



Editorial

At the crossroads of datas: Using artificial intelligence for efficient and resilient planning in African cities

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Abstract: By collecting and conducting in-depth analysis of official statistical data, empirical evidence, and exploring integrated artificial intelligence (AI) approaches in diverse African urban landscapes, this article examines the integration of formal and informal data to bolster urban resilience in Africa. It underscores the significance of this diverse data in crafting effective urban planning strategies tailored to the needs of African city-dwellers. The AI-driven analysis, amalgamating these datasets, provides a comprehensive understanding of urban realities and community needs in African cities. Additionally, the article emphasizes how harnessing so-called informal data—often overlooked yet crucial—alongside formal data enables more contextual and adaptive planning aligned with local needs and aspirations. Highlighting the transformative potential of data-driven approaches, the article presents AI strategies as proactive tools to address the challenges faced by African cities, fostering resilience amidst socio-economic and environmental shifts. Ultimately, it advocates for the integration of diverse data sources in urban planning, utilizing AI as a catalyst, underlining the importance of a holistic approach that values both formal and informal data for sustainable and resilient urban development in Africa.

Keywords: artificial intelligence; urban resilience; data integration; African cities; urban planning; sustainable development; formal data; informal data

1. Introduction

Africa's cities are facing many challenges. Rapid urbanization has led to an urban population of 472

million, a figure that will double over the next 25 years [1]. This rapid urbanization is causing pressure on basic infrastructure, particularly transport systems. In addition to rising urban poverty, shanty towns are developing on the outskirts of major cities, and environmental problems such as pollution and flooding are a growing concern.

However, these problems could be transformed into opportunities. African cities, with their large populations, offer an attractive potential market for developers and investors. A number of actors, whether private (international investors and local entrepreneurs), institutional (governments and local authorities) or international (World Bank and African Development Bank), are seeking to resolve these problems.

The growth in the use of digital tools in Africa, particularly in urban areas, makes the creation of solutions based on dematerialization essential. Big data, resulting from the abundance of data produced by the urban population, can play a major role in the planning of African cities. It is important to understand how the use of this big data can help to improve the daily lives of African city dwellers, by taking into account the diversity of data sources, both formal and informal, to improve the living conditions of city dwellers.

This moves towards greater exploitation of urban data, in particular with the integration of artificial intelligence (AI) into urban planning processes, represents an unprecedented opportunity for Africa. Technological advances, combined with AI, offer the possibility of devising innovative, tailor-made strategies to improve the daily lives of citizens and solve major urban problems.

Assessing data resources in African cities is a major contemporary challenge for urban planning. In the age of big data, we are faced with a world where this data offers unprecedented opportunities to meet individual and collective needs, whether social, economic, or political. In African cities, this data emanates from two types of sources: formal, which is official and digital (telephones, computers, sensors, etc.), and informal, which is often immaterial (orality, rumors, etc.).

The character and credibility of data are closely linked to the cultural realities and lifestyles specific to the area (country, region, city, neighborhood, house, etc.) where it is produced. In African cities, data is generated in all areas. As essential indicators of people's fundamental aspirations, it is vital to identify them in order to respond to social, economic, and political needs. They are invaluable decision-making tools for both institutional and private actors.

On the one hand, in terms of formal data, Africa, although lagging behind other developed regions of the world, is gradually closing the gap in the use of digital technologies. Affordable smartphones are now accessible to a wide range of the African population, including the most disadvantaged. The penetration rate of smartphones is 40% and will reach around 70% on the African continent, according to the Ericsson Group [2]. In Senegal, for example, smartphones are being widely adopted, and internet access is becoming increasingly affordable thanks to competition between telephone operators such as Orange, Tigo, Expresso and Free. This competition is of particular benefit to the majority (the poorest), as it stimulates improvements in network quality and competitive tariffs. As a result, Internet connectivity is increasing rapidly, and a huge amount of data is being generated. This data is either recorded or shared democratically by people from all social classes via social media platforms such as Facebook, WhatsApp and TikTok. These virtual spaces are becoming places of expression, redefining the spatio-temporal dimension of urban geography. Social relations are being reshaped by the interaction between people and the use of digital technologies.

On the other hand, alongside formal data, a rich reserve of data of an informal nature is produced on the fringes of government authorities and decision-making centres. This category of data is mainly

generated by a large part of the African urban population, often faced with unemployment and uncertainty about their future. This data emerges in various contexts, such as informal discussions over tea (the popular daily practice of drinking tea in a group, after lunch, around the palaver tree), exchanges on public transport, interactions in hospital corridors, debates on university campuses, and even graffiti on city walls. Although this data is difficult to quantify and perceive, this contains essential qualitative information, if it can be identified and used to guide decision-making in the development of public policies.

In addition, local authorities hold official data on towns and their inhabitants, recorded in official registers. This information covers various aspects such as unemployment rates, demographics and access to essential urban services such as water, electricity, and sanitation. Collecting this data, which is not necessarily digital, requires a local management and participatory democracy approach. This approach could be based on qualitative surveys or immersion in the places where this data is generated. Whatever the quality of the data and its source, it faithfully reflects the expectations and aspirations of city dwellers.

