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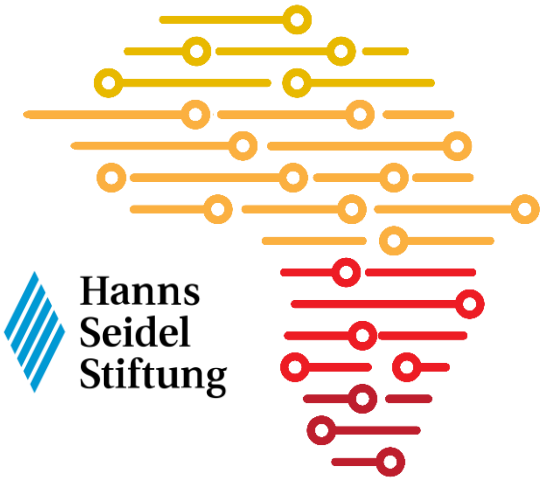

Chinese artificial intelligence in Africa: Digital colonisation or liberalisation?

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Abstract

In this era of globalisation and progressive digitalisation, artificial intelligence (AI) has become an integral part of our everyday lives. While AI technology is lauded for increasing economic growth and solving some of the intricate global development challenges, such as climate change as well as disease and natural disaster forecasting, it has become a threat to citizen freedom and democracy and there are concerns of data privacy and security. China is rapidly expanding its AI and has emerged as one of the leading nations in artificial intelligence, research and development, particularly in the global South. Africa is one of the continents that has become a destination of the fast-expanding Chinese AI, notwithstanding that its impacts remain unknown. This research primarily adopted a qualitative research approach to examine the impact of Chinese AI in Africa and identify opportunities for facilitating positive influence of Chinese AI and digital presence in Africa. The study found that the expansion of Chinese AI in the global South, using Zimbabwe and South Africa as case studies, has been associated with mixed results. Since its beginning in the late 1970s after the economic reform, the Chinese AI-led automation has resulted in improved productivity, particularly in agriculture, health,

infrastructure and manufacturing industries. However, the Chinese AI has been associated with gross human rights violations and promotion of corrupt practices, such as patronage and rent-seeking behaviour. Additionally, Chinese AI is undermining the rule of law and the functionality and legitimacy of weaker state institutions and processes.

Key words: Chinese artificial intelligence, digital colonisation, liberalisation, Africa

Introduction

Recently, artificial intelligence (AI) has emerged as an integral component of the digital economy, with significant prospects for transforming our economies and international politics (Hoffman, 2022). After decades of exponential growth, China's digital economy has become one of the prominent economic forces, competing with countries such as the United States of America (USA) and other global North states in Europe (Meske et al., 2022). Intrinsically, China is rapidly expanding its AI as one of the leading nations in artificial intelligence research and development, particularly in the global South, and is competing with the USA and other global North countries (Lundvall and Rikap, 2022). In 2021, this Asian economic powerhouse's AI market was estimated to be worth approximately US$23.196 billion, and the amount is expected to increase to US$61.855 billion by 2025 (Koty, 2021). Africa is one of the continents that has become a destination of the fast-expanding Chinese AI, even though its impacts remain unknown (Gravett, 2020; Layton, 2020). While AI technology is lauded for increasing economic growth and solving some of the intricate global development challenges, such as climate change and disease and natural disaster forecasting, it has become a threat to citizen freedom and democracy and there are concerns of data privacy and security (Wang et al., 2022). Moreover, some despotic governments are using AI technologies to scrutinise and regulate human behaviour, instil social control and spy on their own people and foreign nationals in order to understand their activities in private and public places (Gravett, 2020). Recent scientific discoveries have pointed out that Chinese AI, particularly in Africa, is accelerating digital authoritarianism by dictatorial governments. This has manifested in Internet shutdowns, digital harassment, cyber-attacks, disinformation and dissemination of fake news, as well as surveillance and facial recognition – all with the primary intention of stifling opposition groups and retaining power (Polyakova and Meserole, 2019).

This study examines the role of Chinese AI in Africa and identifies opportunities for facilitating the positive influence of Chinese AI and digital presence on the continent. This research was guided by the following questions:

- What has been the role of Chinese AI in Africa?
- What policy measures can be adopted to facilitate positive influence and reduce the negative impact of Chinese AI in Africa?

