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Towards Sustainable, Resilient, and Progressive Towns and Cities in Kenya

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32 69

Towards Greener Bytes: Architectural Strategies for Sustainable Data Centre Design in Kenya

The social design approach in the co-creation of digital hubs in urban marginalized areas

10

Kisumu's Urban Transformation Through Strategic Planning

Golf Course
Lakefront Wetland Park
Lakefront Cultural District

Natural Habitat

Impala Park

Natural Habitat
Hippo Point

Natural Habitat

Dunga Hill Camp

Dunga Public Beach

Cities without Planners, Spaces without Architects

Arch. George A. Ndege
President, AAK.

Kenya's urbanization rate is among the fastest in the world, yet formal planning and architecture lag far behind population growth. A high birth rate and rapid rural-to-urban migration have produced towns and cities unable to cope. Local authorities lack coherent lasting approaches. In Nairobi, for instance, over half of residents live in less than a tenth of the city's residential land area shaped by non-professional planners or architects.

Instead of master plans, our cities grow through necessity, survival, and improvisation. County government urban planning departments, underfunded and understaffed, chase after sprawling neighbourhoods with little success. Misallocation of resources has bred dysfunctions that citizens endure daily including overcrowding, unsafe streets and housing, and poor air quality. Yet the towns keep swelling. How long can this be sustained?

Entire neighbourhoods emerge from subdivided farmland without planning input. Land merchants and speculative subdivision dictate urban form more than registered professionals. "Ploti maguta maguta" by brokers coupled with delayed approvals and weak enforcement encourage developers to focus on short-term ROIs, ignoring basic climate-responsive strategies

and long-term sustainability. Infrastructure is almost always an afterthought. Water, sewers, roads, markets, hospitals, schools, and public spaces are squeezed in retroactively, often with poor access. Even middle-class estates become unliveable once mushrooming extensions take over. Without comprehensive plans from the start, future outcome simulation is impossible.

Since planning is devolved, counties must prioritise integrated land-use and local development plans prepared by qualified professionals. These must transcend five-year political cycles and outlast the whims of any political figurehead.

Self-built housing dominates in urban and peri-urban settlements. Families construct incrementally using mabati, timber, earth, or quarry stone. In most cases, the fundi doubles as architect, favoured over professionals for being cheaper and more flexible. Communities adapt local resources creatively, driven by financial constraints.

From these realities emerges an architecture without architects of mixed-use typologies, vertical expansion, and resourceful modifications. As things stand, majority of our urban areas comprise of over two-thirds residential buildings, most of which are irregular. Some county governments have moved to regularize such buildings, which is commendable but must be done carefully. Only structures meeting minimum structural, health, and green standards should be approved. The Architectural Association of Kenya's Healthy Homes Guidelines and Checklist can help assess these "brown"

building stock. The costs of sidelining professionals are severe. Functional chaos manifests in congestion, undersized infrastructure, flood-prone zones, and vanishing public spaces. Safety risks include collapsing buildings, poor ventilation and daylighting, and frequent fire hazards. Environmental stresses from encroaching on wetlands, riverbanks, and natural forests deepens our climate crisis. Social fragmentation worsens as housing patterns reinforce inequality.

Yet informality also offers lessons. Our urban settlements show speed, affordability, and adaptability. These are qualities often strived for in formal planning. Community-led urbanism, integrating local knowledge, materials and labour, could outperform rigid, top-down expert approaches.

Architects and planners must build on this energy. Incremental housing models, if guided professionally, can deliver safe structures, efficient layouts, and resilient cities. Streamlined approvals, incentivised compliance, and digital tools like GIS, AI, and participatory mapping could democratize planning. AAK has consistently advocated for a robust one-stop system for urban design, development control, and management.

Kenya's urban future must merge vernacular creativity with professional standards. Our cities are already being planned, albeit informally. The question is whether planners and architects will remain spectators, or step in to disrupt, regularize, and build responsibly atop what ordinary Kenyans are already creating.

Rural Urbanism:

The role of county governments in shaping livable urban areas in Kenya's rural landscape — a case study of taita taveta county

Arch. Martin Tairo Maseghe
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Introduction

Urbanization is one of the defining global transformations of the twenty-first century. In Kenya, it is projected that by 2050, more than half of the population will reside in urban areas. Yet, unlike in many parts of the world where urbanization is driven by megacities, Kenya's urban future will be shaped significantly by small and intermediate towns, most of which are situated in predominantly rural counties. This phenomenon, often referred to as "rural urbanism," reflects the hybrid nature of settlements that combine urban functions with rural livelihoods.

Devolution, introduced under the 2010 Constitution, transferred significant responsibilities to Kenya's 47 county governments. These responsibilities include land use planning, local infrastructure development, housing, trade regulation, and certain aspects of energy and natural resource management. County governments, therefore, are central actors in shaping how rural towns evolve, whether they become livable, inclusive, and sustainable, or whether they replicate the challenges of unplanned growth, congestion, and environmental degradation.

This paper explores how counties can harness rural urbanism as a pathway to balanced regional development, focusing on Taita Taveta County as a case study. Located at the crossroads of the Coast and Rift Valley, and sharing a border with Tanzania, Taita Taveta illustrates both the opportunities and challenges of rural urban transformation.

Conceptualizing Rural Urbanism

The concept of rural urbanism describes settlements that do not fit neatly into the binary of "urban" or "rural." These are places where farming and herding remain dominant, yet urban services, markets, and administrative functions are increasingly concentrated. Rural urbanism emphasizes three key features:

1. **Hybrid economies** – households may engage simultaneously in agriculture, small-scale trade, transport services, or wage employment.

2. **Incremental urbanism** – growth tends to occur gradually, often without formal planning, as villages expand into trading centers and later into towns.

3. **Strong rural linkages** – rural towns function as nodes that connect hinterlands to larger regional or national economies.

In Kenya, towns such as Mwatate, Taveta, Voi, Kajiado, Keroka, and Maralal exemplify this pattern. They serve as administrative headquarters, commercial centers, and cultural hubs while retaining strong connections to surrounding rural livelihoods.

County governments are uniquely positioned to manage this transition in a way that sustains livability, promotes inclusivity, and protects the environment.

Policy and Legal Framework

Several national policies and laws guide urban development in Kenya:

- **Constitution of Kenya (2010):** Assigns counties the responsibility of county planning and development.
- **County Governments Act (2012):** Provides for integrated planning, requiring every county to prepare County Integrated Development Plans (CIDPs) and spatial plans.
- **Urban Areas and Cities Act (2011, revised 2019):** Establishes criteria for classifying urban areas and provides guidelines for governance structures such as boards and managers.
- **Physical and Land Use Planning Act (2019):** Requires counties to prepare physical and land-use plans, ensuring orderly development.
- **National Urban Development Policy (2016):** Emphasizes sustainable urbanization, including in small towns.
- **Public Finance Management Act (2012):** Provides financial frameworks that counties must adhere to when implementing development initiatives.

These frameworks provide counties with both opportunities and constraints. On one hand, counties

have legal authority to steer urban growth; on the other hand, limited capacity, overlapping mandates, and resource constraints often hinder effective implementation.

