Responsible and Inclusive Urban AI: Opportunities and Challenges for Advancing Sustainable Development Goals

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Abstract

This policy brief navigates the intersection of Artificial Intelligence (AI) in cities and the imperative of responsible governance for sustainable development. The brief addresses the transformative potential of AI for urban challenges by leveraging insights from the global assessment of AI in cities (UN-HABITAT, 2024). AI applications enable multiple opportunities and benefits to support sustainable development progress. However, challenges such as the digital divide, privacy, and ethical concerns exist. The lack of standardized regulations and expertise amplifies these challenges, particularly in the global south. The concept of responsible AI emerges as a critical framework for aligning AI technologies with human rights and Sustainable Development Goals (SDGs). The brief proposes key considerations for responsible AI adoption in cities, offering actionable strategies for aligning AI initiatives with the SDGs.

Key Recommendations

- **Establishing context-specific responsible AI principles to address the challenges of diverse urban contexts.**
- **Emphasizing AI solutions with long-term sustainability**
- **Embedding sustainability into AI strategies, while recognizing the limitations of generic AI governance frameworks.**
- **Fostering inclusion, diversity, and resilience to mitigate the digital divide and AI-induced inequalities in cities.**
- **Creating AI awareness and knowledge among stakeholders empowering them to make informed decisions regarding AI policies and regulations aligned with the SDGs.**
- **Monitoring and evaluating AI for SDGs.**
- **Establishing standards and regulations to support AI deployment that strive to fulfill the SDGs in urban environments.**

Cities across the globe deal with significant challenges associated with increasing urbanization, encompassing sufficient housing and infrastructure, addressing the environmental repercussions of urban sprawl, and minimizing vulnerability. Societal evolution has underscored socioeconomic disparities, highlighting the need for innovative solutions to construct resilient and fair urban environments. The United Nations' Sustainable Development Goals (SDGs), emphasizing Goal 11, which centers on developing inclusive, safe, resilient, and sustainable cities, serves as a comprehensive framework to steer cities towards a more sustainable future.

Most cities increasingly turn to technology, and most recently Artificial Intelligence (AI), to address urban issues resulting from the evolving environment. AI emerges as a transformative force for government and public services by offering innovative solutions to tackle the problems that conventional technologies struggled to address, including the Sustainable Development Goals (SDGs). However, AI applications encounter challenges that impede implementation and pose risks and threats to citizens. Thus, understanding the benefits, opportunities, challenges, and risks encountered with AI implementation becomes imperative for planning AI projects that promote SGDs in cities.

This brief addresses the "responsible" adoption of AI in cities, examining the inherent challenges and risks while exploring the pivotal role of AI in advancing sustainable development goals (SDGs). Our exploration draws insights from the global assessment of AI in cities conducted by UN-Habitat to provide key considerations and policies for fostering responsible AI adoption in urban contexts, specifying actionable strategies to align AI initiatives with SDGs.

AI Opportunities in Promoting SDGs

The motivation to embrace responsible AI is aligned with the collective aim of cultivating sustainable urban settings, which hold the potential to advance 134 targets of the SDGs. However, it also can impede progress on 59 targets (Vinuesa, et al., 2020). This underscores the importance of ensuring that technology serves as a catalyst for positive transformation and shared prosperity.

Our study enquired into 70 AI use cases across various sectors worldwide. Figure 1 presents the SDGs supported by the AI initiatives in the collected cases. The study showcases significant contributions to SDG

16 (Peace, Justice, and Strong Institutions), with more than 53% of the cases illustrating the potential of AI to enhance governance and institutional capacities. Also, SDG9 (Industry, Innovation, and Infrastructure) and SDG 11, with 41% of cases exemplifying the role of AI in fostering urban sustainability, as highlighted by Gupta and Degbelo (Gupta & Degbelo, 2023). Environmental applications accounted for 26%; Social welfare accounted for 13% of cases, including Seoul, South Korea's utilization of AI speakers to aid senior citizens in caregiving (OECD-OPSI, 2017) or AI Automated Social Protection Services in Trelleborg in Sweden (Misuraca & Van Noordt, 2020).

Figure 1. Cases from AI case repository (N=70)

The interest in AI's intersection with the SDGs appears in different use cases, as illustrated in Figure 2 (see below).

AI prediction capability demonstrates its potential to align with key SDGs related to city disaster response. By effectively monitoring emergencies such as tsunamis, AI enables proactive mitigation strategies. The prediction capability also allows health practitioners to detect early diseases, reducing the mortality rate. These opportunities underscore the role of AI in fostering sustainable cities (SDG 11) and healthy societies (SDG 3) within urban environments, as examples.

Similarly, the AI prediction use case emerges as a tool for supporting environmental sustainability in cities by forecasting conditions contributing to climate change in alignment with SDG on climate action (SDG 13). For instance, predicting air pollution patterns in Los Angeles[1] contributes to SDG6 on clean air and water. This approach helps cities manage policies that improve air quality, sustainable consumption, and production patterns while promoting sustainable cities and communities (SDG 11).

