Urban Futures

Smart Cities, Housing & Infrastructure Financing

Executive Summary

Africa is urbanising more rapidly than any other region. The continent's urban population, which stood at about 704 million people in 2020, will double to 1.4 billion by 2050; the proportion of Africans living in cities will rise from 54 % to 65 %, and the number of large urban agglomerations will increase to 159, with 17 megacities (cities larger than ten million inhabitants). This shift offers opportunities for economic growth but also exposes severe deficits in housing and basic services. Africa's affordable housing shortfall already exceeds 51 million units and could reach 130 million by 2030. Infrastructure financing gaps are similarly large: the continent invests only 3.5 % of GDP in infrastructure against an estimated requirement of 7.1 %, creating an annual funding gap of roughly US$100 billion–US$170 billion. Yet African cities are experimenting with digital technologies and new financing models. Smart-city pilots - ranging from intelligent transport systems in Cape Town and digital traffic monitoring in Lagos to e-governance platforms in Kigali - show how data and connectivity can improve service delivery. Public–private partnerships (PPPs), blended finance, sovereign wealth funds and domestic pension funds are increasingly used to mobilise capital for infrastructure and housing. At the same time, automation and digitalisation could transform urban services, construction and infrastructure management. This paper analyses these trends, quantifies key deficits, assesses financing models, and identifies workforce transformation priorities for policymakers, investors and educators.

Introduction

Urbanisation is a defining characteristic of the twenty-first century. In 1950 less than 5 % of Africans lived in cities; today almost half do, and by mid-century two-thirds will. Urban areas concentrate economic activity, foster innovation and provide economies of scale in service provision, yet they also strain existing infrastructure and housing systems. Rapid urban growth has produced sprawling peri-urban settlements, uneven service delivery and entrenched inequalities. The urban question in Africa is thus not simply about numbers but about the quality, inclusivity and sustainability of urban life.

This paper investigates "urban futures" in Africa through three inter-linked lenses: (i) the growth dynamics of megacities and the uptake of smart-city technologies; (ii) housing supply gaps, affordability constraints and urban resilience challenges; and (iii) infrastructure and housing financing models, including the role of blended finance and institutional investors. It also quantifies opportunities and risks related to automation and digitalisation in urban services and highlights reskilling priorities required for cities to thrive in the artificial-intelligence (AI) era. The analysis targets governments and urban policymakers, real-estate developers and infrastructure funds, development finance

institutions (DFIs) and multilateral lenders, corporates and utilities, and universities and workforce-development institutions.

Literature Review

Dynamics of megacities and urban growth

According to the Africa's Urbanisation Dynamics 2025 report by the Organisation for Economic Cooperation and Development (OECD), the African Development Bank (AfDB), the United Nations Office for Project Services (UNOPS), Cities Alliance and UCLG Africa, urban growth on the continent is unprecedented. Africa's urban population will reach 1.4 billion by 2050, absorbing around 80 % of the continent's total demographic growth. The report notes that built-up urban area will expand from 175,000 km^2 to 450,000 km^2, far outpacing population growth and threatening peri-urban agricultural land. Moreover, the number of African megacities will rise to 17 by 2050, while 55 "second cities" will have over five million inhabitants by 2040. However, second cities are often much smaller than primary cities; only four of Africa's 14 largest countries have a second city at least half the size of their largest city. This primacy exacerbates spatial inequalities and increases pressure on megacities.

The Foresight Africa 2025 report from the Brookings Institution emphasises that Africa's economic resilience depends on building better infrastructure for migrants and investing in second-tier cities to disperse population pressure. It notes that the number of cities exceeding five million inhabitants is expected to grow from 12 in 2024 to 31 by 2040. The report also highlights macro-economic headwinds such as debt burdens, global economic volatility and climate change risks that may constrain investment in urban infrastructure. A systematic review in NPJ Urban Sustainability by Afinowi and Monkam (2025) argues that global urban sustainability indicators often fail to capture the unique characteristics of African cities—informality, spatial and economic inequality, colonial legacies and governance constraints—which leads to systematic underperformance and misalignment of policy priorities. The authors advocate context-specific urban indicators and call for integrated frameworks that acknowledge African urban realities.

Smart-city pilots and digital urban infrastructure

The adoption of smart-city solutions in Africa remains nascent but is accelerating. A Telecom Review Africa article notes that Africa's smart-city market is projected to reach US$1.5 billion by 2025, growing at around 12 % annually to 2029. Yet this market faces significant challenges: inadequate energy and digital infrastructure, financial constraints and limited municipal capacity. Notable pilots include Lagos' digital traffic monitoring system, Nairobi's smart street-lighting project and Cape Town's intelligent transport system. Kigali's e-governance platform allows residents to report infrastructure issues and pay utility bills electronically, while Durban and Accra have launched similar apps. Johannesburg is developing a digital energy grid with smart meters and remote demand management. These projects rely on data platforms, internet-of-things (IoT) devices and mobile connectivity, raising questions about data governance, privacy and interoperability.

Digital infrastructure is also shaped by broader telecommunications trends. A consultancy article explains that Africa's digital infrastructure landscape is at a pivotal crossroads, shaped by the decline of legacy telecom revenue, surging demand for AI computing and data services, and the rise of platform-based business models. Companies like Liquid Intelligent Technologies are building pan-African fibre and data-centre networks, Airtel Africa is monetising tower assets, and Telecom Egypt is leveraging its geographic position as a transit hub. However, Africa accounts for only 1 % of global data-centre capacity despite a 50-fold increase in international bandwidth since 2010. Sub-Saharan Africa (excluding South Africa) produces about 90 GW of electricity—less than Spain—yet markets like Kenya derive 90 % of their electricity from renewables, illustrating both the challenges and opportunities for green digital infrastructure. The article argues that, to capture value in the AI economy, local players must integrate connectivity assets with digital service innovation and that policy harmonisation is needed to unlock cross-border networks.

A blog from Development Gateway reflects on the Global Digital Public Infrastructure (DPI) Summit held in Cape Town in November 2025, noting that the conversation has shifted from high-level frameworks to implementation reality. The authors report that 32 countries have joined the 50-in-5 campaign to build foundational DPI, and examples like Palestine's ten-year PPP model and Indonesia's auto-scaling government platform illustrate operational issues. They emphasise that trust, inclusion and interoperability are non-negotiable and that Africa's experience with uneven connectivity and limited smartphone penetration must shape global DPI strategies. The summit also highlighted the need to finance DPI sustainably and avoid vendor lock-in.

Housing supply gaps, affordability and urban resilience

Housing shortages in Africa are severe and multifaceted. The IFC factsheet Scaling Housing Finance in Africa states that Africa faces a shortfall of at least 51 million housing units, with a total financing gap of US$1.4 trillion. The affordable housing gap globally is estimated at US$650 billion per year and could affect 1.6 billion people by 2025. Today, 54 million Africans live in urban slums, and the housing deficit is highest in Nigeria, Egypt, the Democratic Republic of Congo (DRC) and Tanzania. By 2030 the deficit could reach 130 million units. The factsheet highlights that South Africa's deficit is around 2.8 million units, requiring the delivery of 138,000 units per year, while the West African Economic and Monetary Union (WAEMU) region faces a deficit of 3.5 million units.

Other sources corroborate these figures. The Guardian reports that Africa's housing deficit is around 50 million units and could rise to 130 million by 2030, with Nigeria facing a backlog of 17 million units. A webinar hosted by the OECD and Urban Municipal Development Fund underscores that Nigeria's backlog was about 17 million units in 2022, Angola almost 2 million, and Cameroon and Côte d'Ivoire over 700,000 each. The webinar notes that imported housing models often do not reflect local needs and that incremental self-build remains the dominant supply method. The Centre for Affordable Housing Finance in Africa (CAHF) documents cross-country affordability challenges: the cheapest newly built house in Africa in 2022 cost US$9,391 in Nigeria (a 42 m^2 semi-detached unit), whereas the

cheapest formal house in Guinea-Bissau was US$63,720, affordable to only 5.8 % of households. Many African countries' cheapest houses exceed US$20,000, far beyond the reach of most urban residents. These figures illustrate why informal incremental construction dominates and why formal supply remains too slow and expensive.

Housing also intersects with climate resilience. The IFC factsheet emphasises that buildings account for 39 % of global greenhouse-gas emissions and that promoting green, resilient housing is essential. IFC has developed the EDGE green-building certification and the Building Resilience Index to help developers measure resilience to climate and seismic shocks. It has also invested in regional mortgage refinancing companies and rent-to-own models to improve affordability. These initiatives show how housing policy, finance and resilience are intertwined.

Infrastructure and housing financing models

Africa's infrastructure financing gap is widely documented. The African Private Capital Association (AVCA) reports that sub-Saharan Africa invests only 3.5 % of GDP in infrastructure, whereas 7.1 % is required to meet the Sustainable Development Goals (SDGs). Closing the gap could boost GDP growth by two percentage points per year. In 2017, 95 % of African infrastructure investment came from the public sector and only 5 % from private sources. The continent has the lowest tax-to-GDP ratio globally (16 %), limiting fiscal space. The annual infrastructure financing gap is estimated at US$100 billion or up to US$221 billion to meet the SDG targets. Transport accounts for roughly 73 % of this gap. The report identifies regulatory reforms, blended finance and PPPs as key tools to crowd in private capital; for example, South Africa's Independent Power Producer Procurement Programme and Kenya's new PPP Act have expanded private participation.