The subsequent sections of this article are arranged as follows: The next section gives the methodological approach used in writing this research article. The third section reviews the literature on Chinese AI in Africa. This segment also gives the theoretical framework underpinning the research as well as clarification of key terms. Additionally, literature review also examines China's digital expansion in the global South as well as the geopolitics and digital ethics of Chinese AI in Africa. The results and discussion of the paper are presented in section four beginning with the regional experiences of importing Chinese AI. The final section of the paper provides a conclusion.

Methodology

To address the above research questions, we adopted a political economy analysis (PEA) approach in understanding the impact of Chinese AI in Africa. According to Collinson (2003, p. 3) 'PEA approach is concerned with the interaction of political and economic processes within a society: the distribution of power and wealth between different groups and individuals, and the processes that create, sustain and transform these relationships over time'. Initially, we systematically reviewed both academic and policy-related literature relevant to our research questions with a particular focus on Chinese AI in the world and then narrowed this down to global South countries in Africa. Secondly, the researchers conducted key twenty informant interviews in Zimbabwe (12) and South Africa (80) with purposively sampled experts working on areas related to AI, representing the two Southern African states, Chinese technological firms working in Africa, private sector, development partners, academia, civil society, think tanks and people in international non-governmental organisations (INGOs) working in the technology sector to explore and obtain a deep appreciation of the impact of Chinese AI in Africa. Data were analysed thematically.

Literature review

Theoretical framework: Hegemony and counter-hegemonic struggle

The researchers primarily adopted Antonio Gramsci's hegemony and counter-hegemonic struggle as a theoretical framework underpinning this research. The primary aim of a

theoretical framework is to describe, forecast and appreciate a phenomenon under investigation and, often, to challenge or further the current stock of knowledge (Abend, 2008). More so, a theoretical framework gives the structure that can support a given philosophy and justifies the existence of a study under consideration (Swanson and Chermack, 2013). In this context, the USA has traditionally enjoyed global control of AI, mainly because of its extensive digital investments and infrastructure through its nationally based corporations such as Google, Facebook, YouTube and Twitter (Smuha, 2021). However, the USA's digital hegemony is now being challenged by China, particularly in regard to future AI development and investments in the global South (Bogdanov and Evtodyeva, 2021). China's offensive realism in exporting and developing AI in Africa is built on the desire to spread her self-interests, maximise power and counter the actions of fearful states such as the USA as part of her survival in the international system (Savage, 2020).

Clarifying concepts: What is artificial intelligence?

Literature is awash with definitions of artificial intelligence (AI), essentially because it is one of the oldest disciplines in the study of computer science. Broadly speaking, AI is a very comprehensive area of study concerned with all aspects of imitating cognitive functions to solve the world's complex challenges and construct systems that function like human beings (Wang, 2019). Usually called machine intelligence, in contrast to human intelligence, AI is concerned with the relationship and intersection of cognitive science and computer science (Fogel, 2022). For Lele (2019), AI entails the imitation of human intelligence processes by machines, especially computer systems. AI is manifested in applications such as expert systems, speech recognition, natural language processing and machine vision. Implied in the above definitions is that AI is a broad scientific discipline that supports computer systems to solve complex challenges by imitating natural human processes, such as acquiring knowledge and learning, thinking and self-correction (Wadden, 2022). Therefore, AI has its origins in human tactics and inventiveness, unlike being a product of natural or biological influence. The following section examines China's digital expansion in the global South.

