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AI boom comes with hidden environmental and social costs



Grant Oosterwyk

Photo: Supplied

As artificial intelligence (AI) rapidly transforms industries and drives global innovation, a University of Cape Town (UCT) researcher, Grant Oosterwyk, warns that the growing demand for AI-driven data centres is creating significant environmental, social and political challenges that often go unnoticed amid the promise of technological progress.

Oosterwyk is a senior lecturer and PhD candidate in [Information Systems](#) at UCT, where his research focuses on the societal and organisational impacts of emerging technologies. He

recently co-authored a [paper](#) with international collaborators examining how the rapid expansion of AI infrastructure is generating significant sociotechnical tensions that extend far beyond technological innovation.

Drawing on six expert interviews and an extensive media-based analysis, the research identified five major tensions linked to the growth of AI data centres: the energy paradox, water strain, hyperscaler dominance, sovereignty erosion and urban displacement.

While AI technologies continue to drive efficiency, automation and innovation, Oosterwyk argues that the infrastructure supporting these advances comes with substantial trade-offs that policymakers, governments and industry leaders can no longer ignore.

"AI is often framed through a techno-optimistic lens that focuses primarily on innovation and economic growth," he said. "Our findings show that the rapid growth of AI data centres also creates significant environmental, social and political tensions that require much more critical and integrated attention."

Energy and water pressures intensify

One of the central findings of the study is what Oosterwyk and his colleagues describe as the "energy paradox". AI systems require enormous computational power, driving rising electricity consumption in data centres at a time when many countries are already struggling with energy insecurity and climate-related pressures.

The study also points to increasing water strain caused by AI infrastructure. Data centres rely heavily on water cooling systems to prevent servers from overheating, placing additional pressure on already stressed water resources in many regions.

According to Oosterwyk, these environmental pressures raise important questions about the sustainability of large-scale AI deployment. "The expansion of AI infrastructure is not occurring in isolation. It intersects directly with broader concerns around energy access, climate resilience and environmental sustainability," he said.

Concerns over corporate concentration and sovereignty

The study further highlights growing concerns over the dominance of major global technology firms, often referred to as "hyperscalers", in shaping the future of AI infrastructure.

"The concentration of AI infrastructure within a small number of multinational corporations risks reinforcing global inequalities and limiting the ability of smaller nations and local governments to exercise control over their own digital futures," noted Oosterwyk.

The concept of "sovereignty erosion" emerged as another major tension identified in the research. Oosterwyk said the dependence on foreign-owned AI infrastructure may weaken national autonomy over data governance, digital regulation and technological development.

"Our findings suggest that AI infrastructure is increasingly becoming a geopolitical issue. Countries are grappling not only with technological adoption, but also with questions of ownership, control and long-term digital sovereignty," he said.

Urban displacement and unequal impacts

The research also identified urban displacement as a growing concern associated with large-scale data centre development. Expanding infrastructure projects can reshape urban spaces, alter land-use patterns and place pressure on surrounding communities.

Oosterwyk said the impacts of AI infrastructure are unevenly distributed, with certain communities bearing greater environmental and social costs while receiving limited direct benefits from technological advances.

“These tensions demonstrate the need for a more inclusive and socially responsive approach to AI governance and infrastructure planning,” he said.

Call for integrative policy frameworks

According to Oosterwyk, addressing the challenges associated with AI-driven data centre demand will require a more balanced and interdisciplinary approach that moves beyond purely technological or market-driven perspectives.

“We call for integrative frameworks that can simultaneously support innovation while prioritising sustainability, equity and societal well-being,” he said.

He added: “Balancing AI’s transformative potential with environmental sustainability and social responsibility will be one of the defining policy challenges of the coming years. Governments, industry leaders and researchers will need to work together to ensure that AI infrastructure development is both resilient and equitable.”

The findings, said Oosterwyk, provide an important foundation for future policy discussions around AI governance, infrastructure planning and sustainability strategies globally. “Our study contributes to growing international debates about the hidden resource demands associated with AI systems, particularly as governments and corporations continue investing heavily in AI technologies and digital infrastructure.”

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