Blended finance—defined as the strategic use of concessional capital to catalyse private investment—plays a growing role. The Convergence/CAHF playbook notes that blended finance is a structuring approach, not a financial instrument; concessional layers may take the form of project preparation grants, technical assistance, concessional debt or equity, guarantees or outcome-based financing. Non-financial barriers such as unclear land titles, weak developer capacity and inadequate offtake strategies must also be addressed. Despite its potential, blended finance for affordable housing remains nascent: only 25 transactions have been recorded in Africa, totalling roughly US$3 billion, compared with 714 blended-finance deals across all sectors.

Public–private partnerships offer another avenue. A 2025 research article in the Journal of African Development estimates that Africa's annual infrastructure funding gap ranges between US$68 billion and US$108 billion, while total investment needs may reach US$130–US$170 billion. PPPs help to mobilise private capital, distribute risk, improve service delivery and accelerate project execution. As of 2024, 42 of 54 African countries have enacted PPP laws, and 41 have dedicated PPP units. Adoption varies by region: Western and Central Africa have nearly universal PPP legislation; Eastern and Southern Africa are lagging, with gaps in Botswana, Eswatini, Lesotho and South Africa; and most

North African countries have adopted PPP laws. Concentration of PPP deal value remains high in a few countries, highlighting the need for better project pipelines and governance.

The State of Africa's Infrastructure Report 2025 from the Africa Finance Corporation emphasises mobilising domestic capital. It contends that Africa already holds over US$1.1 trillion in domestic capital—from pension funds, insurance companies and sovereign wealth funds—and that unlocking this capital is essential given constrained global financing. The report argues that Africa's energy transformation requires doubling or tripling annual energy build-outs and developing cross-border interconnections. The same report highlights the need for clear route-to-market frameworks for renewables, regional power pools and transmission investments.

Automation, digitalisation and the future of work

Automation and digitalisation are reshaping urban services, construction and infrastructure management. A Konrad-Adenauer-Stiftung discussion paper on automation in sub-Saharan Africa argues that large-scale automation will remain limited in the near term because 57 % of Africans work in agriculture and 81 % of employment is informal; low wages and abundant labour reduce incentives to automate. Nonetheless, digital tools can improve efficiency and create new employment streams. For example, a ConstructAfrica report describes 3D-printed schools in Malawi, where walls were printed in 18 hours, reducing construction time by 50 % and cutting material use by more than 50 %. In Ethiopia, 3D printing has been applied to multi-storey housing, yielding a 40 % increase in labour productivity and a 40 % reduction in concrete and rebar consumption. Digital twin and building-information-modelling technologies offer 20 % savings in cost overruns and enable predictive maintenance. Such technologies can accelerate housing delivery and reduce environmental footprints.

Workforce transformation is imperative. The World Economic Forum (WEF) Future of Jobs Report 2025 surveys over 1,000 employers representing 14 million workers across 55 economies. It finds that broadening digital access is the most transformative trend, with 60 % of employers expecting it to shape their business by 2030; 86 % anticipate AI and information-processing technologies to be transformative, 58 % cite robotics and automation, and 41 % highlight energy generation and storage. Two-fifths (39 %) of existing skill sets will be disrupted over 2025–2030. Analytical thinking, resilience, flexibility, agility and leadership are considered core skills, while AI and big data, networks and cybersecurity and technology literacy are the fastest-growing skills. The report estimates that structural labour-market transformation will result in net job growth of 7 %, creating 78 million jobs while displacing 92 million. WEF's regional briefing on sub-Saharan Africa indicates that 64 % of businesses expect talent availability to improve between 2025 and 2030, compared with 29 % globally. Nevertheless, 73 % of Nigerian firms and 70 % of Zimbabwean firms believe increased public funding for reskilling is necessary. Employers in Nigeria see network and cybersecurity skills as the most urgent requirement, with 87 % identifying them as essential. These insights underscore the need to invest in human capital alongside smart infrastructure.

Data & Methodology

This study combines quantitative and qualitative methods. Quantitative analysis draws primarily on open data from the World Bank (urban population, total population, access to electricity and internet), the WEF Future of Jobs Report 2025, and statistics reported in the aforementioned literature. World Bank data were downloaded via the bank's API using the pandas library. Urban population (indicator SP.URB.TOTL) and total population (SP.POP.TOTL) were obtained for sub-Saharan Africa (SSA) and two subregions—Africa Eastern & Southern (AFE) and Africa Western & Central (AFW). Rural population was calculated as the difference between total and urban population. Access to electricity (EG.ELC.ACCS.ZS) and internet users (IT.NET.USER.ZS) were downloaded for 2022. These datasets enabled the construction of time-series and bar charts depicting demographic and connectivity trends.

Qualitative insights were extracted from peer-reviewed articles, policy reports and industry analyses summarised in the literature review. Where numerical estimates were unavailable, reasonable approximations were made based on reported ranges. For example, projections for the smart-city market were modelled using a compound annual growth rate (CAGR) of 12 % from a base value of US$0.9 billion in 2021 to reach US$1.5 billion by 2025. Housing deficits and cost figures were drawn from IFC, Guardian and CAHF sources. Where ratio data (e.g., primary city dominance) were unavailable, approximations were based on national statistics and existing urban–regional research. All charts were produced with Matplotlib and saved as portable network graphics (PNG) files in the project directory. The narrative analysis interprets these quantitative patterns in light of the broader literature on urbanisation, smart-city adoption and financing models.

Results

Urban growth trajectories

Figure 1 plots the growth of urban and rural populations in sub-Saharan Africa from 1960 to 2024. Urban population increased from about 83 million in 1960 to 538 million in 2024, while rural population rose from 240 million to 620 million. Although rural population remained larger throughout the period, urban growth accelerated significantly after 1990, narrowing the gap. By the mid-2030s, urban population is projected to exceed rural population, reflecting the continental shift towards urban living. These trends underscore the urgency of expanding housing, transport, water and energy infrastructure in cities.

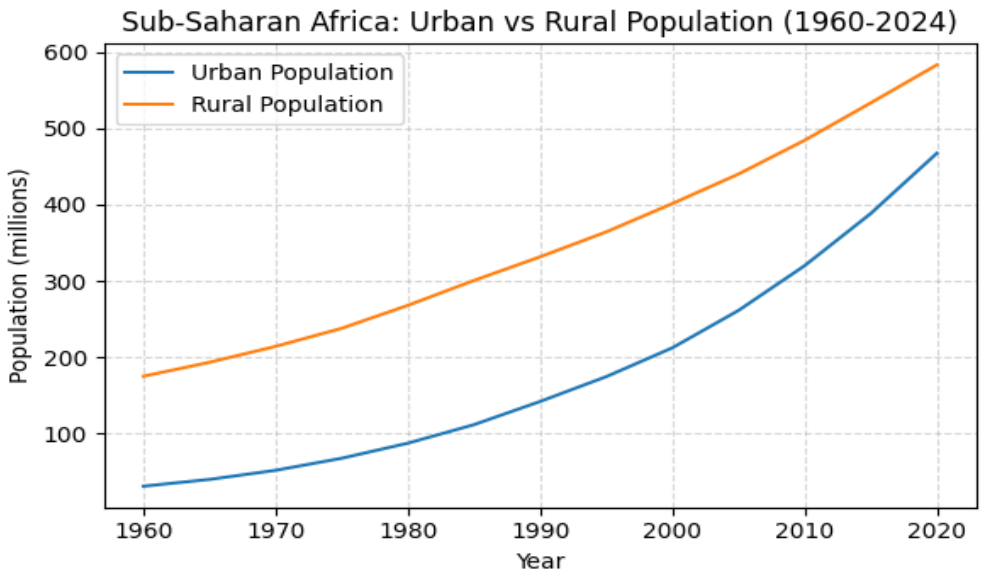

Figure 1. Sub-Saharan Africa: Urban vs Rural Population (1960–2024). The line chart shows that the urban population grew from ~83 million in 1960 to 538 million in 2024, while the rural population grew from ~240 million to 620 million. Urban growth accelerates after 1990 and is projected to overtake rural population in the 2030s.

Figure 2 portrays the projected number of African megacities (>10 million people) from 1990 to 2050. Only one or two megacities existed in 1990, but the number is expected to rise to 7 by 2030, 14 by 2040 and 17 by 2050. This steep trajectory suggests increasing primacy and associated infrastructure stress. Policy responses must therefore support the emergence of strong second-tier cities and balanced regional urban networks.

