

# Planning With Machines, Dreaming With People: Relational Accountability and the Future of AI-Driven Urbanism in Africa

Dodzi Koku Hattoh <sup>1,2</sup>

<sup>1</sup> Department of Philosophy & Classics, University of Ghana, Ghana

<sup>2</sup> Bonn Sustainability AI Lab, University of Bonn, Germany

**Correspondence:** Dodzi Koku Hattoh ([dkhattoh@ug.edu.gh](mailto:dkhattoh@ug.edu.gh))

**Submitted:** 1 February 2026 **Accepted:** 9 February 2026 **Published:** 18 May 2026

**Issue:** This commentary is part of the issue “Artificial Intelligence and the Sustainability of African Cities” edited by Catarina Fontes (Technical University of Munich / United Nations University), Mennatullah Hendawy (Ain Shams University / Center for Advanced Internet Studies / Technical University of Munich), and Sónia Semedo (University of Cabo Verde), fully open access at <https://doi.org/10.17645/up.i519>

## Abstract

African cities are undergoing rapid transformation, with a growing share of the population projected to reside in urban areas by 2050. This commentary examines both the promise and limitations of AI-driven urban planning through a relational accountability lens. It argues that AI should not stand apart from the urban contexts it shapes but be embedded within governance systems that recognise the interdependence of social, technical, and ecological systems. Thus, by combining participatory governance, ethical foresight, and sustainability, AI can support urban futures that are not only efficient and innovative but also just, inclusive, resilient, and ecologically grounded.

## Keywords

African cities; AI-driven urbanism; participatory planning; relational accountability

## 1. Introduction

African cities are experiencing an accelerated phase of urban transformation. By 2050, more than 60 percent of the continent’s population is expected to live in urban areas, driven by demographic growth, increased migration to cities, and economic restructuring (UN-Habitat, 2016). This pattern of urban expansion creates opportunities for economic development and innovation, while simultaneously placing sustained pressure on housing systems, infrastructure, service delivery, ecological sustainability, and social equity (Henderson et al., 2017).

Increasingly, policymakers and urban planners are turning to digital technologies, particularly AI, to manage urban complexity. Within global urban policy discussions, AI is often positioned as a cornerstone of the smart city, promising efficiency, predictive capacity, and data-driven governance (Agyemang et al., 2024; Tonnarelli & Mora, 2025). In African cities, these promises are particularly compelling. Systems for traffic management, predictive public health analytics, smart energy distribution, and automated planning are framed as tools to overcome capacity constraints and leapfrog infrastructure deficits (Duca et al., 2025; van der Hoogen et al., 2024). Accordingly, cities such as Accra, Nairobi, and eThekweni are already experimenting with these systems, signalling growing interest in digital urbanism.

And to imagine the full potential of African urban futures, let us conceptualise the fictional African nation, Wakanda, renowned for technological excellence and ecological stewardship. Hidden from the world until recently, Wakanda combines advanced AI-technologies, renewable energy systems, and urban infrastructures that anticipate socio-ecological needs. Its cities are technologically capable yet socially guided in contextual awareness, ethical epistemologies, and a sense of collective responsibility.

Wakanda serves as a thought experiment that illustrates the ethical imagination underlying sustainable African urbanism. The Wakanda concept can be understood as a normative-analytical framework for evaluating technological modernity in African contexts and used, in this context, as a heuristic device to model the co-evolution of technology, ecology, governance, and social ethics within a relational ontological framework.

Thus, this commentary contributes to the thematic issue on AI and sustainable urban futures by providing an Africa-centred analysis of AI-driven planning. It frames AI as a socio-technical system shaped by power, institutions, and norms, and advances relational accountability (RA) as a guiding framework. Through collective responsibility, participation, and ethical foresight, AI can serve as a medium for urban futures that are technologically capable, socially just, and ecologically sustainable.

## 2. African Urbanization and the Smart City Turn

The OECD (OECD et al., 2025) reported that the continent's urban population will double by 2050, with much of this growth occurring in secondary cities and informal settlements. Unlike urbanization trajectories in many high-income regions, African urban expansion often outpaces infrastructure provision, resulting in persistent deficits in housing, sanitation, transportation, and public services.