The Case of Taita Taveta County

Geographic and Socio-Economic Context

Taita Taveta County, located in Kenya's coastal region, covers 17,083 km², of which more than 60% is occupied by Tsavo National Parks. This unique geography shapes settlement patterns: towns are concentrated along transport corridors and fertile highlands, while large swathes are under conservation. The population of about 400,000 is dispersed, with urbanization occurring mainly in Voi, Taveta, Wundanyi, and Mwatate.

The economy is diverse: agriculture (particularly horticulture and dairy in the Taita Hills), mining (gemstones and industrial minerals), tourism, and cross-border trade with Tanzania all play critical roles. These activities generate rural–urban flows of goods, labor, and services, reinforcing the importance of small towns.

Emerging Urban Centers

- Voi serves as the commercial hub due to its location along the Mombasa–Nairobi highway and the Standard Gauge Railway.
- Taveta, located at the Tanzania border, functions as a gateway for regional trade.
- Wundanyi, former administrative capital, is smaller but important urban area which is the gateway to highland farming and tourism.
- Mwatate has recently grown due to mining and its strategic position as a transport junction. It is also the county headquarters.

Each of these towns illustrates the dynamics of rural urbanism: gradual growth, service concentration, and strong ties to surrounding rural areas.

County Interventions in Urban Development

Integrated Planning

Taita Taveta has prepared successive CIDPs and initiated work on a county spatial plan. These documents identify priority investments in infrastructure, housing, and services. For instance, the county has highlighted the need to upgrade Wundanyi's townscape, expand Voi's industrial potential, and develop Taveta as a regional trade hub.

Infrastructure and Transport

The county has invested in road maintenance and rural access improvements. Roads linking farming areas to towns enhance market access and reduce post-harvest losses. Urban roads in Voi, Mwatate and Taveta have been upgraded.

Housing and Settlement Planning

The county has partnered with the national government's Affordable Housing Program. Informal settlements remain a challenge, particularly in rapidly growing peri-urban areas.

Energy and Water

The county has launched programs to solarize boreholes, improving access to water in rural and peri-urban areas. Expansion of electricity networks and uptake of renewable energy also support small enterprises and households.

Waste Management

In line with national policy on sustainable waste management, the county has constructed a materials recovery facility to improve recycling, reduce pollution, and create green jobs. This initiative highlights how counties can integrate environmental sustainability into urban management.

Challenges in Shaping Livable Rural Towns

1. **Resource Constraints:** The county budget is limited, and competing priorities such as healthcare and education often crowd out urban investments.

2. **Capacity Gaps:** Skilled planners, architects, and engineers are few, making it difficult to prepare and enforce plans.

3. **Informality:** Much of the growth is informal, with unregulated land subdivisions and limited enforcement of building codes.

4. **Land Tenure Complexity:** In Taita Taveta, large tracts are held by private companies or under conservation, constraining land for urban expansion.

5. **Climate Vulnerability:** The county is prone to droughts and flash floods, threatening both rural livelihoods and urban infrastructure.

Opportunities and Strategic Directions

Despite challenges, counties can leverage several opportunities:

- **Devolution of Planning Authority:** Counties now have legal backing to design locally appropriate solutions.
- **Regional Integration:** Taveta's location at the Kenya–Tanzania border positions it as a key player in cross-border trade.
- **Tourism and Heritage:** The Taita Hills and Tsavo National Park provide opportunities for eco-urban development that integrates conservation with town growth.
- **Technology and Innovation:** Digital platforms can enhance planning, revenue collection, and citizen engagement.
- **Public–Private Partnerships:** Collaboration with investors can unlock housing, infrastructure, and energy projects.

Comparative Insights

Looking beyond Taita Taveta, lessons can be drawn from other counties. Nakuru, recently elevated to city status, demonstrates how intermediate towns can become engines of regional growth through

deliberate planning. Lodwar shows how resource discoveries (oil) can trigger rapid urbanization, underscoring the need for proactive governance. Thika and Machakos illustrate how counties can harness their proximity to Nairobi while strengthening local economies. These comparisons highlight that counties must anticipate growth and guide it strategically rather than react belatedly.

The Role of Community and Civil Society

County governments cannot achieve sustainable rural urbanism alone. Community participation, mandated by the Constitution, is critical. In Taita Taveta, ward-level public forums inform priority setting in CIDPs. Civil society organizations also play a role, particularly in areas such as environmental conservation, youth empowerment, and gender inclusion. Building strong partnerships enhances legitimacy, ensures responsiveness, and mobilizes additional resources.

Recommendations

1. **Strengthen Planning Capacity:** Invest in training and hiring of professional planners, urban designers, and engineers.

2. **Prioritize Affordable Housing:** Partner with the private sector to deliver inclusive housing solutions while preventing unregulated sprawl.

3. **Enhance Infrastructure Resilience:** Incorporate climate-smart designs in roads, drainage, and water systems.

4. **Promote Local Economic Development:** Support value addition in agriculture and mining while leveraging border trade.

5. **Institutionalize Urban Boards:** Establish boards for towns as required by the Urban Areas and Cities Act to improve governance.

6. **Foster Green Urbanism:** Expand renewable energy, sustainable waste management, and eco-friendly townscapes.

Conclusion

Rural urbanism is a defining feature of Kenya's development trajectory. County governments, empowered by devolution, are uniquely positioned to shape this process.

Taita Taveta County illustrates both the complexities and opportunities of guiding rural towns towards livability and sustainability. By strengthening planning, investing in infrastructure, promoting inclusivity, and embracing environmental stewardship, counties can transform rural urbanism into a driver of national development.

The challenge is not whether rural urbanization will occur, but whether it will be managed proactively to create towns that are equitable, resilient, and prosperous.

Arch. Tairo is the County Executive Committee Member (CECM) for Public Works, Infrastructure, Housing, and Energy in Taita Taveta County. An architect by profession, he has over 15 years of experience in architectural design, project management, and sustainable urban development. He is passionate about using spatial planning and infrastructure to drive inclusive growth in rural areas. Before joining government, he led a successful architectural practice with projects across Kenya and Tanzania. He currently spearheads key county initiatives in affordable housing, renewable energy, and urban upgrading, and is an advocate for context-sensitive, people-centered urban transformation in devolved units.

Architecture of Dignity

A Comparative Study of Buxton Point and Park Road Affordable Housing Programme

Arch. Yasir Brek

Architect, Urban Designer
and Researcher

1. Introduction

Housing is a fundamental human right and plays a crucial role in upholding the dignity of individuals and communities. Globally, adequate housing is recognized as essential not only to human survival but to human flourishing, with the right to housing enshrined in various international conventions, including the Universal Declaration of Human Rights (Article 25) and the International Covenant on Economic, Social, and Cultural Rights (Article 11).

The built environment is not merely a container for social life; it is a determinant of how dignity is expressed, experienced, and sustained. In this context, housing is not just about shelter but about providing an environment that promotes dignity, safety, health, well-being, and socio-economic mobility.