China's digital expansion in the global South

The following three sections discuss what forms the basis of our interviews to support or negate our conclusions. While China is increasingly competing to be a global digital superpower – much like the USA – much of the contemporary studies on China's digital expansion have focussed on China itself or on impacts within the high-income countries of the global North with limited attention on the implications for other low- and middle-income developing countries of the global South (Roberts et al., 2021; Wang & Chen, 2018). As enshrined in the 14th Five-Year Plan of the People's Republic of China, the Asian economic powerhouse strives to grow its core digital economy to 10% of its GDP by 2025 from 7.8% in 2020, notwithstanding that its major rival, the USA, had a digital economy worth 10.2% of its GDP in 2020 (Liengpunsakul, 2021). China has a rapidly growing digital presence in countries of the global South even though the implications of this remain unknown (Haner and Garcia, 2019). Since its beginning in the late 1970s after the economic reform, the Chinese AI-led automation in Africa has resulted in improved productivity, particularly in agriculture, health, infrastructure and manufacturing industries (McCall, 2020). China's AI footprint in Africa can be traced back to the development of fibre-optic cables and mobile broadband network systems more than a decade ago, with the primary goal to improve Internet access to the people (Kothari and Cruikshank, 2022). Between the year 2000 and 2014, China had several digital-related projects across 44 countries in Africa with half of them located in Nigeria, Ethiopia, and Zimbabwe (Wang et al., 2020). Recent estimates suggest that over the last 20 years Chinese technological giant Huawei has built 50% of Africa's 3G networks and 70% of its 4G networks, indicating that China is entrenching deeper into the continent's information systems (Ohene Djan and Owusu-Ansah, 2020). At the time of writing this paper, there were over 266 Chinese technological initiatives in Africa, with the majority of them implementing AI-related projects such as 5G infrastructure, data centres, smart cities and surveillance (Nkwanyana, 2021).

The Chinese digital expansion in the global South is receiving mixed responses. For instance, digital components of China's Belt and Road motivated the Chinese government to introduce an initiative called the Digital Silk Road (DSR) in 2015 with the objective of encouraging Chinese companies to participate in the development of digital technologies in Africa and the

rest of the world (Wheeler, 2021). Moreover, DSR is meant to accelerate China's ascent to be a global technology leader and its influence in setting global technology standards and cyber governance norms (Buckley, 2020). As part of the DSR initiative, in the year 2021, China allocated US$ 8.43 billion to Africa for AI-related initiatives that encompass computing, big data, Internet of Things, artificial intelligence; block chain and quantum computing cross-border e-commerce, smart cities, telemedicine and Internet finance (Gu et al., 2022). However, Chinese AI in Africa has been associated with gross human rights violations and promoting corrupt practices, such as patronage and rent-seeking behaviour, particularly in authoritarian regimes (Gwagwa et al., 2020). In addition, Chinese AI in Africa has been criticised for undermining the rule of law and the functionality and legitimacy of weaker state institutions and processes in the region (Gravett, 2020).

The geopolitics of AI between China and Africa

Governments and other actors across the world are competing more and more for political, economic and other strategic benefits associated with the development of AI (Bareis and Katzenbach, 2022). The last decade has witnessed the rivalry between China and other global North countries such as the USA in the development and exporting of AI, particularly to African countries (Li, 2021). Recently, China intensified her digital presence in Africa, becoming one of the key trade partners with the countries in the global South (Jenkins, 2022). Chinese AI in Africa has become crucial over the last two decades given that cyber-imperialism is most prevalent, with far-reaching impact on human rights and elections as well as other key pillars of democracy (Cheng and Liu, 2022). While many developed countries have manufactured and exported their AI to Africa over the years, China is playing a leading role in contemporary geopolitical competition of AI in the region (Zeng, 2021). Many scholars and stakeholders have raised a range of concerns about the manner in which China is deploying and exploiting AI in African countries in ways that undermine national sovereignty and the key pillars of democracy (Feldstein, 2021).

Between 2012 and 2017, Huawei and the Chinese government's intelligence collection were accused of hacking the headquarters of the African Union (AU), which raised concerns of cybersecurity and undermining sovereignty in the region (Abegunrin and Manyeruke, 2020).

Therefore, such practices of exporting AI to Africa by the Chinese government and companies have instigated fears of widespread digital repression and colonisation (Schelenz and Schopp, 2018). Over the past decades, some governments in Africa, including Burundi, Zambia, Chad, the Republic of Congo, Tanzania and Uganda, among other governments, have been accused of using digital authoritarian practices linked to Chinese AI (Bagwandeen, 2021). For instance, AI imported from China to Africa has been used to target the opposition groups and act as a form of social control of the general public. Such actions have taken numerous forms, including shutting down Internet, passing draconian cybersecurity laws, imposing harsh penalties, such as imprisonment over anti-government posts, and online surveillance (Feldstein, 2019). Therefore, digital authoritarianism by African governments has threatened basic civil rights and constitutional freedoms in the region and has raised worries about the future of democracy in the region (Zeng, 2022). At country level, the Zambian government, with support from Huawei technicians, has been accused of using Chinese imported AI for appalling purposes by spying on political opponents and threatening democracy (Wahlberg Scott, 2021). Several other tyrannical governments in Africa are also using AI for both blunt and subtle authoritarian controls, triggering repression and infringement of civil liberties in nations with weak legal frameworks and checks and balances (Calzati, 2022).