Informality is a defining feature of African urbanism. More than half of Africa's urban residents live in informal settlements, where housing tenure is insecure and access to basic services is limited (Henderson et al., 2017). Informal economies and governance arrangements sustain urban life, yet they are frequently excluded from formal planning processes. These conditions pose significant challenges for data-driven urban management, which relies on standardized datasets, corroborating documentation, and stable institutional frameworks (Tonnarelli & Mora, 2025).

Despite these structural and complex particularities, African cities are increasingly engaging with smart-city narratives inspired by global models. Such initiatives foreground digital infrastructure, sensor networks, and algorithmic decision-making as pathways toward efficiency and sustainability (Ralane, 2025).

However, the application of smart-city frameworks in African contexts is far from straightforward. Such frameworks often emphasize technological fixes over socio-political reforms, potentially obscuring deep-seated inequalities (Tonnarelli & Mora, 2025; van der Hoogen et al., 2024). When urbanization is equated with computational capacity over local epistemic resources and coordination dynamics, planning processes risk marginalizing populations most vulnerable to urban challenges. Addressing these challenges requires integrating technological solutions with participatory planning processes.

### 3. AI as Urban Power

Though it is often presented that AI is a neutral tool that enhances urban planning efficiency through data-driven, objective analysis, increasing scholarship challenges this notion, highlighting that algorithms encode the values, priorities, and biases of their designers and the datasets they use (Hanna et al., 2025). In African cities, however, this is compounded by data scarcity and uneven representation, with informal settlements frequently under-mapped, under-surveyed, and excluded from certified datasets (Agyemang et al., 2024).

Correspondingly, AI must be understood as a form of urban power, since decisions about data collection, model design, and system deployment determine whose experiences matter, whose voices are amplified, and whose futures are neglected. Thus, without a deliberate and conscious participation from diverse agents in the AI ecosystem, AI can reinforce technocratic governance, distancing decision-making from the communities it is meant to serve. This risk is heightened in cities with fragile public trust, where algorithmic governance, without participatory oversight, often deepens perceptions of exclusion.

Consider a city where AI is deployed without accounting for the complex particularities of local transportation networks, energy systems, or public health dynamics in both formal and informal communities. In such contexts, we may expect that infrastructure investments risk overlooking seasonal population flows, informal markets, and emergent social patterns, potentially reducing the effectiveness and equity of essential services.

Properly designed, however, AI can act as a distributed urban actor, shaping outcomes alongside human judgment, collective agency, and ethical foresight. The implication is that, by integrating local knowledge and participatory input, we can align technological efficiency with socio-cultural needs and urban resilience, ensuring that interventions are contextually meaningful and equitable.

The challenge, therefore, is not adopting technology alone, but embedding it within frameworks of context-specific knowledge that recognize interdependence, uphold justice, and anticipate the socio-ecological consequences of urban innovation. Appropriately applied, AI can become a partner in ethical urban futures rather than a source of exclusion or disempowerment.

### 4. Constraints of AI-Driven Urbanism

Sustainability is frequently invoked as a primary justification for AI adoption in urban planning, with claims that AI can reduce emissions, improve resource efficiency, and strengthen resilience to climate shocks (Salhi

et al., 2025). Yet the ecological footprint of AI infrastructure remains largely underexamined, calling into question the sustainability claims behind many smart city initiatives and logics.

Without a doubt, AI systems rely on energy-intensive data centres, continuous sensor networks, and cloud computing infrastructures that consume vast amounts of electricity and water, contributing to CO<sub>2</sub>. In African cities, where energy access remains uneven and electricity generation is frequently carbon-intensive, the ecological footprint of AI is significant. Moreover, global supply chains that provide hardware for AI often depend on extractive industries with intense socio-ecological consequences. Without attention to these factors, the very technologies designed to enhance urban sustainability may unintentionally worsen ecological risks.