In Kenya, the government's Big Four Agenda initiated a nationwide AHP aimed at providing decent and affordable shelter. However, beyond metrics of unit count and cost, the question arises: Does the architecture of AHP projects embody dignity? This paper examines the concept of dignity in housing through a comparative case study of selected projects in Kenya. Using principles of urban planning, architectural design, and community engagement, the paper evaluates how dignity is spatially and materially constituted in these housing environments.

2. Kenya's Affordable Housing Programme: Context and Intentions

Launched in 2017 as part of the Big Four Agenda, Kenya's AHP seeks to construct 500,000 housing units targeting low and middle-income groups. The programme was initially to be driven as a Public Private Partnership (PPP) model and emphasizes modern construction technologies (MOTIs), digital registries, and efficient land use. With the introduction of the Housing Levy in 2024, the government aimed to generate funds to finance and speed up the construction of affordable housing units, while stimulating economic growth through job creation. Despite its technical and economic merits, critiques have emerged around evictions, lack of inclusivity, and uniform design templates. The architecture of dignity challenges such interventions to not only build faster and cheaper but to build with empathy, diversity, and cultural sensitivity.

3. Theoretical Framework: Architecture and Human Dignity

3.1 Introduction

The concept of dignity in architecture is complex and touches on philosophical ethics, cultural anthropology, urban sociology, and design theory. Dignity, as argued by Immanuel Kant, is an intrinsic and inviolable value of the human being. [1]Architecture, must therefore avoid treating people as machines but should instead foster their autonomy, privacy, comfort, and social worth. This ethical position places architecture not only in the realm of aesthetics, structure, and function but also morality.

Martha Nussbaum's capabilities approach offers a more practical framework, emphasizing the conditions that allow individuals to live meaningful lives. In the built environment, this means access to adequate space, clean water, safety, social inclusion, and recognition. Jeremy Till's developed the idea that "architecture depends" ; on people, politics, time, and context. It infers that dignity in architecture cannot be captured in form alone, but must be developed with the users through participatory processes, culturally relevant symbols, and flexible systems. Closer to home, African views of dignity focus on community, mutual respect, and belonging. Concepts such as utu or ubuntu express a relational understanding of dignity rooted in reciprocity and collective life. Such ideas are manifested in the organization of traditional homesteads, communal courtyards, or informal economies. As a result, architecture that ignores these aspects might be functionally adequate but culturally impoverished.

3.2 Spatial Justice and the Right to the City

Edward Soja conceptualizes spatial justice as the fair and equitable distribution of spatial resources and services, emphasizing that spatial organization is both a reflection and a driver of social relations. The built environment, therefore, is not neutral, it can perpetuate inequality or serve as a platform for empowerment.

Henri Lefebvre's work The Right to the City complements this by asserting that all urban residents should have, not only access to urban spaces, but also the ability to shape and transform them. This concept supports the idea that housing should go beyond shelter to affirm identity, agency, and collective belonging. In the context of affordable housing, the right to the city implies a right to live in a dignified, integrated, and culturally appropriate environment. These frameworks are essential in interrogating Kenya's AHP, particularly in light of critiques that mass-produced, standardized housing often excludes residents from participatory design processes and reinforces spatial segregation.

3.3 Human-Centered Design and Dignity in Architecture

Human-centered design (HCD) emphasizes empathy, co-creation, and responsiveness to users' needs. In architecture, this translates to built environments that are adaptable, inclusive, and deeply contextual. Scholars such as Till argue that architecture must be socially engaged and participatory to be ethical and effective.Dignity in this context involves creating spaces that respect the lived realities and aspirations of users. According to Nussbaum, human dignity is intimately tied to capability; the ability to live a life one values. Housing, as a basic platform for human development, must therefore support both physical comfort and psychological security.

In Africa, architects like Joe Osae-Addo and Francis Kéré have championed context-responsive, dignified architecture using local materials, participatory methods, and culturally grounded spatial configurations. Their work provides valuable benchmarks for evaluating AHP projects.

3.4 Global and African Discourse on Affordable Housing

Globally, affordable housing discourse has evolved from simply addressing shelter deficits to examining issues of inclusivity, resilience, and liveability. The Sustainable Development Goals (SDG 11) call for "inclusive, safe, resilient and sustainable cities and human settlements," emphasizing quality as much as quantity.

In the African context, housing policies often struggle with balancing economic feasibility and cultural relevance. Kombe and Kreibich highlight that state-led housing in Sub-Saharan Africa frequently adopts imported models unsuited to local urban dynamics. As a result, such developments often fail to reflect the socio-economic diversity and spatial fluidity of African urbanism. Moreover, the African Union's Agenda 2063 underscores the need for "African solutions to African problems," including housing that promotes identity, dignity, and community cohesion. These calls align with critiques of Kenya's AHP, where modernist, standardized block typologies may clash with localized,

dynamic ways of inhabiting space.

3.5 Parameters in Determining the Architecture of Dignity

An Architecture of Dignity is therefore not a stylistic program but rather, a moral and ethical imperative in ensuring persons are accorded the necessary respect in the built world. It challenges architects and urbanists to design spaces that affirm human worth, enable community, and challenge injustice. From the foregoing, it can therefore be deduced, that the Architecture of Dignity is hinged on the parameters of:

1. **Spatial Justice:** How fairly is space distributed and accessed?
2. **Material and Aesthetic Quality:** Do materials and form affirm human worth?
3. **Cultural Resonance:** Does design speak to users' identities and ways of life?
4. **Procedural Inclusion:** Were people included in design and planning processes?

4. Methodology

This paper employs a qualitative, comparative case study approach, along with theoretical interpretation and document analysis. The objective is to critically examine how the principle of human dignity is embodied in the built form, planning logic and stakeholder process. The Buxton Point in Mombasa and Park Road AHP in Nairobi were selected due to their central role in the AHP discussion.

Both have prime visibility, located in the proximity of the CBD, while being flanked by major roads and having received significant media coverage.

Primary data was sourced from project briefs, policy reports, planning documents and architectural plans. This was preceded by secondary information from academic publications, news articles and human rights reports. These were supported by visual and spatial analysis using Google Earth imagery and site photographs.
Each project was then assessed using the matrix derived from the theoretical framework.

5. Case Study Analysis

5.1. Case Study 1: Buxton Point, Mombasa

5.1.1 Overview and Design Concept

Buxton Point comprises 1,850 residential units spread over 14 blocks with commercial and social amenities. Led by GulfCap Africa and

Buxton before redevelopment

the County Government of Mombasa, it follows a Developer-Financed model with zero government offtake.

5.1.2 Spatial Justice

The master plan incorporates mixed-use blocks, green areas, playgrounds, and retail corridors. Building heights range from five to twelve floors, forming a compact yet navigable urban fabric. Pathways are pedestrian-friendly, and open spaces are interspersed.

Master plan incorporates mixed-use blocks and green areas

5.1.3 Material and Aesthetic Quality

Units are finished with ceramic tiles, pre-fabricated doors, and aluminum windows. Façade ornamentation reflect a modernist logic subtly incorporating vernacular sensibilities and cultural articulation of space.