Digital ethics and Chinese AI in Africa

Globally, AI has been lauded as an engine for economic growth and has been designed to achieve socio-economic transformation (Aggarwal, 2020). In Africa, AI from China and other countries around the world is positively impacting on infrastructure development and the construction of smart cities, minimising levels of crime and enhancing the safety of the people, as well as improving education and skills development programmes, particularly after the COVID-19 pandemic era (Aggarwal, 2020; Roberts et al.,2021). More so, AI increased the effectiveness of state institutions by providing them with communication tools to engage with their citizens, gauge common views of their people, calculate political threats and risks, and improve public policies so that they become more responsive to public needs (Feijóo et al., 2020).

However, recent scientific evidence has revealed several risks associated with importing Chinese AI, particularly to African countries (Layton, 2020). Recently, through its foreign policy China has been criticised for providing despotic and tyrannical governments in Africa with new tactics of suppressing various freedoms, democratic human rights and freedoms, controlling and thwarting the activities of the opposition (Crawford, 2021). Africa has a nasty track record of authoritarian governance and corruption, with some undemocratic states having a tendency of using Chinese AI technologies to implement widespread surveillance mechanisms. While traditional political strategies, such as propaganda, limited political pluralism and control of the media, have been used by despotic governments in Africa to stifle the opposition and retain power, importation of Chinese AI by regional states is making repression more widespread, effective and ubiquitous (Gwagwa et al.,2020). Digital authoritarianism imported from China is now superseding digital democracy – a more desirable derivative of modern democracy that uses AI to increase citizen engagement and participation in government affairs (Mare, 2020). Profoundly, digital authoritarianism using Chinese AI in Africa is now redesigning and reconfiguring the balance of power between the democratic and authoritarian regimes in the region, thus making it imperative for African countries to introspect imported AI from the Asian economic giant (Adeyoju, 2018). Hoffman (2022) argues that China has a longstanding history of using AI and other digital tools, such as Great Firewall, CCTV cameras, social credit system and domestic surveillance and censorship on its own people. In Africa, Chinese companies such as CloudWalk and Huawei have engaged in controversial AI-related deals with repressive governments in Africa to limit people's rights and freedoms (Peterson and Hoffman, 2022). Furthermore, the Asian economic and digital giant is also the preferred supplier of AI by many tyrannical and despotic governments in Asia, South America and Africa because of her uncompetitive procedures and opaque deals, which are shrouded in secrecy, as well as with limited parliament and public scrutiny (Wright, 2021).

Findings and discussion

Regional experiences with Chinese AI

Box 1: The Zimbabwe Cloudwalk artificial intelligence pact

Results indicated that Zimbabwe is regarded as the first destination of the fast-expanding Chinese AI in Africa. In 2018, the Government of Zimbabwe signed an agreement to build facial recognition database and monitoring systems with a technological company called Cloudwalk, with part of the financial support coming from the Guangzhou municipality. Findings from the interviews were the same as literature and Gwagwa (2018) argues that the agreement between Cloudwalk and Zimbabwe stems from the broad 'win-win' diplomacy in which Chinese AI companies train regional countries in Africa to diversify their datasets and get modern technology for monitoring and controlling their people. The Zimabwean-Cloudwalk AI initiative sought to strengthen administrative and security capacity by fighting crime and strengthening the government's law-enforcement determinations. Nevertheless, proponents of digital rights, through interviews, expressed fears over the unwarranted surveillance and collection of citizens' biometric data primarily because of the country's long history of human rights abuse and lack of rule of law.