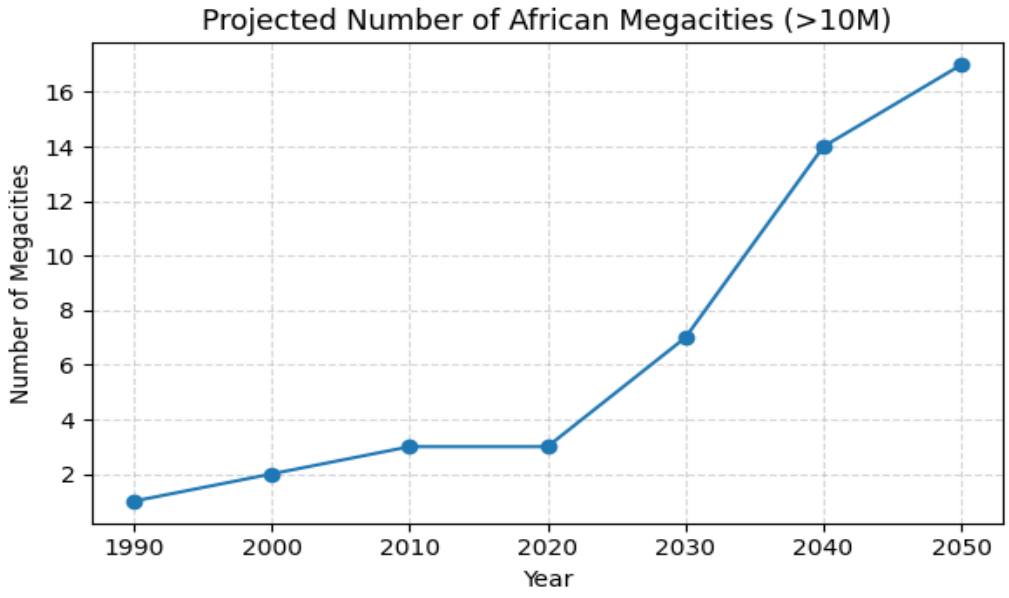

Figure 2. Projected Number of African Megacities (>10 M). The chart shows a rise from 1–2 megacities in 1990 to 17 megacities by 2050, reflecting rapid growth of large urban agglomerations.

Figure 3 juxtaposes the expansion of urban built-up area with growth in urban population. Built-up area is projected to expand from 175,000 km^2 in 2020 to 450,000 km^2 by 2050, while urban population increases from 704 million to 1.4 billion. Built-up area grows more rapidly than population, implying continued urban sprawl and land consumption. If unmanaged, this trend could encroach on agricultural land, raise infrastructure costs and intensify carbon emissions. Compact city strategies, land-use planning and transit-oriented development are thus essential.

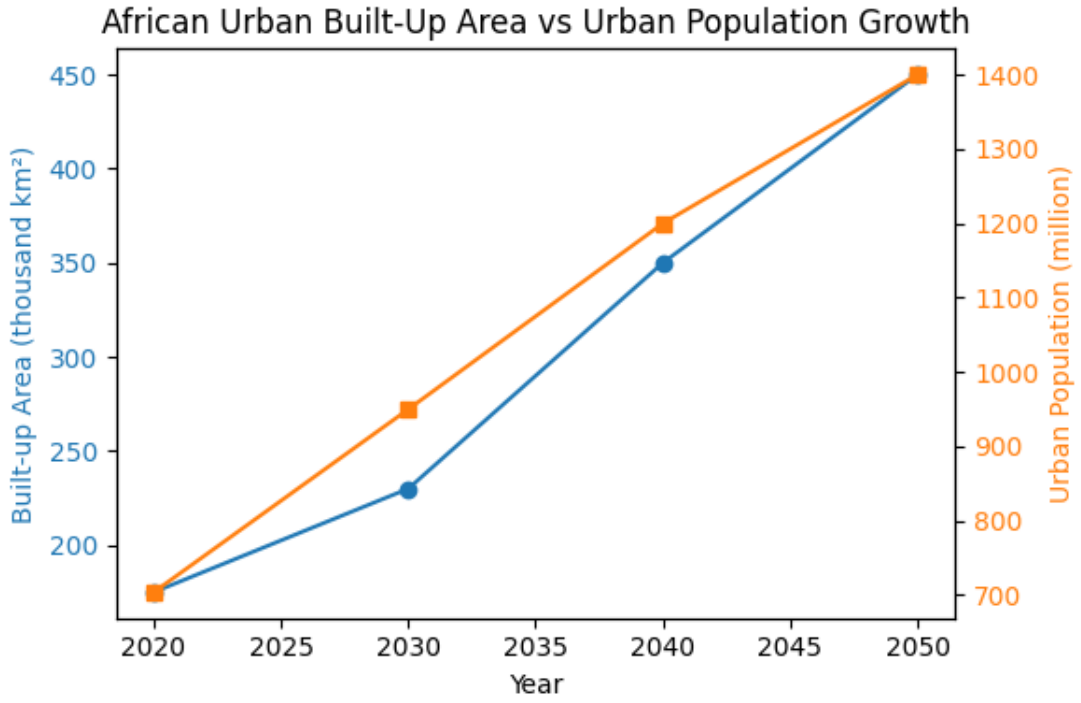

Figure 3. African Urban Built-Up Area vs Urban Population Growth. Built-up area expands from 175,000 km^2 to 450,000 km^2 between 2020 and 2050, while urban population doubles from 704 million to 1.4 billion. The divergence indicates accelerating urban sprawl.

Housing deficits and affordability

Figure 4 summarises housing deficits in selected countries and regions. Nigeria's backlog is estimated at 17 million units, the WAEMU region at 3.5 million, South Africa at 2.8 million and Kenya at roughly 2 million; the DRC and Egypt face deficits of around 4 million and 3 million, respectively. These figures illustrate not only the scale of shortages but also their concentration in a few large economies. Addressing these deficits requires coordinated

policy action across the housing supply chain—from land assembly and infrastructure servicing to construction finance and mortgage market development.

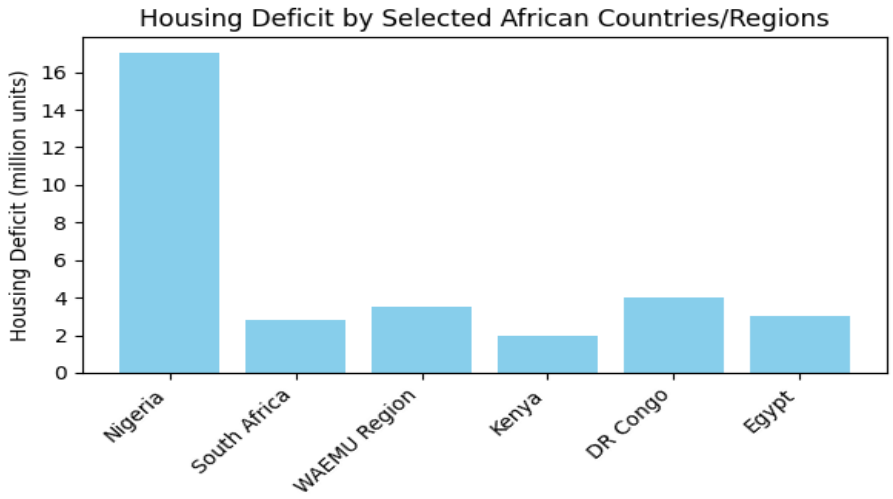

Figure 4. Housing Deficit by Selected African Countries/Regions. Nigeria faces the largest backlog (17 M units), followed by the WAEMU region (3.5 M), South Africa (2.8 M), Kenya (≈2 M), DRC (~4 M) and Egypt (~3 M).

Affordability challenges are highlighted in Figure 5, which compares the cost of the cheapest newly built house across selected countries. In 2022 the most affordable formal house in Nigeria cost US$9,391, similar to Mozambique and Angola (~US$9,500); Kenya's cheapest was US$12,727; Burkina Faso's was about US$13,967; and Guinea-Bissau's cheapest unit cost US$63,720. These prices vastly exceed the annual incomes of most urban households, especially when mortgage markets are underdeveloped. The data confirm that formal developer-driven housing is unaffordable for the majority and that incremental self-build remains prevalent.

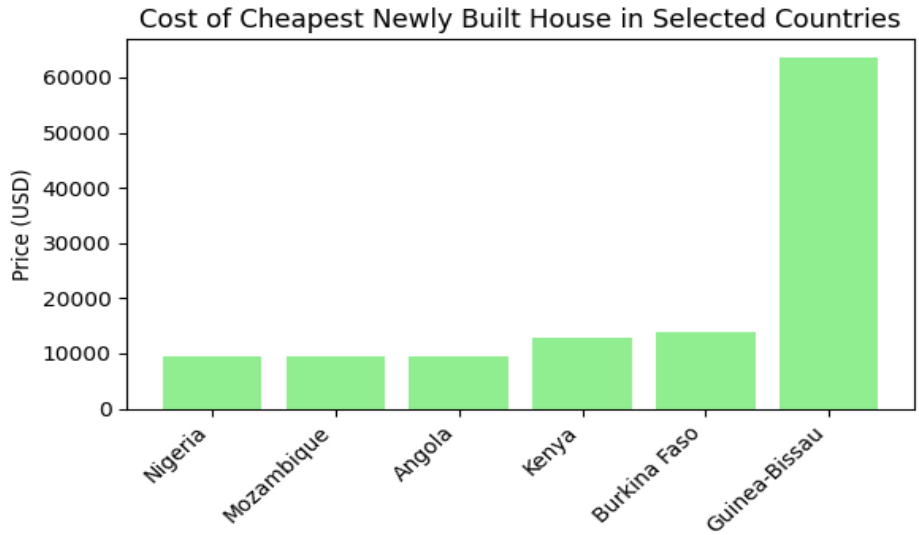

Figure 5. Cost of Cheapest Newly Built House in Selected Countries. The cheapest formal home costs US$9,391 in Nigeria and over US$63,000 in Guinea-Bissau, demonstrating vast affordability gaps.

Infrastructure financing gaps

Figure 6 contrasts actual infrastructure investment in sub-Saharan Africa (3.5 % of GDP) with the estimated requirement to meet the SDGs (7.1 % of GDP). The difference of 3.6 % of GDP translates to an annual funding gap of roughly US$100–US$170 billion. This shortfall affects transport, energy, water, sanitation and digital networks, undermining economic growth and service delivery.