Façade ornamentation incorporating vernacular sensibilities and cultural articulation

5.1.4 Cultural Resonance

The project combines local culture and symbolism through Swahili-inspired courtyard layouts, coastal architectural themes, and community-focused amenities. It respects Mombasa's diverse identity through inclusive design features and green corridors.

5.1.5 Procedural Inclusion

Buxton was initially home to over 500 tenant households, most of whom were relocated with compensation. Civil society groups protested limited participation and perceived gentrification, arguing the new housing was unaffordable to former tenants. This raises questions about dignity in procedural justice.

Project combines local culture and symbolism

5.2 Case Study 2: Park Road AHP, Nairobi

5.2.1 Overview and Design Intent

Located in Pangani, Park Road is the pilot AHP project under the State Department for Housing and Urban Development. It features 1,370 units, community halls, retail spaces, and landscaped courtyards.

Park Road AHP Planning (Source: https://realestateblogpost.com)

The Project had limited participation

5.2.2 Spatial Justice

Unlike Buxton, Park Road adopts a gated megablock structure. Courtyards act as semi-public social spaces, while a boundary wall secludes the development from the neighbourhood. Its regimented layout reflects top-down planning with limited visual porosity and minimal hierarchy in spatial transition.

5.2.3 Material and Aesthetic Quality

The development has a clear repetitive architectural language with simple and minimal elevation design. The play of bright colors and greys contrasts sharply from the neighbouring buildings.

5.2.4 Cultural Resonance

The buildings display repetitive façades and modular fenestration. Though structurally efficient, the architectural language leans toward uniformity, potentially undermining individuality and place identity. The lack of vernacular design elements raises concerns about cultural alienation.

5.2.5 Procedural Inclusion

Units were allocated via the Boma Yangu digital platform. However, critics argue that digital literacy and financial thresholds exclude the truly indigent. Additionally, a few provisions were made for persons with disabilities.

Fig. 5.9 Boundary wall secludes the development from the neighbourhood (Source: Google Maps)

Boundary wall secludes the development from the neighbourhood (Source: Google Maps)

5.3. Comparative Analysis: Elements of Dignity

SR	PARAMETER	STANDARDS		CASE STUDY			
		Kenya National Building Code 2024	Kenya AHP Building Design Guidelines 2018	Buxton Point, Mombasa		Park Road AHP, Nairobi	
A	**SPATIAL JUSTICE**						
1	**ROOM SIZES**						
i.	Living Room	Minimum of 3.5m2 per person. [87 (3)]Minimal internal dimension of 2.1m. [87(2)]	10.6m2	8.4 m2	√	8.7m2	√
Ii.	Bedroom	Minimum of 3.5m2 per person. [87(3)] Minimal internal dimension of 2.1m. [87(2)]	9 m2	9.24m2	√	9.28m2	√
iii.	Kitchen	The internal area of every kitchen in a renement house shall be at least 3.75m2	4.6m2	6.3m2	√	6.4m2	√
iv.	Bath	The room area should fit for the purpose for which it is intended. [87(1)]	3.8m2	4.55m2	√	2.52m2	
2	**DENSITY**						
	Plot Ratio	FAR determined by governing authoriy according to zone	N/A	3.17		3.74	
	Ground Coverage %	Minimum GC 65% [2.1.4 (c)]	GC determined by physical planning handbook	31.5%		35.8%	
	No. of Units / Acre	70 units per hectare but in special cases i.e Kibera minimum land 133 units per hectare. [2.1.3]	N/A	100		200	
	Space Between Buildings	Distance between dwellings (front to front) min. of 2 times the height of taller bulding.[2.1.4(e)]	Façade-façade 10m				
	Façade - Building end 8m Building end - Building end 6m	6m		5.5m			
3	**WINDOW SIZES**						
		Ventilation: Min. 5% of room area. [138(3)] Lighting: Min 10% of room area. [136(4)]	N/A	L 17.14% B 15.15% K 22.17% BT 7.91%	√	L 25.86% B 24.25% K 8.43% BT 14.28%	√
				L = Lounge, B=Bedroom, K = Kitchen, BT=Bathroom			

SR	PARAMETER	STANDARDS	
		Buxton Point, Mombasa	Park Road AHP, Nairobi
B	**MATERIAL & AESTHETIC QUALITY**		
	Material	Reinforced concrete and masonry blocks with coral-stone on facades.	Reinforced concrete and masonry blocks.
	Language	Repetitive modular language with warm-coloured stone cladding.	Simple repetitive façade language with minimal elevation design.

		Buxton Point, Mombasa	Park Road AHP, Nairobi
	Human Comfort	Window openings, open-air stairwells, and exterior corridors allow natural light and passive ventilation	Every room has a window meeting minimum standard for natural lighting and ventilation.
	Ornamentation	Ornamentation is understated with coral stone earthy tones.	No ornamentation but instead has a standard modular design.
C	**CULTURAL RESONANCE**		
	Unit Configuration	Apartments range from studio to three-bedroom. Layouts do not reflect the fluid, intergenerational household structures typical in Swahili communities.	Units range from one-bedroom to three-bedroom apartments. Configuration is open plan different from the African household
	Spatial Organization	Shared courtyards offer open space for light, ventilation and social interaction.	Open spaces used for parking in lieu of green communal areas diminishing social intergration and children play areas.
	Social Amenities	Community spaces; courtyards, barazas playgrounds, play courts, swimming pools, and community centers, provides opportunities for gatherings.	Lacks cohesive and sufficient social infrastructure
	Style	Modern aesthetic with Swahili design elements adding a sense of place and identity	Modular architectural style lacks local identity.
SR	**PARAMETER**	**STANDARDS**	
		Buxton Point, Mombasa	**Park Road AHP, Nairobi**
D	**PROCEDURAL INCLUSION**		
	Pre-Development Engagement	Limited early engagement with residents	No early engagement with original residents.
	Participatory Design	Minimum participatory planning forums with residents.	Lack of participatory planning forums with residents.
	Allocation Transparency	Lack of transparency around tenant relocation, allocation criteria, and pricing models.	Lack of transparency around tenant relocation and allocation criteria.
	Post-Occupancy Feedback	Little evidence of formal post-occupancy evaluations or feedback mechanism.	No available evidence of formal post-occupancy evaluations or feedback mechanism.

5.4. Summary of Findings

Both projects illustrate the tension between the need for provision of housing and the need for social and cultural inclusion.

The design of "technically-fit" housing contradicted the architecture of dignity with the lived realities of exclusion, displacement, and aesthetic homogenization. Though Buxton Point's redevelopment is commended by the integration of cultural resonances, it raises issues of gentrification and loss of tenant rights. On the other hand, Park Road's approach sidestepped grassroots engagement and lacked indigenous spatial orders, which are central to dignity in many urban African contexts.

6. Conclusion

Architecture is a moral act when conceived as a vehicle of dignity. The Kenyan AHP offers a generational opportunity to redefine urban life for millions, but its realization must transcend technocratic targets.

The Buxton and Park Road projects exemplify different trajectories in pursuit of dignified housing; both commendable and contestable.