Results from interviews have shown that Chinese AI has been used in many sectors of Zimbabwe over the past decades, particularly in agriculture, health, ICTs, infrastructure development and environmental management. For instance, farmers in Zimbabwe's rural areas have been indicated as some of the major beneficiaries of Chinese AI through climate-smart agriculture technologies and other modern digital farming practices. A key informant's narrative is illustrative:

As smallholder farmers working in the horticulture production sector here in Nyanga, we have been benefiting from Chinese AI over the past years through localised services such as weather information and digital extension programmes. As farmers targeting the export market, Chinese AI is important and is used along the entire food value chains where internet-connected sensors are used to monitor food quality and improve food safety. More so, we also use Chinese AI through digital advancement in insurance systems and banking systems thereby improving our farming practices. Innovations in weather and climate forecasting are also used to improve decision-making through early warning systems, thus saving lives and reducing damages from extreme weather events.

It is crucial for African governments to embrace regional cooperation in mitigating the risks associated with Chinese AI while, at the same time, improving its positive impacts. Specifically, the African Union can set-up a region-wide taskforce of all the stakeholders, including digital and human rights groups, to hold the Zimbabwean government to be accountable and transparent in the agreements with Chinese firms, particularly in exporting and deploying AI. Furthermore, further research contextualised to Zimbabwe is needed to examine how AI technologies, such as facial recognition systems, are deployed and used, as well as possible risks in order to design strategies for mitigation.

Box 2: Use of Huawei's facial recognition system during the 2021 Ugandan Presidential elections
The events before the 2021 presidential elections in Uganda were characterised by massive protests and political violence, leaving more than 50 people dead. Results from systematic literature reviews indicate that the Ugandan police purchased a closed-circuit television camera (CCTV) system worth US$ 126 million from the Chinese telecommunications firm Huawei Technologies (Hoffman, 2022). Huawei's facial recognition system used by the Ugandan police was meant to crack down on dissent after anti-government protests before the 2021 Ugandan presidential elections (Ayang, 2020).

Approximately 836 suspected supporters of opposition leader Bobi Wine were identified and arrested using the Huawei facial recognition AI system. Supplied under the pretext of law enforcement, the facial recognition technologies imported from China are instigating worry and anxiety among Ugandan citizens, as well as other African people, because their civil liberties and rights have been violated. Across the region, Huawei has been implementing Safe City Projects where they supplied surveillance technologies to governments in Africa, mainly funded through China Exim Bank loans. While the Ugandan government and other regional states often justify the importation of Chinese facial recognition systems on the basis of strengthening national security and development, the AI from the Asian economic powerhouse is raising many critical concerns.

Findings from both literature and key informant interviews (KIIs) reveal that Chinese AI in Africa has managed to revolutionise entirely all sectors, including education, infrastructure, agriculture, tourism, healthcare and economic industries. The proliferation of Chinese technological companies in Africa was cited as one of the examples in which imported AI from the Asian economic powerhouse transformed the continent through Internet access and enabled the availability of mobile phones and computers (Wheeler, 2021). Key informant interviews with a Director from the Ministry of Foreign Affairs and International Trade in Zimbabwe highlighted that Chinese AI offers unprecedented opportunities to all the economic sectors in African countries, providing technological solutions that avert climatic risks through real-time monitoring and forecasting. Chinese AI is also transforming the entire food systems value chain in most African countries by providing digital agricultural services, such as climate-related services including weather forecasting, procurement, e-commerce, finance and smart farming services (Liengpunsakul, 2021). Key informant interviews with an expert in international relations from a South African university highlighted that, in democratic African countries and elsewhere around the world, Chinese AI is also strengthening citizen democracy and affording them rights and voice in determining the allocation of the national resources.

Notwithstanding the benefits of the Chinese AI to socio-economic and political transformation in African states, a systematic literature review noted that the continent is not ready to embrace Chinese AI as some authoritarian countries use it to reinforce and control the general public and target opposition and other micro-groups during elections. Findings from key interviews with a South African think-tank resonate with literature, stating that Chinese AI has put African countries, particularly despotic governments, at risk of coercing and exploiting its people to achieve the political interests of the elites. Results from a key informant interview with a programme manager of a civil society organisation working on political rights in Zimbabwe highlighted that Chinese imported facial recognition technologies do not always provide efficient and well-rationalised public administration; instead, they are entangled in complex systems of social and political problems that undermine human and political rights and other key pillars of democracy. It is thus imperative for African countries to ensure and enforce transparency and accountability mechanisms for AI companies, as well as permit parliamentary and public scrutiny of and oversight into contracting Chinese AI-related deals.