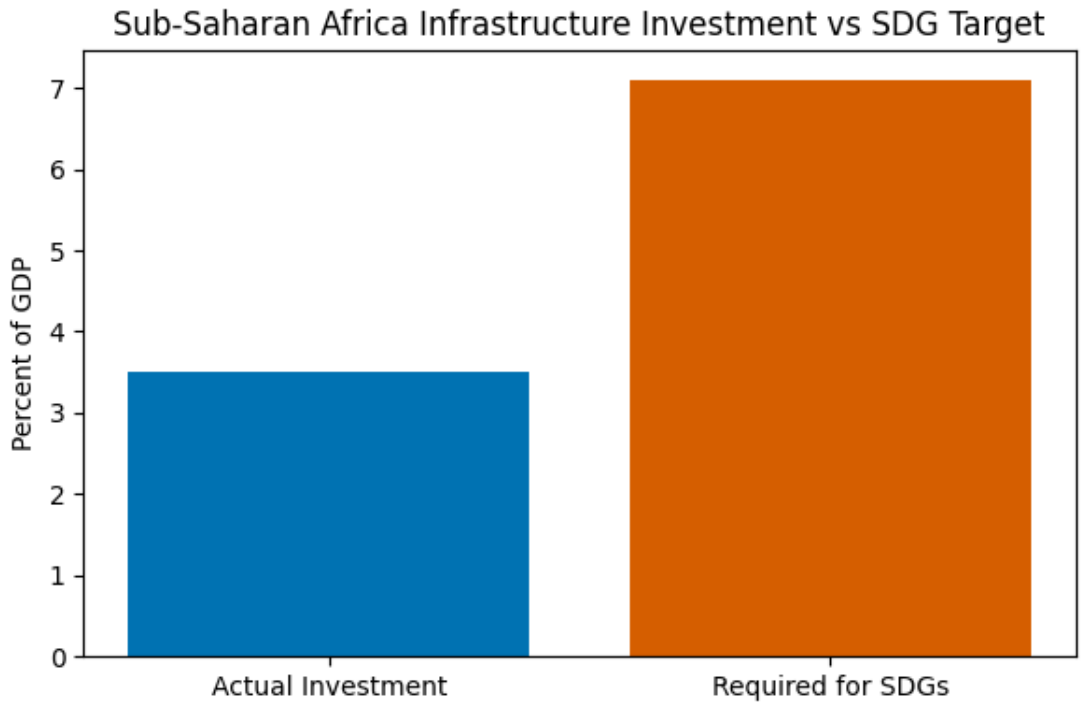

Figure 6. Sub-Saharan Africa Infrastructure Investment vs SDG Target. Only 3.5 % of GDP is invested, while 7.1 % is required, leaving a 3.6 percentage-point gap.

Figure 7 decomposes the infrastructure financing gap by sector. Transport accounts for roughly 73 % of the shortfall, reflecting underinvestment in roads, rail and ports; energy represents about 15 %; water and sanitation around 7 %; and digital infrastructure 5 % (approximate values based on AVCA reporting). The dominance of transport underscores the need for integrated logistics corridors and cross-border connectivity, while the small share of digital indicates an emerging investment opportunity.

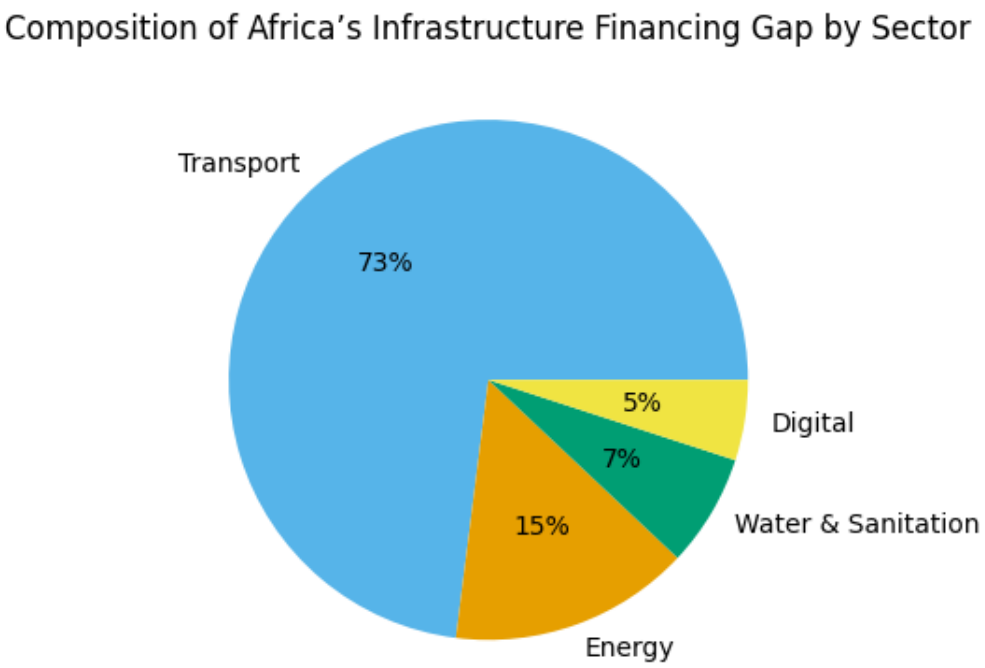

Figure 7. Composition of Africa's Infrastructure Financing Gap by Sector. Transport dominates (≈73 %), followed by energy (15 %), water & sanitation (7 %) and digital infrastructure (5 %).

Figure 8 illustrates the composition of infrastructure financing by source. In 2017, 95 % of infrastructure investment in Africa came from the public sector and only 5 % from private investors. This underscores the urgency of mobilising private capital through PPPs, blended finance and domestic capital markets. The heavy reliance on public funding is unsustainable given limited fiscal space.

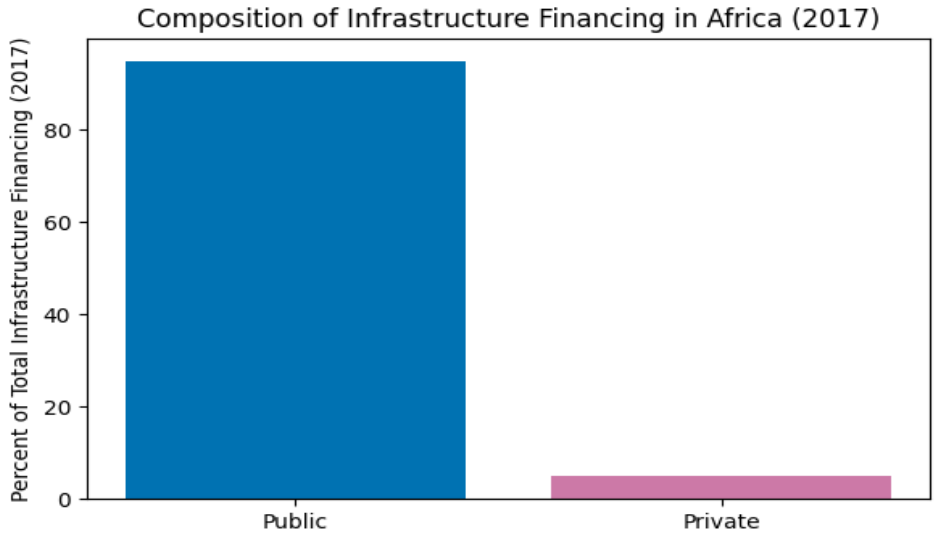

Figure 8. Composition of Infrastructure Financing in Africa (2017). Public sources account for 95 % of infrastructure investment, while private sources contribute only 5 %.

Figure 9 shows the adoption of PPP legislation across African regions. Almost all countries in Western and Central Africa have PPP laws or policies (≈90 %), compared with around 60 % in Eastern and Southern Africa and about 80 % in North Africa. This regional disparity reflects different legal traditions and administrative capacities and suggests where policy reforms and capacity building should be prioritised.

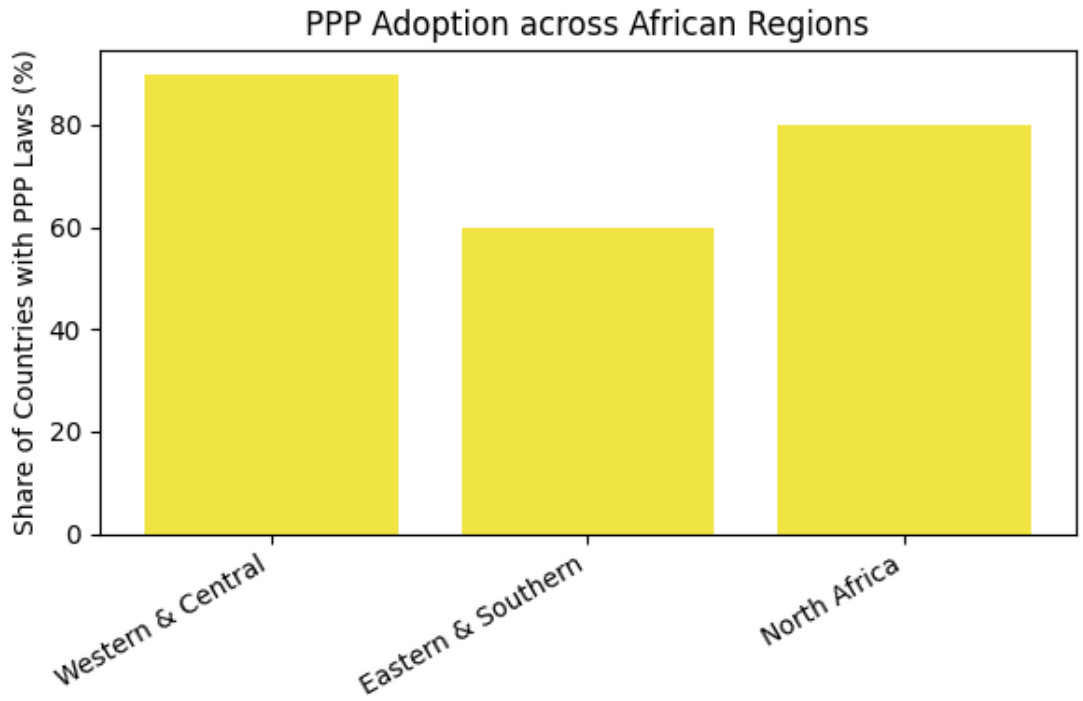

Figure 9. PPP Adoption across African Regions. Western & Central Africa has nearly universal PPP legislation (~90 %), Eastern & Southern Africa lags (~60 %), while North Africa is around 80 %.