A truly dignified architecture must embrace participatory design, cultural embeddedness, spatial equity, and aesthetic plurality. Future AHP initiatives should therefore institutionalize community design charrettes, integrate vernacular typologies, and adopt inclusive financing models to ensure that dignity is not only designed but also democratically experienced.

Yasir Brek is an architect, urban designer and a researcher exploring the creative and human side of architecture. He is the founder of Morphosis Limited, an award-winning architectural practice with a vast experience in the region. He investigates how creative and thoughtful designs can nurture liveable spaces in urban environments.

Kisumu's Urban Transformation Through Strategic Planning

Figure 1: Kisumu City Lakefront

Mary Ngaruiya
Graduate Planner, Advocacy Officer

Kisumu City, nestled on the northeastern shores of Lake Victoria, is undergoing a massive transformation. Once a colonial port town, Kisumu is now poised to become a vibrant lake metropolis, an intermediary city with regional influence and global aspirations. The Local Physical and Land Use Development Plans (LPLUDPs), developed under the Kisumu Urban Project (KUP) and financed by the French Development Agency (AFD), offer a bold vision for sustainable, inclusive, and resilient urban growth. But how can Kisumu translate these plans from paper to reality?

A Lakefront City with Untapped Potential

Lake Victoria is Kisumu's most defining natural asset. Yet for decades, the city has turned its back on the lake, physically, economically, and socially. The LPLUDPs seek to reverse this trend by reorienting the city toward the waterfront, transforming it into a cultural, ecological, and economic hub. The proposed lakefront district includes promenades, amphitheaters, wetland parks, mixed-use developments, and transport piers, all designed to integrate public life with nature.

The lakefront is envisioned as a regional park, a cultural district, and a multi-modal transport corridor, making this vision strategic and not just about aesthetics. It will host green amphitheaters, fish markets, boardwalks, and indigenous woodlots, creating a layered experience of ecology, commerce, and community. But Kisumu must tread carefully. Lake

Victoria is a fragile ecosystem, and the city's development must be guided by ecological sensitivity and long-term resilience.

Strategic Planning Anchored in Data and Inclusivity

Kisumu's LPLUDPs are a testament to holistic, evidence-based urban planning. They are built on a foundation of rigorous spatial analysis, participatory visioning, and a deep understanding of the city's socio-economic, environmental, and physical dynamics. From mapping topography and flood-prone zones to assessing informal settlements, infrastructure gaps, and land tenure patterns, the plans offer a comprehensive diagnosis of the city's current state and future potential. This integrated approach has enabled the formulation of spatial strategies that are not only technically sound but also socially inclusive and environmentally responsive.

The following pillars illustrate how the LPLUDPs are designed to transform Kisumu into a vibrant, equitable, and resilient lake metropolis:

Polycentric Growth for Balanced Urban Expansion

Rather than concentrating development in the historic core, the plans promote the emergence of multiple urban nodes, such as Kibos, Otonglo, Nyamasaria, and Kisian, as centers of commerce, industry, and services. This spatial reorganization is intended to reduce congestion in the city center, distribute economic opportunities more equitably, and bring services closer to residents. It also stimulates local entrepreneurship, reduces travel times, and enhances land value in underutilized areas.

Green and Blue Networks for Climate Resilience and Livability

Kisumu's proximity to Lake Victoria and its network of rivers and wetlands present both opportunities and vulnerabilities. The LPLUDPs recognize these ecosystems as critical urban infrastructure and propose the development of interconnected green and blue corridors. These include wetland parks, riparian buffers, pedestrian promenades, and tree-lined streets that serve ecological, recreational, and mobility functions. Such networks are essential for managing stormwater, mitigating flood risks, and enhancing biodiversity.

Incremental Housing and Informal Settlement Upgrading

With over 60% of Kisumu's urban population residing in informal settlements, the LPLUDPs prioritize inclusive housing strategies that go beyond eviction or relocation. The plans advocate for land readjustment, infrastructure investment, and tenure regularization as tools for upgrading informal areas like Nyalenda, Manyatta, and Obunga. This approach improves access to basic services, enhances land security, and supports local construction industries and job creation.

Heritage Preservation and Cultural Regeneration

Kisumu's historic core, anchored around Oginga Odinga Street, holds significant architectural, cultural, and civic value. The LPLUDPs propose a revitalization strategy that preserves the city's colonial-era buildings, promotes adaptive reuse, and enhances the public realm through pedestrianization and placemaking. This strategy positions Kisumu as a cultural destination and complements the lakefront redevelopment, creating a seamless cultural corridor from the city center to the waterfront.

Lessons from Other Lakefront Cities

Kisumu's ambition is not without precedent. Around the world, cities have successfully revitalized their waterfronts, turning neglected or industrialized shorelines into thriving public spaces that balance ecology, economy, and equity.

Chicago: A Legacy of Public Trust and Green Infrastructure

Chicago Lakefront Trail. Source: Chicago Park District

Chicago's lakefront spans over 3,400 acres of parkland along Lake Michigan, protected by the Lakefront Protection Ordinance of 1973. Parks like Grant Park, Lincoln Park, and Jackson Park serve as ecological buffers, host migratory birds, and offer stormwater retention zones. Chicago's commitment to multi-modal access ensures the lakefront remains inclusive and accessible.

Cape Town: Sustainability at the V&A Waterfront

Cape Town V&A Waterfront. Source: The OceanRace

Cape Town's V&A Waterfront balances tourism, commerce, and environmental stewardship. Through its "Our Better Nature" campaign, it has implemented water conservation, waste management, and energy efficiency strategies. It diverts 37% of waste from landfills, uses seawater cooling systems, and promotes eco-tourism through marine wildlife protection and public art.

Toronto: Flood-Proofing and Inclusive Urbanism

Toronto's Waterfront Toronto initiative includes the Port Lands Flood Protection Project, which created a new mouth for the Don River and unlocked 240 hectares of land for housing, jobs, and public amenities. The project integrates naturalized shorelines, mixed-use zoning, and Indigenous-led stewardship, reflecting a holistic vision of urban resilience.

Why Kisumu Must Pay Attention to Its Special Ecosystem

Kisumu's lakefront forms part of the Lake Victoria ecosystem, a region of high ecological sensitivity. The area faces growing threats from pollution, encroachment, and climate variability. Similar urban water bodies, such as the Nairobi River have been turned into toxic conduits by decades of uncontrolled development, informal settlements, industrial effluent, and poor waste management. To avoid a similar fate, Kisumu must treat its lakefront as a special planning zone. This requires clear development controls, ecological buffers, and active community stewardship. The city's proposals to integrate wetlands, green belts, and cultural spaces offer a strong foundation, but their success depends on timely implementation, institutional coordination, and long-term commitment to protecting the lakefront's ecological integrity.

