., 2020; Gwagwa et al., 2022; Kajiita & Hendricks, 2024). The country is positioning itself as a leader in AI on the African continent through strategic investments, capacity building, and regulatory frameworks. Moreover, digital literacy in South Africa is a critical factor in the country's ability to compete globally and drive inclusive AI development. While significant strides have been made, mainly through government initiatives and private sector involvement, challenges such as the digital divide, infrastructure limitations, and socio-economic disparities continue to hinder widespread digital literacy (George & Wooden, 2023). Addressing these issues will require sustained investment in education, infrastructure, and inclusive policies to ensure all South Africans can participate in the digital economy and service delivery.

The efficiency of AI in education and training in South Africa depends on its ability to offer personalized, scalable, and cost-effective learning solutions – the ability to address key challenges such as educator shortages and accessibility to learning materials. However, for AI to be fully effective, efforts must continue to close the digital divide and ensure that these technologies reach all segments of service delivery, especially social services. By integrating AI into the social service delivery and the education system, South Africa can enhance learning outcomes, foster inclusivity, and prepare its workforce for the demands of a rapidly evolving global economy.

## **6. Implications for Social Services Professional Training and Practice**

The findings indicated that the application of AI has gained momentum and acceptance in various sectors across the globe. The higher education sector in South Africa has embraced AI to facilitate and enhance teaching, learning, and training. The Africa Social Work and Development Network (2024) indicates that

AI can be used in social work education, research, and practice. The use of AI includes improving writing in the English language, especially in contexts where it is not the first language, generating relevant unbiased images, generating ideas, translation, and text data analysis. However, the Africa Social Work and Development Network (2024) advocates for the ethical usage of AI, considering the non-replacement of human beings' productivity and creativity and fair disclosure whenever used. These principles are critical across the typology of AI, such as interactive (chatbots, Smart personal assistants), analytic (risk assessment, forecasting, among others), functional (robots), text (text recognition, speech text conversion, content generation, among others), and visual (computer vision) (UNESCO, 2022). Therefore, the adoption and ethical application of AI have fundamental benefits in facilitating the training and development of social service professionals and facilitating their practice for efficiency and effectiveness (Victor et al., 2023).

According to Sanders and Mukhari (2024), there is a critical need for supportive measures, such as management, enhanced training opportunities, professional development initiatives, reliable technological infrastructure, and improved internet connectivity, to implement AI in training and practice in South Africa successfully. Consequently, there is a need for curriculum development to improve the usability of AI tools and their ethical implications in social service training and practice. Developing ethical frameworks for AI in social service practices is instrumental in addressing regulatory barriers and promoting ethical AI integration. With clear policy frameworks, the challenges of the digital divide will be addressed by fostering a culture of innovation within social service sectors. Using the TAM and the Institutional Theory, attitudes, perceived ease of use, and regulatory and ethical constraints must be considered when initiating any AI tools or applications in the social services sector. Therefore, to accelerate AI uptake and practical implementation in South Africa, the government and private organizations must align AI investments with individual and community needs and capabilities. Strategic investments in employee reskilling and upskilling into new digital roles are paramount to successfully adopting AI in social service provision in South Africa.

## **7. Conclusion**

This paper has contributed to the broader understanding of AI's role in the Fourth Industrial Revolution, emphasizing the need for balanced, ethical approaches in adopting AI within social services provision. Drawing from the findings, AI uptake in social service profession training and practice in South Africa presents opportunities and challenges. Accelerators such as supportive policies, digital literacy initiatives, and infrastructure advancements highlight AI's potential to transform the social services sector, improving efficiency, accessibility, and training outcomes. However, significant inhibitors, including socio-economic disparities, ethical concerns, fear of job displacement, and inadequate infrastructure, hinder AI's wide-scope and effective adoption. To successfully integrate AI in social services provision and profession, there is a need for targeted investments in digital skills, infrastructure development, and ethical frameworks to address data privacy and fairness.

Additionally, aligning AI tools with the needs and capacities of social service professionals, coupled with enhanced training programs, can foster a positive shift towards AI adoption. Ultimately, a balanced approach, recognizing both the benefits and ethical implications, will be critical in shaping the future of AI in social service education and practice in South Africa. The opportunities and challenges of AI in the South African education system should be analyzed and critically examined progressively.

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