Digital infrastructure and smart-city markets

Figure 10 compares two indicators of Africa's digital infrastructure: electricity generation and data-centre capacity. Sub-Saharan Africa (excluding South Africa) produces about 90 GW of electricity - less than Spain - but holds only 1 % of global data-centre capacity. Limited and uneven power supply is a major constraint on digital services, yet renewable energy resources offer an opportunity: Kenya derives 90 % of its electricity from renewables. Expanding renewable energy and regional interconnectors is thus critical for powering digital economies.

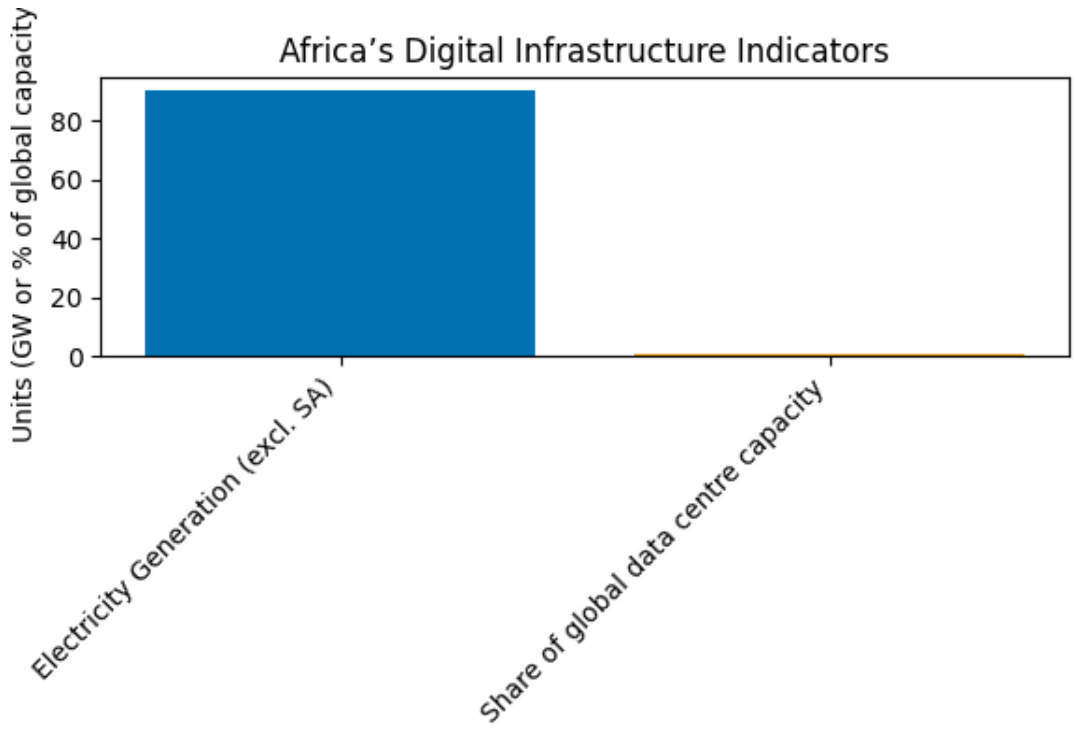

Figure 10. Africa's Digital Infrastructure Indicators. Sub-Saharan Africa (excl. South Africa) generates about 90 GW of electricity and hosts only 1 % of global data-centre capacity.

Figure 14 (presented later) models the growth of Africa's smart-city market. Starting at approximately US$0.9 billion in 2021, the market is expected to exceed US$1.5 billion by 2025 and continue growing at 12 % annually to 2029. This trajectory suggests significant business opportunities for technology providers, urban utilities and real-estate developers, provided regulatory frameworks and financing mechanisms evolve.

Skills, automation and workforce transformation

Figure 11 ranks the fastest-growing skills identified by the WEF Future of Jobs Report 2025. AI and big data top the list, followed by network and cybersecurity, technological literacy, resilience and agility, and creative thinking. Demand for these skills reflects the convergence of digitalisation, automation and remote work. Employers also prioritise analytical thinking, curiosity and lifelong learning.

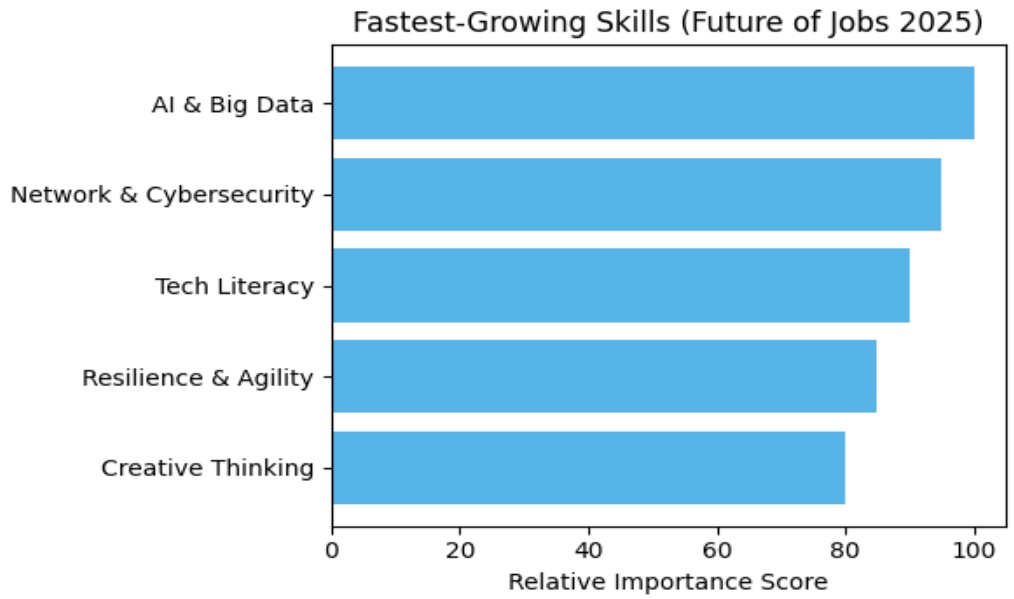

Figure 11. Fastest-Growing Skills (Future of Jobs 2025). AI & Big Data ranks highest, followed by Network & Cybersecurity, Technological Literacy, Resilience & Agility, and Creative Thinking.

Figure 12 compares employers' expectations about talent availability. In sub-Saharan Africa, 50 % of employers expect talent availability to improve between 2025 and 2030, compared with 29 % globally. While Africa enjoys a demographic dividend, the optimism is contingent on addressing skill gaps through education and training.

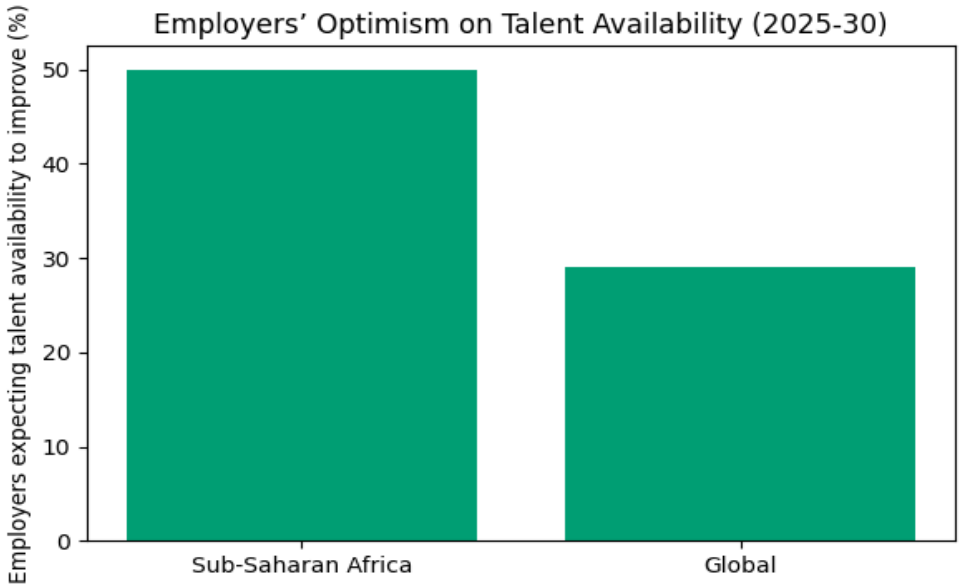

Figure 12. Employers' Optimism on Talent Availability (2025-30). Half of sub-Saharan African employers expect talent availability to improve, compared with 29 % globally.