Recommendations: From Vision to Implementation

To realize the transformative potential of the LPLUDPs, Kisumu must prioritize the development of Area Development Plans (ADPs) and Local Physical Development Plans (LPDPs) for each proposed urban node. These detailed plans will guide infrastructure investment, land use regulation, and service delivery at the neighbourhood level, ensuring that the broader vision is translated into tangible outcomes. This approach will help Kisumu avoid the pitfalls experienced by Nairobi, whose masterplan has faced significant implementation hurdles due to fragmented governance, lack of localized planning, and weak enforcement. By investing in ADPs and LDPs, Kisumu can ensure that each growth node evolves with clarity, coordination, and community ownership.

Planning with Purpose and Protection

Kisumu's lakefront is a once-in-a-generation opportunity to build a city that is beautiful, resilient, and inclusive. By learning from global best practices and avoiding local planning failures, Kisumu can shape a waterfront that serves its people and protects its environment. The LPLUDPs offer a roadmap. Now, it's time to walk the path from plans to reality.

Don Mouth Naturalization and Port Lands Flood Protection Project. Source Toronto and Region Conservation Authority

First Pan-African Architecture Biennale

NAIROBI BIENNALE
SEPTEMBER 2026

The Engineer's Role in Building Resilient, Livable Cities

Matilda Nimatsutsu
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As Kenya undergoes rapid urbanisation, the pressing question is no longer whether our cities will grow, but rather how they will grow. The theme for the AAK 2025 Convention, "Shaping the Urban Future," invites built environment professionals to rethink and redesign our urban spaces to make them more inclusive, resilient, innovative, and livable. For engineers, this presents both a technical and ethical responsibility.

Engineers play a crucial role in achieving sustainable urban transformation by working across various disciplines, including structural, civil, electrical, mechanical, environmental, and geotechnical engineering. They are thus involved in a wide range of activities, such as designing transportation systems, marine infrastructure, and resilient structures like buildings, retaining walls, and bridges. They also implement sustainable energy and water systems and utilise advanced tools, such as drones, for surveying and monitoring. Their contributions extend beyond Kenya, making a significant impact on global development. Their extensive knowledge and technical expertise are applied to every project, creating a multidisciplinary approach that ensures buildings, infrastructure, and systems are designed and executed with a focus on precision and safety.

Safety, compliance, efficiency, and sustainability are core values upheld by engineers at every stage of a project. They are dedicated to constructing a future that is durable, resilient, innovative, and rooted in best engineering practices. Engineers not only envision the future; they actively create it, with a core mission centred on solving problems creatively, accurately, and responsibly. The AAK Engineers Chapter continues to play a crucial role in the local professional landscape through thought leadership, opportunities for peer learning, and professional engagement.

Creating a sustainable urban future involves more than just constructing physical infrastructure. It is about creating environments that meet the diverse needs of all urban residents. Our homes, working spaces, industries, streets, public spaces, and systems must reflect the fact that cities are inhabited by people of all ages, genders, and abilities. Historically, infrastructure in many towns in Sub-Saharan Africa has often excluded certain users, prioritising some while leaving others behind. For instance, road infrastructure has typically favoured private vehicle users, often neglecting safe, accessible, and dignified options for the majority who walk, cycle, or rely on public transport. This imbalance exacerbates social inequities and makes daily mobility a challenge for many.

Thus, as engineers, we have a responsibility to challenge the status quo and rethink our design priorities to put people first, for us to create a sustainable urban future. From the initial planning stages to the final implementation, we must consider how each decision impacts the everyday lives of those who will use the facilities and infrastructure we develop. Engineering should be inclusive by default, not just an afterthought.

The climate crisis has further significantly reshaped our professional responsibilities. As temperatures rise and extreme weather events become more common, engineering must adapt to the realities of a changing world. Every design decision we make now incorporates climate considerations, from the materials we choose to the systems we develop, and how we manage our landscapes. Our cities must not only withstand future challenges but also adapt and thrive in spite of them. This necessitates low-carbon solutions, nature-based approaches, circular design thinking, and climate-responsive infrastructure areas where engineers are uniquely positioned to take the lead. Moreover, technology is also impacting the transformation of the urban landscape by providing new tools to address existing challenges, such as data-driven design, smart infrastructure, automation, and

real-time monitoring. Urban innovation will thus no longer be limited to theoretical plans; it is increasingly being embedded in how we design, build, and maintain our cities. Therefore, engineers must stay agile and curious, embracing these advancements while ensuring that the technology enhances human well-being and does not exacerbate social inequalities.

As the AAK Engineers Chapter, we take pride in contributing to a collective vision of resilient, inclusive cities designed for living through professional development, learning and networking opportunities for our profesionals. Over the past year, the Chapter has organised a variety of Continuing Professional Development (CPD) activities aimed at deepening knowledge and expanding the exposure of built environment professionals to ongoing professional practices and infrastructure developments in the country. These activities include a technical site visit to the Isiolo-Kulamawe-Modogashe Lot II Road Project, which provided

valuable insights into highway engineering in semi-arid regions and the integration of resilience into road design and construction. Additionally, we hosted a Post-Tensioning Breakfast Seminar that brought together various professionals in the built environment to discuss innovative, effective, and efficient structural systems through post-tensioning, particularly for longer spans. The seminar also explored the use of the beam and block system as a potential solution for projects where reducing construction time is essential.

We also have an upcoming visit to Lamu Port, part of the LAPSET Project, which will enhance our understanding of marine infrastructure development, coastal infrastructure, and their roles in economic and spatial development. Events like these underscore our commitment to providing our members with ongoing professional development and networking opportunities, allowing them to gain insights into critical infrastructure projects being undertaken by their

peers across the country. Moreover, these experiences offer our students a chance to connect the theory they learn in school with practical applications in the field.

Ultimately, shaping a sustainable urban future requires collaboration among various professions. No single field has all the answers. Engineers need to work closely with architects, planners, quantity surveyors, policymakers, and the public to create urban spaces that reflect shared values and aspirations. Through these partnerships, ideas can become concrete plans, which can then evolve into vibrant living environments.

As a chapter, we will continue to collaborate with professional associations, government agencies, private developers, and international organisations to drive innovation, uphold engineering standards, and efficiently deliver critical infrastructure projects. The future is not something we wait for; it is something we will engineer together.

From Plans to Reality:

Delivering Effective Urban Systems through Data, Policy, and Finance

Meshack Ochieng
Graduate Quantity Surveyor

Introduction

Kenya is going through significant urban transformation. It is projected that 50% of the population shall be residing in urban areas by the year 2050 (World Bank, 2023). As a result, there is a need to develop well managed, sustainable and inclusive urban systems. In the recent past, there has been success on the establishment of spatial plans and policies, however, implementation has been inadequate. This has led to the strategies for urban development to remain as paper projects mainly due to the lack of integration of data, policy and finance which are potentially the three pillars of success in delivery of effective urban systems.

Data: The Foundation of Urban Decision-Making

Effective urban systems are based on dependable and updated information. Most Kenyan counties, however, continue to depend on obsolete base maps, paper-based land registers, or incomplete census information for urban planning (Kenya National Bureau of Statistics [KNBS], 2020). Only about 20% of Kenya's 911 urban centres have approved physical and land use plans (Gatabaki, 2023). Without accurate and real-time data, it is difficult to allocate infrastructure, manage informal settlements, or track demographic shifts that influence service demand.