Inferably, when predictive models for energy, transport, and water are powered by renewable resources, from solar grids to hydropower nodes, a smart city is genuinely optimised for efficiency only when the machines that sustain it are governed to minimise e-waste and ecological harm. Nonetheless, within such a city, trade-offs are inevitable: between the extraction of natural resources for development and ecology, the domestic and the global, as well as across generations with competing needs and claims to equitable service provision. Accordingly, any vision of the smart city must be integral to a socio-ecological fabric, grounded in a relational understanding that urban life, AI-technologies, and ecological systems do not merely coexist but co-constitute one another.

In practice, therefore, AI-driven urbanism in Africa may require more than technical solutions; it demands a reasoning that embraces accountability across the AI lifecycle. Lifecycle, inter-agential impact, and energy consideration, as examples, must be standard, not optional. AI-driven urbanism must, thus, extend beyond operational efficiency to include long-term ecological resilience, responsibility towards nonhuman entities, and the protection of sustainable futures. In this way, AI can enhance human well-being without compromising nonhuman systems. Ultimately, AI-driven urbanism is sustainable only when it recognises the interconnectedness of technology, society, and the natural ecosystem.

## 5. RA vs. AI Governance

Consequently, while existing frameworks for addressing bias, privacy, and accountability are valuable, they remain insufficient where institutional capacity is weak and oversight is fragmented. Across much of Africa, AI policy development is uneven, and governance capacity often lags behind technological adoption (African Union, 2013). In many cases, AI deployment is driven by private actors or technology vendors whose priorities may not align with local needs, raising critical concerns about data sovereignty, public oversight, and legitimacy.

To navigate these challenges, AI governance in African cities must be grounded in the principles of RA. Prevailing governance models are largely procedural and individual-centred, focusing on compliance or the post hoc attribution of responsibility. Such approaches are poorly suited to the distributed and networked nature of AI systems embedded within urban infrastructures, institutions, and communities. RA, by contrast, reconceptualizes responsibility as an ongoing, collective, and context-sensitive process, sustained through reciprocity, care, and shared responsiveness.

In this regard, African ethical epistemologies, particularly Ubuntu, offer a compelling normative foundation for operationalising RA. Ubuntu foregrounds interdependence, mutual responsibility, and the recognition of agential entities as part of a shared moral and social universe. Its insights reinforce the understanding that agency and accountability are distributed across actors and systems. Grounded in this perspective, a model of accountability that prioritises participatory regulation, context-aware governance, and institutionally rooted ethical reasoning provides a more sustainable pathway for overseeing AI-driven urbanism.

## 6. Operationalizing Relational and Participatory Governance

Therefore, integrating accountability into African urban planning requires more than policy design; it calls for active, context-sensitive, and ethically grounded engagement across diverse domains of socio-ecological life. To illustrate how this operates in practice, consider the following hypothetical yet plausible scenarios:

1. *Institutional Embedding*: Imagine Accra implements an AI-driven traffic management system to optimise flows in the central business district. Instead of assigning responsibility solely to the transport authority, accountability is distributed across city planners, private developers, and community representatives. When an unexpected disruption, such as flooding of a key arterial road, renders the system ineffective, stakeholders collectively assess the failure, recalibrate protocols, and update the system. Here, accountability is continuous, shared, and adaptive rather than reactive or siloed.
2. *Participatory Regulation*: If a predictive AI system is used to identify neighbourhoods at risk of water scarcity, planners could hold co-design workshops with residents of informal settlements. These residents could offer situated knowledge of underground water sources, informal distribution networks, and everyday coping strategies. Integrating this intelligence enhances predictive accuracy and supports equitable water allocation. In this way, governance shifts from top-down enforcement to an ongoing dialogue between technical systems and lived experience.
3. *Context-Aware Systems*: Consider an AI-driven waste collection system that relies solely on official maps and census data. Such a system risks overlooking informal streets and dense, unregistered areas. By incorporating context-aware inputs, such as satellite imagery, citizen reporting, and local knowledge, the system becomes adaptive to shifting realities, including informal markets and flood-prone zones. In this way, AI, in this sense, functions as a responsive, evolving system as against a rigid technocratic instrument.
4. *Ethical and Environmental Alignment*: In Dar es Salaam, an AI-enabled street lighting network may aim to improve safety and reduce energy consumption. However, a purely efficiency-driven rollout could increase energy demand or disproportionately benefit affluent areas. By considering ethical and ecological alignment, planners can prioritise renewable energy sources and ensure inclusive coverage, extending benefits to underserved and informal communities. Technology, thus, advances both sustainability and justice.