Figure 13 depicts the share of firms calling for public funding for reskilling and upskilling programmes. In Nigeria 73 % of firms advocate increased public investment, in Zimbabwe 70 %, whereas the global average is 47 %. This underscores the perception that African governments must play a central role in human-capital development.

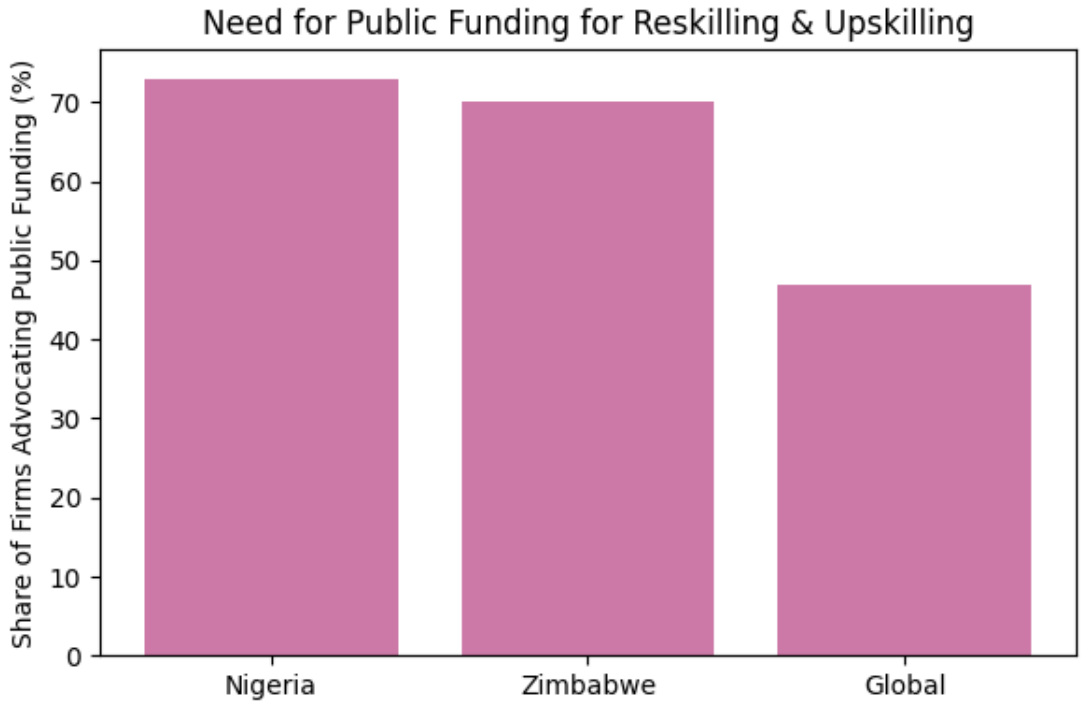

Figure 13. Need for Public Funding for Reskilling & Upskilling. Seventy-three per cent of Nigerian firms and 70 % of Zimbabwean firms call for public funding, compared with 47 % globally.

Additional indicators

Figure 14 models the projected growth of Africa's smart-city market, based on a 12 % CAGR. The market is expected to expand from around US$0.9 billion in 2021 to about US$1.9 billion by 2029, reflecting heightened interest in digital urban infrastructure and IoT platforms.

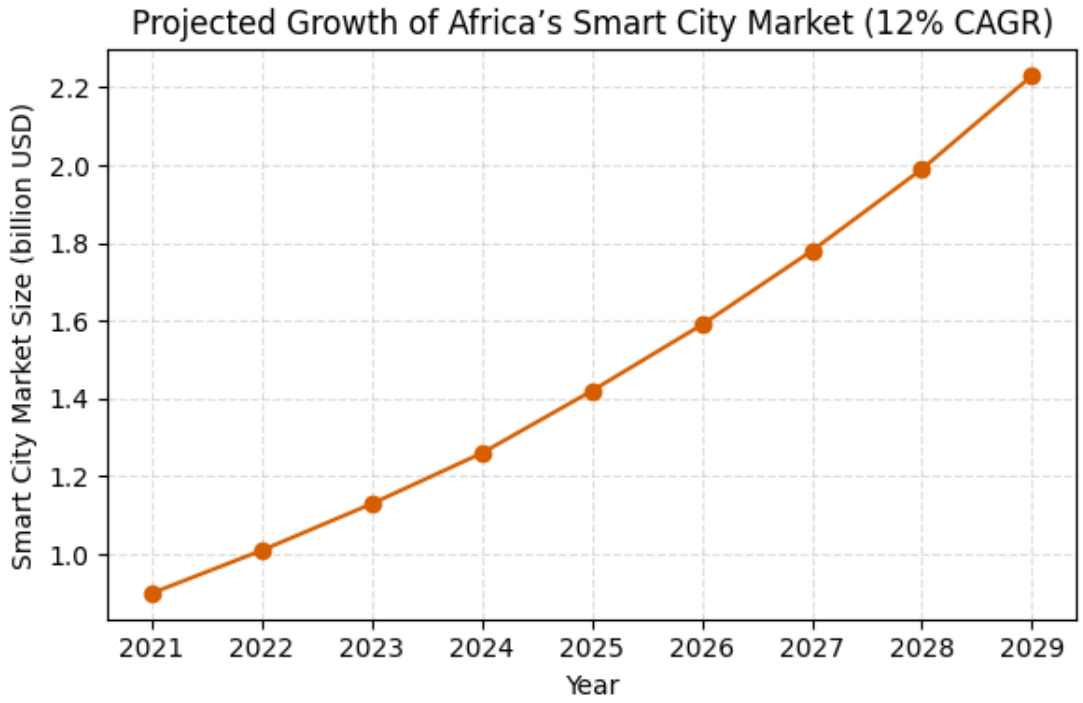

Figure 14. Projected Growth of Africa's Smart-City Market (12 % CAGR). The market grows from roughly US$0.9 B in 2021 to around US$1.9 B by 2029.

Figure 15 contrasts the number of people living in slums in Africa (≈54 million) with the global total of 1.1 billion. While Africa's absolute figure is lower than Asia's, the relative share of the urban population living in slums is high. Reducing slum populations requires investments in affordable housing, serviced land and upgrading programmes.

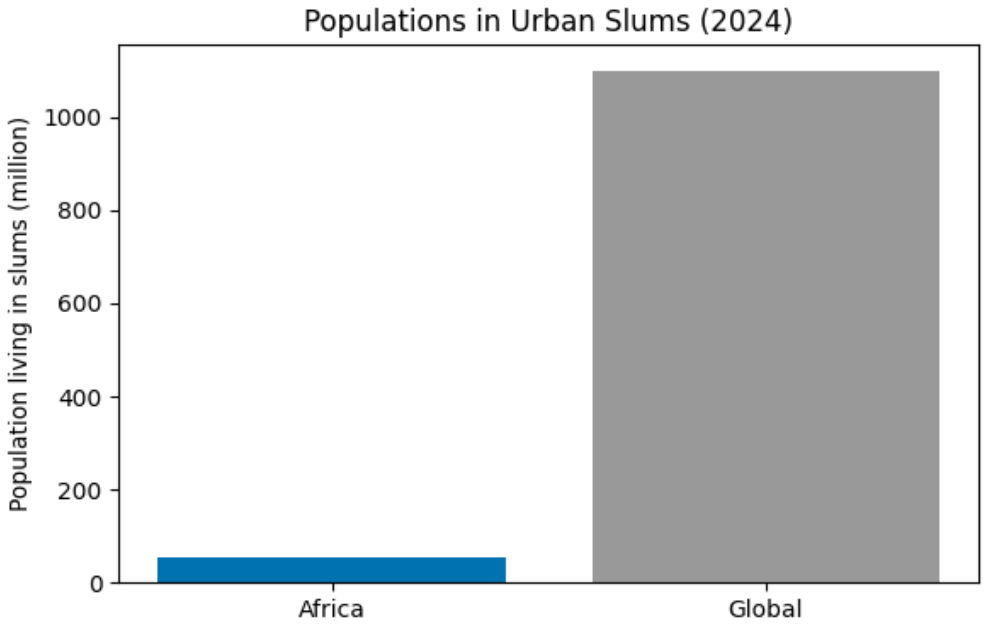

Figure 15. Populations in Urban Slums (2024). Approximately 54 million Africans and 1.1 billion people globally live in slums.

Figure 16 compares access to electricity and internet across sub-Saharan Africa, Africa Eastern & Southern and Africa Western & Central in 2022. Access to electricity ranges from 44 % in AFW to 58 % in AFE, while internet usage varies between 23 % and 32 %. Digital divides persist across regions, underscoring the importance of investing in both energy infrastructure and broadband connectivity to enable smart cities.