AI also offers the potential to monitor and forecast city growth and needs as well as economic growth for better land management, urban planning, and employment opportunities. These opportunities enhance city governance and resilient urban spaces, contributing to economic growth (SDG 8) and sustainable cities (SDG 11).

AI recommendation systems support farmers in managing their crops better by suggesting activities based on weather and crop status to improve crop productivity. This contributes to enhancing food security (SDG 2).

Likewise, personalized information and services elevate citizens' livelihoods. These government-citizen interactions contribute to informed and inclusive societies, creating public awareness among citizens of different diversity and thus reducing inequalities (SDG 10).

Furthermore, AI can detect crimes and monitor usual city circumstances, creating safer and more secure cities. Such as the use of Live Facial Recognition (LFR) by the Metropolitan Police of London[2] to prevent and detect crime, identify criminals, safeguard vulnerable people, protect citizens from harm, and contribute to peaceful and inclusive societies while promoting SDG 1. However, these applications could imply several challenges.

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[1] An Air Quality Project with a goal of helping to mitigate the effects of air pollution through interventions that have measured results. https://airquality.lacity.org/#

[2] Facial Recognition Deployed by the Metropolitan Police. https://www.met.police.uk/advice/advice-and-information/fr/facial-recognition-technology/

Figure 2. Examples of interested AI use cases in cities.
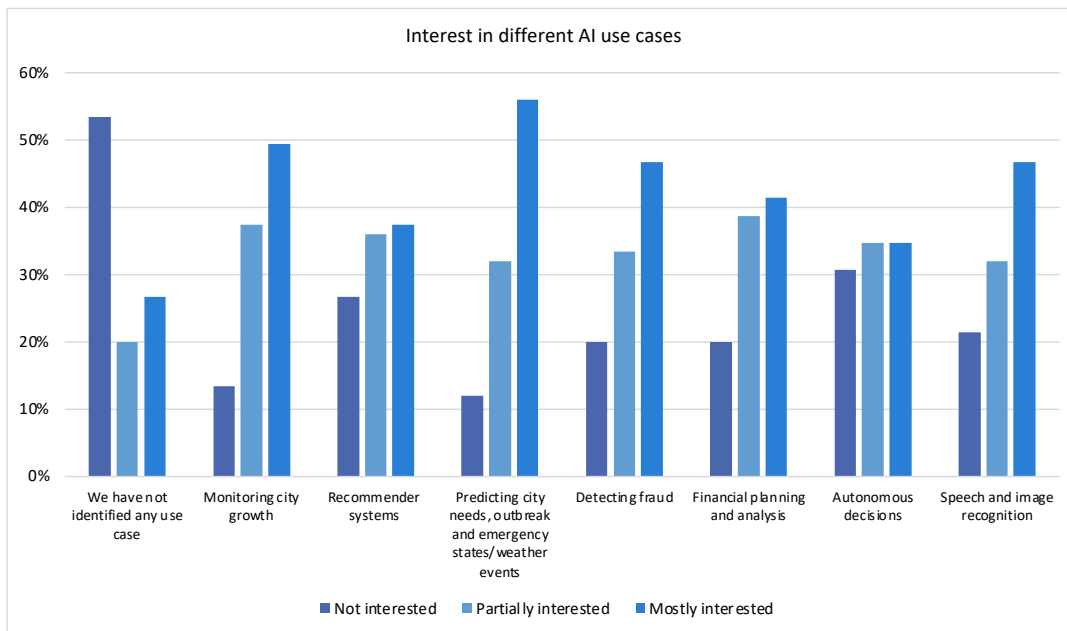
Challenges of AI Adoption

Despite the potential opportunities for implementing AI applications, cities aspiring to enhance inclusivity, safety, resilience, and sustainability face persistent risks and challenges. Some challenges are generic to most digital projects in government and public services. These include a need for more resources, a lack of awareness and knowledge, and poor support to facilitate the implementation of AI (see Figure 3), among the challenges of AI adoption in cities. In this brief, we discuss key challenges of AI adoption that decelerate SDGs.

Real concerns exist regarding security complexities and data privacy, especially when introducing AI in urban settings alongside other technologies. Citizens may find themselves compelled to share sensitive and personal data or be subject to continuous surveillance, with the widespread use of cameras like the LFR case in the London Metropolitan Police[2] leading to privacy violations and data misuse. Data misuse may also occur during the development of AI solutions without owners' knowledge and consent. Additionally, some solutions benefit companies rather than citizens and accelerate community inequalities. Ethical concerns emerge from these practices, where such solutions may fail to uphold societal values and human rights. These challenges impede SDG 10 in cities.

Quality data availability is crucial to developing an efficient and successful AI model. These calls for frequent model updating for sustainable AI solutions in cities. Still, the availability of quality and representative data to develop models is perceived as a challenge. AI may discriminate against specific groups, making unfair judgments due to inadequate data representation, delaying SDG 16, inhibiting inclusion and equal access to service in cities with SDGs 10 and 11.