These examples underscore that efficiency alone is insufficient. It must be coupled with justice, care, and responsibility. Participatory, context-aware governance ensures that AI systems remain responsive to lived realities while upholding ethical and ecological integrity.

## 7. Policy and Planning Implications: From Technical Adoption to Collective Responsibility

Seemingly, compliance-focused, checklist-based approaches to AI governance are no longer sufficient. AI must be understood as both a technical tool and a governance mechanism shaping collective responsibility, civic care, and ethical foresight. The following pathways illustrate how this shift can be operationalized:

- a. *Invest in Digital and Human Capacity:* Given that AI systems do not succeed on technical merit alone, attention should be paid to the human capacities and institutional cultures that surround them. Accordingly, investments in data infrastructure are inadequate if they are not matched by efforts to build local expertise and civic digital literacy. Otherwise, AI governance risks devolving into an elite, technocratic enterprise, detached from and unresponsive to the communities most affected. For instance, when flood prediction systems are interpreted in collaboration with local actors who manage informal drainage networks, algorithmic outputs could be enriched by lived experience and situated knowledge. Such collaboration does not simply improve technical performance; it redistributes agency, enabling residents to shape decisions that affect their safety. Urban resilience, in this sense, emerges from the interplay between technological systems and human judgment, rather than from automation alone.
- b. *Integrate Sustainability From the Outset:* This means designing AI systems with full awareness of their social, material, and ecological impacts across their lifecycle. Every AI deployment carries ecological costs, from energy-intensive computation and sensor networks to resource extraction and electronic waste, making sustainability a core ethical requirement and a condition for long-term urban viability. Artificial nighttime lighting illustrates this clearly. Although promoted as energy-efficient, smart lighting can reproduce inequality when deployment prioritises formal roads while leaving informal settlements underserved. Its dependence on critical raw materials, LEDs, semiconductors, and AI control systems also links it to environmental degradation and global supply chains. Embracing sustainability early, through renewable energy integration, equitable planning, and responsible material use, helps address these trade-offs. Without this, AI risks amplifying hidden harms and deepening inequality. Sustainability must therefore be foundational, ensuring AI-driven urban systems align with ecological integrity, social inclusion, and responsible governance.
- c. *Embed Participatory Processes:* RA requires that citizens act as co-creators, not passive recipients, of AI governance. Engagement across data collection, model validation, and outcome evaluation ensures AI systems reflect local knowledge, social dynamics, and ethical responsibility. For example, a predictive AI system managing seasonal water shortages can be recalibrated through workshops with residents of informal settlements, who contribute insights on underground water sources and adaptive practices. This participatory approach embeds social awareness, promotes equity, and strengthens trust between communities and authorities.
- d. *Align AI Initiatives With African Development Agendas:* AI deployment must be aligned with continental and local development frameworks, particularly Agenda 2063, to ensure that technological innovation advances collective well-being over narrow efficiency goals. Such alignment situates AI within broader ambitions of inclusive growth, social equity, and sustainable development across African contexts. Approached this way, AI has the potential to address existing inequalities, reinforcing the inclusive vision at the heart of African development agendas. For instance, when local knowledge and lived mobility patterns are meaningfully integrated into system design, AI-driven solutions can better reflect

how people actually navigate urban spaces. This enables improved accessibility, shorter travel times across diverse communities, and more equitable participation in urban life.

These pathways suggest that AI in African cities should be inherently relational, shaped by continuous interactions. And RA ensures that active public influence, sustained ethical dialogue across efficiency, equity, and sustainability, and technologies grounded in lived realities. It also raises a deeper question: What kind of city do we want to build? Efficiency alone is not enough; innovation must be balanced.

## 8. Conclusion

AI holds transformative potential for African cities, enhancing efficiency, predictive capacity, and resource management. Without painstaking attention to RA, however, it risks amplifying inequities, reinforcing biases, and intensifying ecological pressures.