A key informant interview with a manager of one of the Chinese AI-based private sector organisations working in Zimbabwe highlighted China's clear strategy of engaging Africa and bolstering investments designed to boost the entire digital economy value chain. However, the above findings from key informant interviews differ to that revealed in literature as it argues that Africa needs to design and implement viable options for diversifying the importation of AI from global North countries, including promoting home-grown digital solutions to mitigate overdependence on Chinese AI (Wright, 2021).

Key informant interviews with academia indicated that the adoption of Chinese AI tools in Africa is not accompanied by robust legislative frameworks that mitigate inequalities based on gender, race and political orientation. For instance, through the key informant interview with a professor of AI in one of the state universities in Zimbabwe, it was noted that Chinese AI has been criticised for suppressing civil liberties, particularly of majority groups, while protecting the rights of the few elites to further their political interests. It is crucial that the adoption of Chinese AI be accompanied by strong legal and statutory procedures that

circumvent abuses and avoid rampant exploitation by technological companies and state actors working in the AI industry. Therefore, analysing the impact of the Chinese AI on the continent calls for regional states in Africa to design and implement policies that mutually benefit China and Africa and reduce the negative consequences of adopting this form of digital technology.

Conclusion

While AI offers great opportunities to achieve national development and ultimately socio-economic transformation, like any technological revolution, this form of digital tool presents many potential risks, particularly in undemocratic regimes and countries with weak checks and balances. The hegemony and counter-hegemonic struggle theoretical framework was useful to show how China is competing with the USA in developing and exporting AI to Africa, motivated by the Chinese Communist Party's grant plan to use modern technology to expand its political influence on weaker states in the global South. Therefore, it is imperative for African countries to foster transparency and accountability mechanisms by allowing parliamentary oversight on and public scrutiny of all Chinese contracted deals, including those related to AI. Furthermore, African governments need to diversify their AI market by embracing investments from global North countries as well as home-grown solutions to mitigate the dominance of Chinese AI in Africa. Without the ability to understand such developments, African governments remain starved to develop sustainable strategies to counteract the Chinese digital authoritarianism through imported AI from this Asian economic giant.

References

Abegunrin O. and Manyeruke C. 2020. Sino-Africa Relations: An Overview. *China's Power in Africa:* 9–25.

Abend G. 2008. The meaning of 'theory'. *Sociological theory 26*(2): 173–199.

Adeyoju A. 2018. Artificial intelligence and the future of law practice in Africa. https://ssrn.com/abstract=3301937 or http://dx.doi.org/10.2139/ssrn.3301937

Aggarwal N. 2020. Introduction to the special issue on intercultural digital ethics. *Philosophy & Technology 33*(4): 547–550.

Ayang M. 2020. Ugandan police accused of using facial recognition system to fuel rights abuses. https://www.biometricupdate.com/202011/ugandan-police-accused-of-using-facial-recognition-system-to-fuel-rights-abuses

Bagwandeen M. 2021. Don't blame China for the rise of digital authoritarianism in Africa. https://blogs.lse.ac.uk/africaatlse/2021/09/09/dont-blame-china-for-rise-of-digital-authoritarianism-africa-surveillance-capitalism/.

Bareis J. and Katzenbach C. 2022. Talking AI into being: The narratives and imaginaries of national AI strategies and their performative politics. *Science, Technology, & Human Values* 47(5): 855–881.

Bogdanov K.V. and Evtodyeva M. 2021. US–China: Mechanisms and Dynamics of Arms Race. *Mirovaia ekonomika i mezhdunarodnye otnosheniia* 65(6): 42–50.

Buckley P.J. 2020. China's Belt and Road Initiative and the COVID-19 crisis. *Journal of International Business Policy* 3(3): 311–314.

Calzati S. 2022. 'Data sovereignty' or 'Data colonialism'? Exploring the Chinese involvement in Africa's ICTs: a document review on Kenya. *Journal of Contemporary African Studies* 40(2): 270–285.