These data challenges cement the need for data governance and regulations to define and guide data ownership, privacy, and processes for SDG promotion. However, the availability of such initiatives at the city level is still a challenge, as demonstrated in **Error! Reference source not found.**.

Further, concerns about the decision-making process of AI systems, including algorithmic bias, discrimination, and privacy violations (Kordzadeh & Ghasemaghaei, 2022), necessitate a responsible and ethical approach. The concept of responsible AI, as defined by UN-Habitat, becomes critical in ensuring the alignment of AI technologies with core values, including human rights and the SDGs. Therefore, addressing these challenges is imperative for ensuring responsible practices that effectively support the progress of SDGs in cities.

Figure 3. Perceived challenges of AI from the surveyed cities.
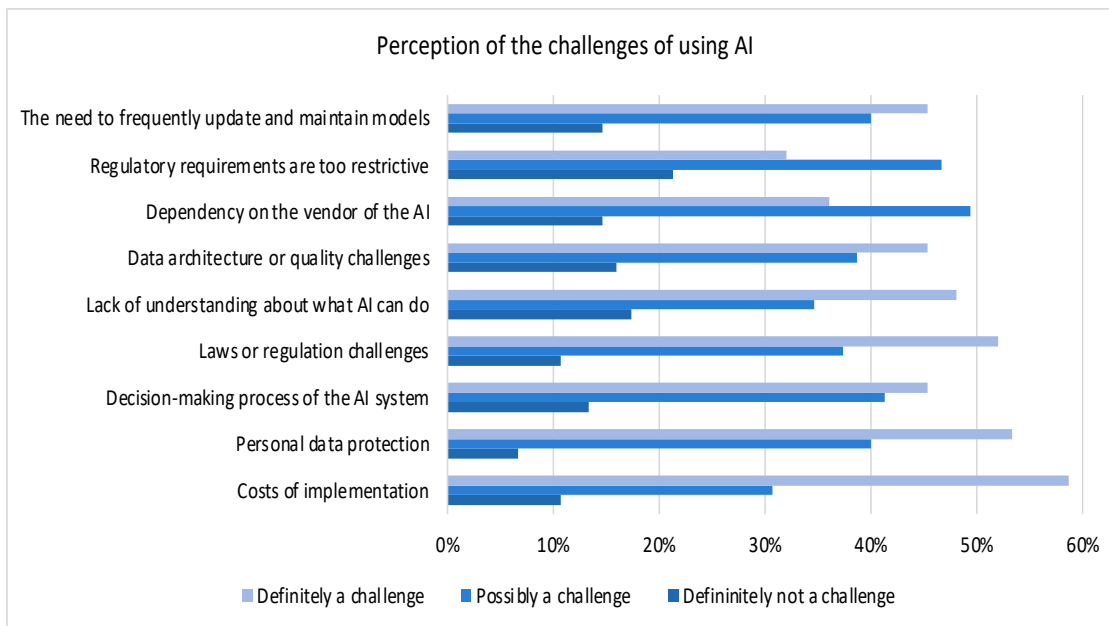
Policy Recommendation and Priorities

From the Global experiences and lessons learned on AI adoption and implementation in cities, it is critical to understand the promising path that unfolds from the intersection of AI and urban sustainability. This path involves innovative urban planning, strategic alignment with the SDGs, impact assessments, and a shift in societal perspectives toward sustainable urban development.

We highly recommend that city managers consider the following when adopting, implementing, and governing AI:

Establishing context-specific responsible AI principles for cities by prioritizing the development of accepted and context-specific principles, strongly emphasizing trustworthiness and a human-centric approach. These principles are critical to addressing and mitigating AI's negative consequences and challenges in urban settings.

Emphasizing long-term sustainability by prioritizing a needs-driven perspective, aligning AI initiatives with citizens' priorities, and fostering economic, social, and environmental sustainability. Embedding sustainability into AI strategies is essential globally, particularly in urban contexts working towards the SDGs.

Fostering inclusion, diversity, and resilience by mitigating the digital divide at the local level is essential, as AI can potentially exacerbate existing inequalities. Regulations updates and competitive laws are required to address AI-induced digital disparities, ensuring AI benefits all members of society. Efforts should be directed toward accommodating diverse perspectives, genders, and contextual factors to prevent the reinforcement of existing inequalities and digital disparities.

Creating awareness and knowledge among civil servants and citizens on how responsible AI contributes to strengthening SDG by focusing on initiatives dedicated to enhancing knowledge and awareness of AI technology among stakeholders within diverse urban settings. The awareness empowers stakeholders to make informed decisions regarding AI policies and regulations tailored to specific urban contexts striving to achieve the SDGs.

Monitoring and evaluating AI for SDGs by continuously assessing the impacts of AI on SDGs to measure the extent to which implemented solutions support or hinder sustainable actions and progress.

Establish standards and regulations tailored to the specific urban contexts and involve stakeholders in governing AI implementation. Such regulations are a cornerstone for ensuring accountability and the responsible deployment of AI technologies to fulfill the SDGs.

Acknowledgments

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