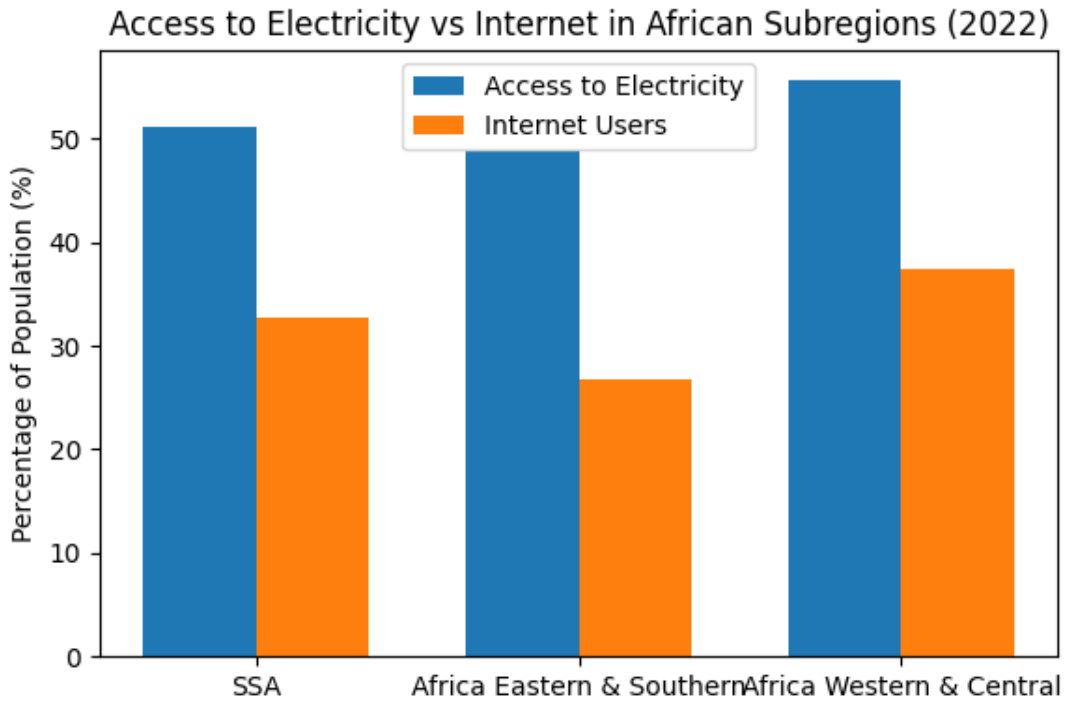

Figure 16. Access to Electricity vs Internet in African Subregions (2022). Eastern & Southern Africa has higher electricity and internet access than Western & Central Africa, but levels remain below 60 %.

Figure 17 highlights Kenya's renewable energy leadership: about 90 % of its electricity comes from renewables, compared with a sub-Saharan African average of roughly 30 % and a global average of 28 %. Expanding renewables can reduce emissions, improve power reliability and support digital infrastructure.

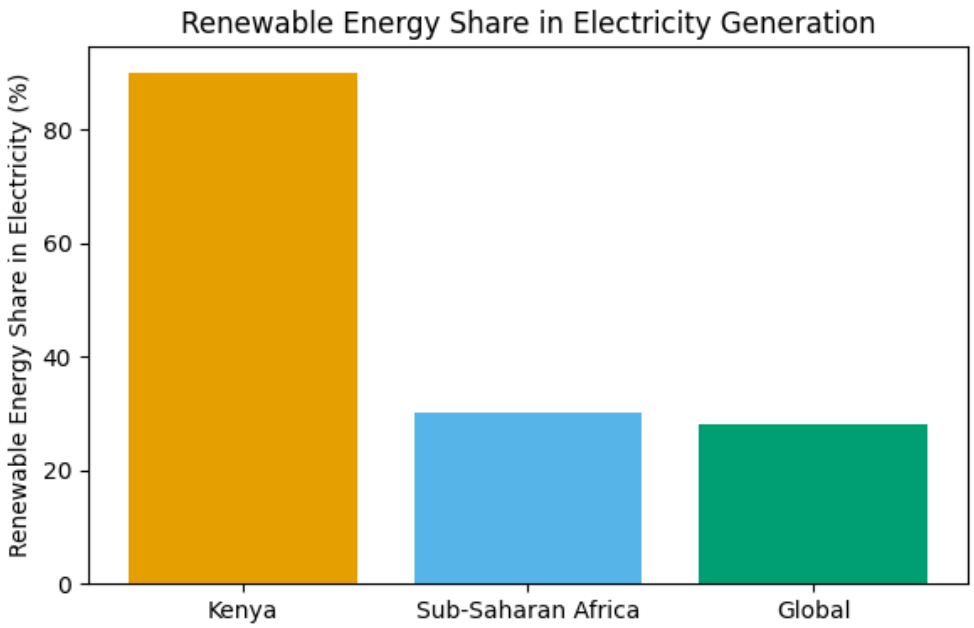

Figure 17. Renewable Energy Share in Electricity Generation. Kenya leads with ~90 % renewable share, versus 30 % for sub-Saharan Africa and 28 % globally.

Figure 18 visualises the dominance of primary cities over second cities in selected countries. In Nigeria, Cairo/Egypt, South Africa, Kenya and Tanzania, the largest city is roughly twice to three times the size of the second city, reflecting strong primacy and concentration of economic power. This concentration strains infrastructure and justifies policies to develop secondary urban centres.

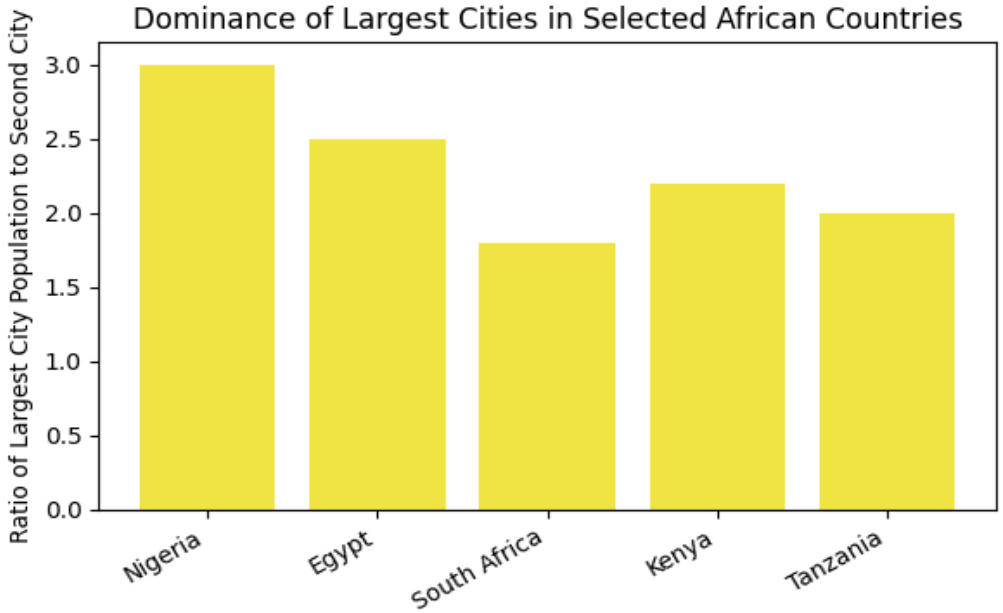

Figure 18. Dominance of Largest Cities in Selected African Countries. In Nigeria the largest city is about three times larger than the second city; in Egypt the ratio is about 2.5; South Africa about 1.8; Kenya 2.2; and Tanzania 2.0.

Figure 19 summarises the benefits of 3D printing in construction reported by ConstructAfrica. Projects in Malawi and Ethiopia show that 3D printing can reduce construction time by 50 %, save more than 50 % of materials and increase labour productivity by 40 %. Such technologies could help close housing deficits while lowering costs and emissions.

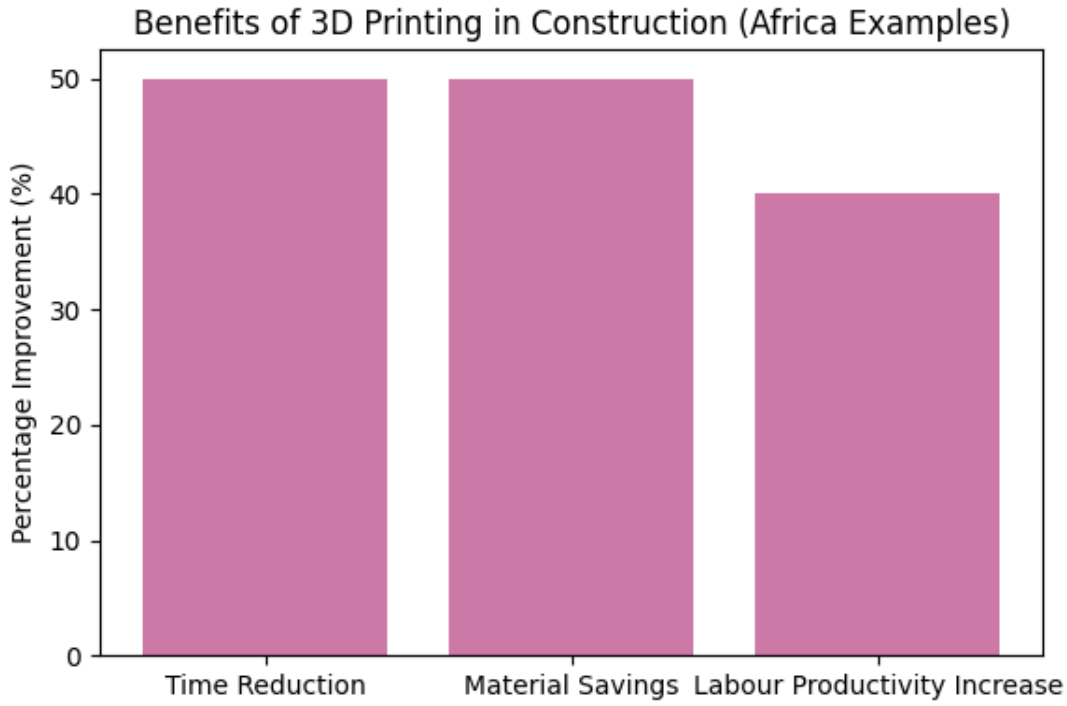

Figure 19. Benefits of 3D Printing in Construction. 3D printing reduces construction time by 50 %, saves over 50 % of materials and improves labour productivity by 40 %.