Cheng H. and Liu W. 2022. Temporality and the Geopolitical Enframing of Chinese International Development Thinking. *Geopolitics:* 1–25. DOI: 10.1080/14650045.2022.2089563

Collinson S. 2003. *Power, livelihoods and conflict: case studies in political economy analysis for humanitarian action*. London: Humanitarian Policy Group, Overseas Development Institute.

Crawford K. 2021. *The atlas of AI: Power, politics, and the planetary costs of artificial intelligence*. Yale University Press.

Feijóo C., Kwon Y., Bauer J. M., Bohlin E., Howell B., Jain R., ... and Xia J. 2020. Harnessing artificial intelligence (AI) to increase wellbeing for all: The case for a new technology diplomacy. *Telecommunications Policy* 44(6): 1–14.

Feldstein S. 2019. The road to digital unfreedom: How artificial intelligence is reshaping repression. *Journal of Democracy* 30(1): 40–52.

Feldstein S. 2021. *The Rise of Digital Repression: How Technology is Reshaping Power, Politics, and Resistance*. Oxford University Press.

Fogel D.B. 2022. Defining artificial intelligence. *Machine Learning and the City: Applications in Architecture and Urban Design:* 91–120.

Gravett W.H. 2020. Digital coloniser? China and artificial intelligence in Africa. *Survival* 62(6): 153–178.

Gu X., Dinkelbach C., Heidbrink C., Huang Y., Ke X., Mayer M. and Ohnesorge H. W. 2022. China's Engagement in Africa: Activities, Effects and Trends. https://www.cgs-bonn.de/cms/wp-content/uploads/2022/07/CGS-China_Africa_Study-2022.pdf

Gwagwa A. 2018. Exporting Repression? China's Artificial Intelligence Push into Africa. https://www.cfr.org/blog/exporting-repression-chinas-artificial-intelligence-push-africa.

Gwagwa A., Kraemer-Mbula E., Rizk N., Rutenberg I. and De Beer J. 2020. Artificial Intelligence (AI) deployments in Africa: benefits, challenges and policy dimensions. *The African Journal of Information and Communication 26:* 1–28.

Gwagwa A., Kraemer-Mbula E., Rizk N., Rutenberg I. and De Beer J. 2020. Artificial Intelligence (AI) deployments in Africa: benefits, challenges and policy dimensions. *The African Journal of Information and Communication* 26: 1-28.

Haner J. and Garcia D. 2019. The artificial intelligence arms race: Trends and world leaders in autonomous weapons development. *Global Policy* 10(3): 331–337.

Hoffman S. 2022. China's Tech-Enhanced Authoritarianism. *Journal of Democracy* 33(2): 76– 89.

Jenkins R. 2022. *How China is reshaping the global economy: Development impacts in Africa and Latin America*. Oxford University Press.

Kothari A. and Cruikshank S.A. 2022. Artificial Intelligence and Journalism: An Agenda for Journalism Research in Africa. *African Journalism Studies* 43(1): 17–33.

Koty A.C. 2021. Artificial Intelligence in China: Shenzhen Releases First Local Regulations. *China Briefing*.

Layton P. 2020. Artificial intelligence, big data and autonomous systems along the belt and road: towards private security companies with Chinese characteristics? *Small Wars & Insurgencies* 31(4): 874–897.

Lele A. 2019. Artificial Intelligence (AI). In *Disruptive Technologies for the Militaries and Security. Smart Innovation, Systems and Technologies*. Singapore: Springer. https://doi.org/10.1007/978-981-13-3384-2_8.

Li X. 2021. The rise of China and its impact on world economic stratification and re-stratification. *Cambridge Review of International Affairs* 34(4): 530–550.

Liengpunsakul S. 2021. Artificial intelligence and sustainable development in China. *The Chinese Economy* 54(4): 235–248.

Lundvall B.Å. and Rikap C. 2022. China's catching-up in artificial intelligence seen as a co-evolution of corporate and national innovation systems. *Research Policy* 51(1): 104395.

Mare A. 2020. Internet Shutdowns in Africa| State-Ordered Internet Shutdowns and Digital Authoritarianism in Zimbabwe. *International Journal of Communication* 14(1): 4244– 4263.