The Kenya Urban Observatory project and the National Spatial Data Infrastructure (NSDI) are notable efforts to bridge this gap. However, uptake at the county level is inconsistent due to limited technical capacity and digital infrastructure (UN-Habitat, 2021).

Policy: Connecting Vision and Implementation

Kenya has taken significant policy initiatives on urban government administration under laws like the Physical and Land Use Planning Act (2019) and the Urban Areas and Cities Act (2011). The National Urban Development Policy (NUDP) for Kenya, launched in 2018, presents a harmonized national vision for sustainable urban development (Ministry of Transport, Infrastructure, Housing, Urban Development and Public Works [MoTIHUD&P], 2018).

Despite this, implementation challenges persist. Many counties have not operationalized the urban boards mandated by the law. Planning remains fragmented, with disjointed sectoral interventions and limited community engagement (Institute of Economic Affairs [IEA], 2022). Moreover, political intervention and pre-election interferences usually disturb the continuity of long-term plans. Projects could get suspended or shelved as the administrations reassess priorities (UN-Habitat, 2021).

Finance: The Driver of Implementation

Development of urban infrastructure is costly. Kenyan counties significantly depend on transfers from the national government, which are usually late or insufficient for big-ticket urban investments (The World Bank, 2021). The counties also do not possess the capacity to design bankable projects or venture into other financing arrangements. Kenya Urban Support Programme (KUSP) from 2017 to 2023 assisted 59 municipalities with access to more than KES 20 billion performance-based grants to finance urban infrastructure as well as the establishment of governance systems (KUSP, 2023). The success has inspired a second cycle, KUSP II, introduced in 2024, with the World Bank's funding. Despite these successes, long-term urban redevelopment will require diversified financing, including PPPs, green bonds, and instruments for capturing the value of land.

Recommendation

With strong leadership from built environment professionals, a series of coordinated actions spanning the domains of data, policy, and finance are needed to successfully translate Kenya's urban plans into concrete, operational systems. First and foremost, it is imperative that trustworthy and consistent data systems be institutionalised at the county level. To collect, handle, and evaluate data on population dynamics, land use, infrastructure, and climate risks, county governments should set up specialised urban data units within their departments. To improve evidence-based planning, digital tools like Building Information Modelling (BIM), remote sensing, and Geographic Information Systems (GIS) should be widely used. In addition to increasing accuracy, these technologies will enable more dynamic scenario analysis and monitoring. To enhance official

data and encourage the inclusion of marginalised urban populations, community-driven mapping should also be encouraged, especially in informal settlements. The complete implementation of current urban legislation must be the counties' top priority in terms of policy. As required by the Urban Areas and Cities Act (2011), this includes operationalising town and municipal boards to make sure they have a significant influence on service delivery and planning.

Incorporating participatory mechanisms into planning processes is equally important because it gives citizens and stakeholders a say in the priorities and form of their cities. Additionally, County Integrated Development Plans (CIDPs) and national frameworks like Vision 2030 and the National Urban Development Policy need to be more closely aligned. In order to prevent administrative or political disruptions to important long-term projects,

counties should also guarantee policy continuity across political cycles. From a financial standpoint, counties ought to create thorough urban investment prospectuses in order to overcome their reliance on federal transfers. These documents can be used as strategic tools to draw in both public and private investment because they are based on local spatial plans and infrastructure priorities. To guarantee that counties can create and carry out feasible, cost-effective projects, capacity-building in financial management, project appraisal, and procurement is essential. Priority urban interventions can be implemented more quickly and with more fiscal space if alternative funding sources like municipal bonds, land value capture, public-private partnerships (PPPs), and climate financing are investigated. Lastly, professionals working in the built environment need to take the lead in this change. Professionals can contribute to the creation of cities that function (not

just on paper) by incorporating digital technologies into planning and design, actively participating in public policymaking, and promoting sustainability and inclusivity.

Conclusion

As Kenya's cities expand rapidly so do the people's expectations for improved public services, housing, transportation, and infrastructure. Plans will remain on shelves, though, unless the implementation gap is closed. Kenya can transition from planning to reality by empowering the professional community and coordinating data, policy, and finance. Let this decade be marked not only by innovative urban concepts but also by the delivery of inclusive, functional, and visible urban systems.

Meshack Ochieng is a graduate Quantity Surveyor with a strong passion for technology, information, and data. He is keen on leveraging his skills to drive innovation and create impactful solutions in the built environment and beyond.

Evidence-Based Sustainable Design Systems

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INTRODUCTION

Energy in buildings is used for heating, ventilating and air-conditioning (HVAC) systems, lighting, appliances, water heating, and equipment. Architects and related allied building professionals must consider ways and means to improve efficiency, smart design and the integration of renewable sources to minimize costs and harmful emissions.

"The largest single sector of global energy use in 2023 was for buildings, accounting for over one-third of global energy consumption and emissions. According to the IEA (2023a), as of 2023, the operations of buildings account for 30% of global final energy consumption and 26% of global energy-related emissions, with 8% being direct emissions in buildings and 18% indirect emissions from the production of electricity and heat used in buildings.

Direct emissions from the buildings sector decreased in 2022 compared to the year before, despite extreme temperatures driving up heating-related emissions in certain regions and in 2022, buildings sector energy use increased by around 1%. In the United States, 40% of the carbon emissions are from buildings. The United Nations Environment Programme reported similar findings (UNEP 2022). In addition, energy used for residential and commercial building construction and operations accounted for 34% of the total global final energy use.

In turn, buildings produced 37% of the global greenhouse gas (GHG) emissions in 2021 (UNEP 2022)" (ASHRAE, 2025:34.1). The US Energy Agency (EIA) said that energy consumption by sector in 2023 (Figure 1) was transportation using 28.0 quadrillion BTU (30%), industrial using 22.5 quadrillion BTU (24%), residential buildings consuming 6.6 quadrillion BTU (7%), commercial buildings consuming 4.7 quadrillion BTU (5%) and electric power in buildings consumed, 29.0 quadrillion BTU (34%) (US EIA "How the United States uses energy" at https://www.eia.gov/energyexplained/use-of-energy/ last accessed August 21, 2025).

Energy-efficiency in buildings is an important cost-effective climate strategy for society. Design strategies must address the need to install high-performance insulation, windows, LED lighting, Energy Star appliances, and smart controls such as occupancy sensors, smart thermostats, and building management systems. There is a worldwide increase in the use of renewable energy sources such as solar, wind, geothermal, and clean grid power. Major areas of energy use in buildings, in order of the largest amounts, include (1) Heating & Cooling (HVAC) that is often influenced by climate, insulation, windows, and occupancy, (2) Lighting that have transitioned from incandescent lamps to LED integrated with controls (occupancy sensors, daylight harvesting, dimmers), (3) Appliances & equipment, and (4) Water Heating.
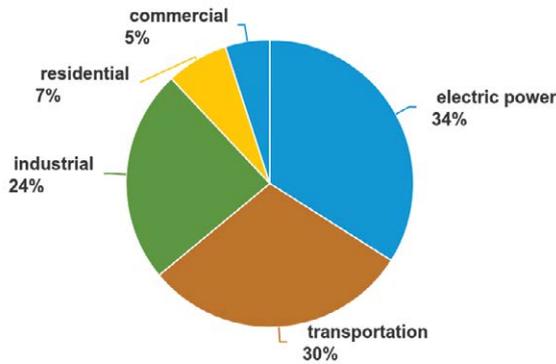
The need to employ passive solar design strategies include building orientation, shading, natural ventilation, and natural daylighting. Buildings must incorporate smart energy and water management systems, including solar panels and rainwater harvesting to gain approval. The Kenya Building Code should require the use of environmentally friendly materials and building integrated photovoltaic (BIPV) systems and rainwater harvesting.