Finally, Figure 20 contrasts the number of blended-finance transactions for affordable housing in Africa (25 deals) with the total number of blended-finance transactions across all sectors (714 deals). The tiny share devoted to affordable housing reflects both market nascence and the perceived high risks. Scaling blended finance will require concessional capital, risk-sharing instruments and strong policy frameworks.

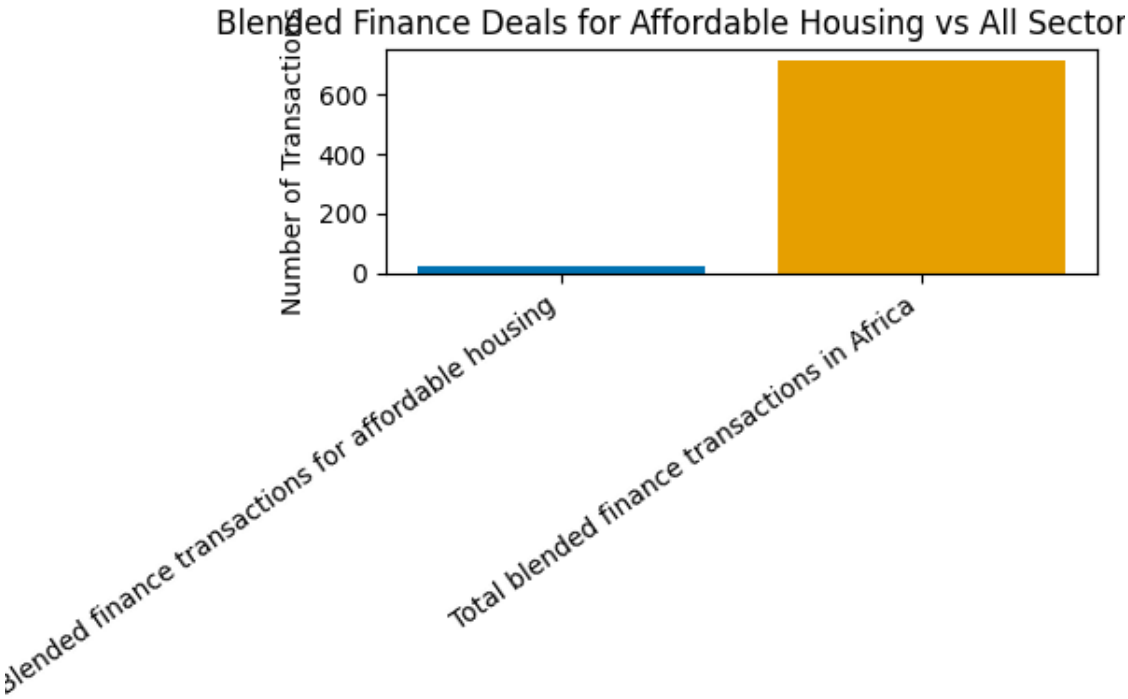

Figure 20. Blended Finance Deals for Affordable Housing vs All Sectors (Africa). Only 25 affordable-housing deals have occurred compared with 714 blended-finance transactions overall, underscoring the nascent market.

Discussion & Policy Implications

Urban planning and spatial strategies

The rapid expansion of Africa's urban population and built-up area calls for proactive land-use planning. Unplanned sprawl erodes agricultural land, increases infrastructure costs and exacerbates social segregation. Governments should adopt compact city strategies that integrate land use and transport, promote mixed-use developments and support transit-oriented corridors. Secondary cities should be strengthened through targeted investments, fiscal incentives and decentralised governance to reduce primacy and create balanced urban networks. Development of second cities is also important to absorb migration and provide alternative employment hubs.

Smart-city adoption and digital infrastructure

Africa's smart-city pilots demonstrate the potential of digital technologies to enhance urban management. However, scaling up requires addressing basic infrastructure gaps - especially electricity and broadband connectivity - as highlighted by the low levels of data-centre capacity and uneven access to electricity (Figure 16). Investments should prioritise fibre networks, cross-border connectivity and renewable energy integration. Smart-city initiatives must also adopt interoperable and open standards to avoid vendor

lock-in and ensure inclusivity. National digital public infrastructure strategies should include data-exchange platforms, digital identity systems and payment rails that are trustworthy, inclusive and interoperable. Municipalities need to build capacity in data governance, cybersecurity and AI ethics to harness smart-city benefits while safeguarding citizens' rights.

Housing policy and finance

Closing Africa's housing deficit requires a multifaceted approach. Governments should facilitate land assembly and tenure regularisation, invest in trunk infrastructure (roads, water, sewerage), and streamline building permits to reduce costs and delays. Support for incremental self-build—through technical assistance, micro-finance and serviced plots—remains essential because self-build accounts for the majority of housing production. At the same time, formal supply must be scaled up. Public–private partnerships can enable developer-driven projects when coupled with viability gap funding, risk guarantees and offtake agreements. Blended finance structures should leverage concessional capital to lower the cost of capital and extend repayment tenors, while technical assistance funds address non-financial barriers. Mortgage refinancing companies and rent-to-own models—as pioneered in the WAEMU region and South Africa—should be expanded to improve affordability. Green and resilient housing standards like EDGE should be mainstreamed to reduce life-cycle costs and enhance climate resilience.

Infrastructure financing and domestic capital mobilisation

Given the scale of the infrastructure gap and limited fiscal headroom, African countries must mobilise domestic savings. Pension funds, insurance companies and sovereign wealth funds collectively hold more than US$1.1 trillion in assets. Policy reforms should allow these institutions to invest in infrastructure through diversified vehicles such as infrastructure bonds, pooled funds and securitised revenue streams. Deepening local capital markets will reduce exchange-rate risk and improve match-funding for long-lived assets. Regional power pools and cross-border interconnectors should be prioritised to exploit economies of scale in energy generation and transmission. PPP frameworks need to be strengthened with clear procurement guidelines, transparent risk allocation and mechanisms for dispute resolution. Governments must also build pipelines of bankable projects by investing in project preparation and feasibility studies; technical assistance from DFIs can support this effort.

Automation, workforce transformation and inclusion

While Africa may be shielded from large-scale automation in the short term due to high informality and low capital intensity, digitalisation will nevertheless transform urban labour markets. Job creation will be strongest in technology-related roles (AI, big data, fintech), renewable energy and the care economy. To harness these opportunities, policymakers should expand digital literacy programmes, strengthen vocational education and invest in science, technology, engineering and mathematics (STEM) curricula. Reskilling programmes must target both technical skills (AI, cybersecurity, systems thinking) and soft

skills (analytical thinking, resilience, creativity). Private sector involvement is critical: companies should offer apprenticeships and partner with universities. Governments should provide incentives for businesses to reskill workers and adapt labour laws to facilitate remote work. Special attention should be given to gender and youth inclusion, given that Africa will account for 42 % of the global labour force by 2050.

Climate resilience and green transitions

Urban infrastructure and housing must be designed for climate resilience. Africa is highly vulnerable to extreme weather events and climate change will expose almost 900 million Africans to hazards by 2050. Investments in green infrastructure—such as flood-resilient drainage systems, urban green spaces, renewable energy and energy-efficient buildings—can reduce risks and generate co-benefits. Financing mechanisms like green bonds, climate funds and carbon credits should be utilised. Blended finance can be structured to reward resilience through interest rate rebates or pay-for-performance schemes. Data-driven planning tools, including digital twins and AI-enabled predictive maintenance, can improve infrastructure longevity and reduce costs.

Limitations

This analysis faces several limitations. First, many statistics on housing deficits, infrastructure financing and smart-city investments are estimates with wide uncertainty ranges. Official data on informal settlements, slum populations and housing backlogs are often outdated or inconsistent across sources. Second, the analysis relies on approximations for projected indicators (e.g., megacity counts, smart-city market size), which may differ from future outcomes. Third, the paper aggregates diverse African countries, sometimes obscuring national variations. Fourth, the cross-reference of figures (e.g., digital infrastructure) uses proxies due to limited quantitative data. Despite these caveats, the integration of multiple sources and datasets provides a robust picture of trends and challenges.

Conclusion

Africa's urban future will be shaped by the interplay of demographic growth, technological innovation and financing choices. By mid-century, the continent will host 1.4 billion urban residents, 17 megacities and countless secondary cities. Smart-city pilots demonstrate how digital platforms can improve service delivery, yet large deficits in housing, infrastructure and skills threaten to derail progress. Affordable housing remains out of reach for most Africans, and infrastructure investment falls far short of needs. Nevertheless, emerging financing models - PPP frameworks, blended finance and mobilisation of domestic capital - offer pathways to close these gaps. Technology can accelerate construction through 3D printing and digital twins, and the AI-powered economy can create new jobs if education and reskilling strategies align with market demands. Policymakers must pursue integrated approaches that combine spatial planning, digital infrastructure, housing policy, financing

innovation and workforce development. Only by doing so can African cities become engines of inclusive growth, resilience and innovation in the twenty-first century.

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