McCall B. 2020. COVID-19 and artificial intelligence: protecting health-care workers and curbing the spread. *The Lancet Digital Health* 2(4): e166-e167.

Meske C., Bunde E., Schneider J. and Gersch M. 2022. Explainable artificial intelligence: objectives, stakeholders, and future research opportunities. *Information Systems Management* 39(1): 53–63.

Nkwanyana K. 2021. China’s AI deployment in Africa poses risks to security and sovereignty. https://www.aspistrategist.org.au/chinas-ai-deployment-in-africa-poses-risks-to-security-and-sovereignty/

Ohene Djan K. and Owusu-Ansah W.A. 2020. Assessing the Impact of the Huawei Brand on the Information Communication Technology Infrastructure of Ghana. In Zhang W., Alon I. and Lattemann C. (eds) *Huawei Goes Global*. Palgrave Studies of

Internationalization in Emerging Markets. Palgrave Macmillan, Cham. https://doi.org/10.1007/978-3-030-47579-6_8

Peterson D. and Hoffman S. 2022. Geopolitical Implications of AI and Digital Surveillance Adoption. https://www.brookings.edu/wpcontent/uploads/2022/06/FP_20220621_surveillance_exports_peterson_hoffman_v2.pdf

Polyakova A. and Meserole C. 2019. Exporting digital authoritarianism: The Russian and Chinese models. Brookings Policy Brief, Democracy and Disorder Series. Washington, DC. https://www.brookings.edu/wpcontent/uploads/2019/08/fp_20190826_digital_authoritarianism_polyakova_meserole.pdf.

Roberts H., Cowls J., Morley J., Taddeo M., Wang V. and Floridi L. 2021. The Chinese approach to artificial intelligence: an analysis of policy, ethics, and regulation. *AI & society* 36(1): 59–77.

Savage N. 2020. The race to the top among the world's leaders in artificial intelligence. *Nature* 588(7837): S102-S102.

Schelenz L. and Schopp K. 2018. Digitalization in Africa: Interdisciplinary perspectives on technology, development, and justice. *International Journal of Digital Society* 9(4): 1412–1420.

Smuha N.A. 2021. From a 'race to AI'to a 'race to AI regulation': regulatory competition for artificial intelligence. *Law, Innovation and Technology* 13(1): 57–84.

Swanson R.A. and Chermack T.J. 2013. *Theory building in applied disciplines*. Berrett-Koehler Publishers.

Wadden J.J. 2022. Defining the undefinable: the black box problem in healthcare artificial intelligence. *Journal of Medical Ethics* 48(10): 764–768.

Wahlberg Scott A. 2021. Promoting digital authoritarianism: A study of China's Digital Silk Road. A Master's Dissertation submitted at Dalarna University.

Wang P. 2019. On defining artificial intelligence. *Journal of Artificial General Intelligence* 10(2): 1–37.

Wang R., Bar F. and Hong Y. 2020. ICT aid flows from China to African countries: A communication network perspective. *International Journal of Communication* 14(1): 1498–1523.

Wang R., Jiao Z., Yang L., Choi J.W., Xiong Z., Halsey K., ... and Bai H.X. 2022. Artificial intelligence for prediction of COVID-19 progression using CT imaging and clinical data. *European radiology* 32(1): 205–212.

Wang Y. and Chen D. 2018. Rising sino-US competition in artificial intelligence. *China Quarterly of International Strategic Studies* 4(02): 241–258.

Wheeler A. 2021. Exploring China's Digital Silk Road. The Digital Transformation of Logistics: Demystifying Impacts of the Fourth Industrial Revolution. In Sullivan M. and Kern J. (eds). *The digital transformation of logistics: Demystifying impacts of the Fourth Industrial Revolution*. John Wiley & Sons.

Wright C. 2021. China's Digital Colonialism: Espionage and Repression Along the Digital Silk Road. *SAIS Review of International Affairs* 41(2): 89–113.

Zeng J. 2021. China’s Artificial Intelligence Innovation: A Top-Down National Command Approach? *Global Policy* 12(3): 399–409.

Zeng J. 2022. *Artificial Intelligence with Chinese Characteristics: National Strategy, Security and Authoritarian Governance*. Singapore: Palgrave Macmillan. DOI: 10.1007/978-981-19-0722-7