In Nigeria, the mobile penetration rate is rising steadily, reaching the 100% mark and currently standing at around 103% [3]. This has led to an explosion in the use of social media such as Facebook, Twitter and WhatsApp, which have become major channels for communication and information sharing. The data generated from these platforms is invaluable for understanding citizens' concerns and can be harnessed to improve urban policies.

In addition, in cities such as Nairobi, Kenya, local communities use urban problem reporting applications such as "MajiVoice" to report water shortages or sanitation problems [4]. This informal data is then taken into account by local authorities to improve the delivery of public services.

Finally, participatory mapping initiatives such as "OpenStreetMap" allow residents to contribute to the mapping of their city by adding information about public transport, infrastructure and other urban features. This data, although informal, enriches geospatial databases and can contribute to better urban planning.

This diversity of data sources offers considerable potential for urban planning that is better adapted to the needs of city dwellers. The integration of AI in the management of this data, both formal and informal, could offer innovative prospects for optimizing urban planning, improving the quality of life, and tackling urban challenges in Africa. The growing use of digital technologies, combined with AI, opens up new prospects for more effective and targeted urban planning.

The use of data to improve urban services represents a significant challenge in the management of African cities. Thanks to the rise of digital services and the collection of data, whether quantitative, qualitative, formal, or informal, authorities and private actors can now better respond to the needs of the population by understanding their behavior, concerns, and aspirations. Using the potential offered by AI, this approach involves harnessing data in real time, analyzing it, prioritizing it, and transforming it into usable information, in order to obtain new knowledge that can improve urban services in specific ways.

A concrete example of the use of data to improve urban services can be found in Côte d'Ivoire. By analyzing billions of statistics from mobile phone traffic between 2011 and 2013, the authorities were able to identify population movements in Abidjan. This information was crucial in deciding on the location of new roads and the reallocation of more than 500 buses, 5,000 minibuses, and 11,000 shared taxis. This data comes from the users (the population) and has been essential in meeting their expectations by offering services based on consistent modelling [5]. However, it is important to note

that digital uses, although growing, are not yet widespread among all citizens, and the digital divide is still a reality. This means that institutional and private players have a responsibility to innovate in order to respond to urban challenges and economic, environmental, and social concerns by making the best possible use of the diversity of data available.

With the increase in the use of mobile telephony on the African continent, many start-ups have embarked on innovation by offering new services, such as mobile banking—This is a solution that allows you to carry out banking transactions from a mobile phone connected to the Internet. This service facilitates access to banking and other essential services, such as online payments and checking balances, for all sections of the population. This puts an end to the hassle that African city dwellers used to have to pay their water, telephone, and electricity bills, saving them long queues and journeys. For example, thanks to the use of quantitative and qualitative data provided by the population, the powerful Afro-Senegalese start-up Touch, with its TouchPoint counters (present in several African countries), is offering highly innovative digital solutions such as a “Touch One-Stop Shop” that enables mobile phone users to pay their various bills without having to go anywhere.

In addition, Senegalese engineers and designers have created applications to solve mobility problems in Dakar. Based on data collected from public complaints about transport and from social networks, these applications provide real-time information about traffic conditions, journey times and routes to take. For example, the TALI BI application makes it easier to get around by car; Tukki Jamm offers a simple, ecological, and economical car-sharing solution. These innovative digital services improve the quality of life of African city dwellers, dematerializing traditional processes and contributing to sustainable urban development by reducing car journeys.

Finally, with a view to transparency and democratization, many developed countries are moving towards sharing open data. In Africa, under the aegis of the African Development Bank (ADB), the “Information Highway” initiative encourages institutions such as central banks and ministries to share data with the general public. The aim of open data is to enable citizens to get involved in public life by having access to reliable information from official sources. For example, an open data portal in South Africa provides precise information on the budget to the people of Cape Town [6]. This enables citizens to conduct studies or develop entrepreneurial projects using quality data.

In sum, the analysis of different data with the use of AI could improve urban services in Africa, offering considerable opportunities to optimize city management, improve quality of life, and promote sustainable development. The combination of digital data, the democratization of digital services, and open data is contributing to a better future for African cities by responding in a more targeted way to the needs of the population.

It may seem surprising to talk about a “data city”, or the use of Artificial Intelligence in African cities at the present time, given that the continent is lagging behind other continents. Nevertheless, it is undeniable that the appropriate modelling and analysis of existing data with AI, taking into account local sociological realities, offers considerable potential for many African cities. With the collaboration of stakeholders, this approach could help to initiate a transformation aimed at streamlining urban planning and improving the services offered to city dwellers, particularly the poorest.

Concrete examples of the use of data to improve urban services in Africa demonstrate that digital advances can provide concrete solutions to urban challenges. Innovation in digital services, data collection, and open data are opening up promising prospects for the future of African cities. However, it is essential to ensure that these advances benefit the entire population by reducing the digital divide and guaranteeing equitable access to the benefits of digital transformation.

Use of AI tools declaration

The authors declare they have not used Artificial Intelligence (AI) tools in the creation of this article.

Conflict of interest

The author declares no conflict of interest.

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