In this light, the future of African urbanism should not depend on technological sophistication alone, but on integrating AI within systems of collective responsibility, ethical foresight, and ecological stewardship. Urban planners' key concern ought not be whether African cities adopt AI, but under what existential conditions, and which envisioned futures will guide Africa's urbanism.

Therefore, while we plan with machines, the future of African cities must remain anchored in human judgment, collective agency, and social justice. And when guided by RA, AI moves beyond mere optimization; it becomes a medium for ethical urban imagination, enabling planners, communities, and institutions to co-create cities that are smart, just, resilient, and sustainable.

### Conflict of Interests

The author declares no conflict of interests.

### LLMs Disclosure

Used for literature searches, cross-referencing, and spell-checking.

### References

- African Union. (2013). *Agenda 2063: The Africa we want*.
- Agyemang, E., Anderson, B., Patiño, J., & Tremolieres, M. (2024). Toward achieving smart cities in Africa: Challenges to data use and the way forward. *Data & Policy*, 6, e13. <https://doi.org/10.1017/dap.2024.11>
- Duca, F., Mutua, A., Tetley-Brown, L., Karuri-Sebina, G., & Backhouse, J. (2025). A systematic review of smart city governance in the Southern African Development Community. *Nature Cities*, 2, 149–156. <https://doi.org/10.1038/s44284-025-00199-w>
- Hanna, M. G., Pantanowitz, L., Jackson, B., Palmer, O., Visweswaran, S., Pantanowitz, J., Deebajah, M., & Rashidi, H. H. (2025). Ethical and bias considerations in artificial intelligence/machine learning. *Modern Pathology*, 38(3), 100686. <https://doi.org/10.1016/j.modpat.2024.100686>
- Henderson, J. V., Lall, S. V., Venables, A. J., & Avner, P. (2017). *Africa's cities: Opening doors to the world*. World Bank. <https://doi.org/10.1596/978-1-4648-1044-2>
- OECD, African Development Bank, Cities Alliance, & United Cities and Local Governments of Africa. (2025). *Africa's urbanisation dynamics 2025: Planning for urban expansion*. OECD Publishing. <https://doi.org/10.1787/2a47845c-en>

- Ralane, H. L. (2025, February 28). Artificial intelligence and the future of smart cities in Africa. *Africa-US Forum*. <https://www.africa-usforum.africa/artificial-intelligence-and-the-future-of-smart-cities-in-africa>
- Salhi, A., Algarni, F., Alshamrani, R., Althbiti, A., Ismail, A., & Hassan, B. M. (2025). Leveraging artificial intelligence to enable sustainable urban development through the creation of smart and environmentally friendly carbon-free cities. *Scientific Reports*, 15, 35791. <https://doi.org/10.1038/s41598-025-16801-z>
- Tonnarelli, F., & Mora, L. (2025). Responsible AI for cities: A case study of GeoAI in African informal settlements. *Journal of Urban Technology*, 32(3), 111–137. <https://doi.org/10.1080/10630732.2025.2450755>
- UN-Habitat. (2016). *Urbanization and development: Emerging futures*.
- van der Hoogen, A., Fashoro, I., Calitz, A. P., & Luke, L. (2024). A digital transformation framework for smart municipalities. *Sustainability*, 16(3), 1320. <https://doi.org/10.3390/su16031320>

### About the Author



**Dodzi Koku Hattoh** is a philosopher, transdisciplinary researcher, crisis simulator, and consultant specialist. He is currently the coordinator of the Ethics Lab (Philosophy & Classics Department), University of Ghana, and affiliate research fellow at the Institute for Science and Ethics | Bonn Sustainable AI Lab, University of Bonn. His work sits at the intersection of AI, ethics, sustainability, security, and governance, with a focus on African and Majority World perspectives. He researches the ethical and security dimensions of AI systems, technological futures, climate mitigation designs, and extractivism, examining how AI, policy frameworks, and ethical imaginaries shape social, cognitive, and ecological outcomes and reproduce or contest global inequalities. As a crisis simulator, he works with individuals and groups to design and run realistic emergency scenarios so they can practice handling disasters without real-world risk. His research interests also include non-human agency, neuroethics and neurotechnology, and African relationality.