Practising architects and students of architecture must acquire an understanding of the use of passive solar strategies and active systems in buildings by carefully addressing the five control barriers of a building, namely, (1) vapor barrier, (2) air barrier, (3) water penetration barrier, (4) thermal barrier (insulation), and (5) water-shedding barrier (façade and exterior building envelope). When people can adjust their surroundings for adaptation, they tend to be comfortable at wider ranges. There is mounting evidence (Humphreys, 1996; Karyono, 2000) that suggests that thermal perceptions are affected by factors that are not recognized by Comfort Standards in naturally ventilated spaces.

Comparing the measured data gathered by instruments and questionnaires with simulated data gathered by software and formulae showed that predicting thermal comfort sensation of occupants in the academic building may not always be accurate. Measured data provided a better complete perception of responses than those simulated.

Percentage share of total primary energy consumption by U.S. energy use sectors, 2023

Total = 93.59 quadrillion British thermal units

Data source: U.S. Energy Information Administration, *Monthly Energy Review*, Tables 2.1a and 2.1b, April 2024, preliminary data
Note: Sum of individual percentages may not equal 100 because of independent rounding.

Figure 1: US Energy Information Administration

EXPERIMENTAL METHOD

The CBU Architecture Building has two levels comprising of about 36,000 SF (3345m2) academic space. It has central VAV, HW Heat, Chiller 5.96 COP and boilers at 84.5% efficiency. The building has classrooms, offices and other support spaces.

The main occupants of the building are students. Measured and simulated data were gathered to assess thermal comfort. The City of Riverside California is located at latitude 33.95°N and longitude 117.44°W at an elevation of 804 feet (245 m) above sea level. On average it receives about 11 inches (280 mm) of rain annually. The US average rainfall is 38 inches (965 mm) per annum.

The City of Riverside gets 0 inches (0 mm) of snow per year with the US average being 28 inches (711 mm) of snow per year. On average Riverside gets about 277 sunny days per year where the US average is 205 sunny days. The climate of Riverside, California is generally hot and dry. The summer (July) high dry-bulb temperature is about 94°F (34.4°C) while the winter (January) low is 42°F (5.6°C). Average relative humidity ranges between 10% in winter (January) and 75% in summer (July). Annually, the city is about 11.8% of the time within the ASHRAE Comfort zone

The climates of Riverside, CA (USA), and Nairobi (Kenya) were discussed for similarities and differences in the Tables below. Nairobi is moderate and can be summarized by the temperature and degree-days shown in Tables 1, 2 and 3. Nairobi is a highland equatorial region while Riverside is a low-lying outside the tropics. The ratio of heating days to cooling degree-days for Riverside 1341 HDD65 and 1875 CDD65 (ratio 1:1.4) while Nairobi is 264 HDD65 and 711 CDD65 with a corresponding ratio of about 1:2.7. Nairobi barely requires any heating at all while cooling requirements are moderate. Figure 2 shows some of design strategies recommended for non-domestic buildings in Riverside that can attain 21.3% in sun-shading of windows, 18.9% high thermal mass with nighttime flushing (1660 hours of the total annual 8760 hours), 13.9% adaptive comfort ventilation (1216 hours), 17.4% passive solar direct gain high mass (1524 hours), and, 20.9% direct heating with additional humidification as needed for about 1827 hours annually. Buildings can achieve comfort for 11.8% (1037 hours annually) under California Energy Code.

The California Energy Code (Title 24) can be seen on the psychrometric chart with two parallel sides defined by the comfort low and comfort high dry bulb temperatures at 68°F (20°C) for heating to 75°F (23.9°C) for cooling. The Code does not define comfort limits for humidity.

In Climate Consultant the sloped top of the comfort zone is "defined by the highest relative humidity at the comfort low temperature, and follows the wet bulb temperature line. Using 80% relative humidity at the comfort low temperature of 68°F (20°C) corresponds to 66°F (18.9°C) wet bulb which is reasonable. The lowest comfortable humidity is shown as the flat bottom of this zone as defined by the minimum dew point temperature which is set at 27°F (-2.8°C)" (Climate Consultant version 6.0, 2025). A similar illustrative study was done for the climate observed at Dagoretti Corner in Nairobi Kenya.

OBSERVATIONS AND ANALYSIS

Measurements were observed for the building in Riverside CA and computer simulations done simultaneously using the Program EnergyPlus, Version 23.1.0-87ed9199d4, YMD=2025.08.14 17:15. Tabular Output Report was formatted in HTML with an environment run using climatic data for Nairobi Dagoretti Corner NB KEN (ISD-TMYx WMO#=637410) for values gathered over total annual 8760.00 hours. Figure 3 and 4 are illustrations of the simulations in the building.

The personal factors of occupants included activity (metabolic rates) and clothing (thermal insulation values). Research subjects were classified by gender, age, education, personal health condition. Alongside these factors, the psychological expectations (knowledge, experience, psychological effect of visual warmth by, say, direct sunlight) were observed. There is mounting evidence (Olgyay, 1963; Givoni, 1976, 1994; Fanger, 1970; Nishi, 1981; Humphreys, 1996; Karyono, 2000; Ogoli, 2000; Szokolay 2008) that suggests that thermal perceptions are affected by factors that are not recognized by

Table 1: Heating and Cooling degree days

	RIVERSIDE, CA	NAIROBI, KENYA	KISUMU, KENYA
LATITUDE	33.953°N	1.3013°S	0.086°S
LONGITUDE	117.435°W	36.7597°E	34.729°E
ELEVATION	846 feet (257.9m)	5900 feet (1798.3m)	3965 feet (1208.5m)
HEATING DEGREE DAYS (BASE 65)	1341	264	0
COOLING DEGREE DAYS (BASE 65)	1875	711	3504

Table 2: Riverside, CA WMO #722869 Latitude 33.953°N and longitude 117.435°W

	Jan		Feb		Mar		Apr		May		Jun		Jul		Aug		Sep		Oct		Nov		Dec	
High °C (°F)	20.0	68	20.0	68	21.7	71	24.4	76	26.7	80	30.6	87	34.4	94	35.0	95	32.8	91	28.3	83	23.3	74	19.4	67
Low °C (°F)	6.1	43	6.7	44	7.8	46	9.4	49	12.2	54	13.9	57	16.7	62	16.7	62	15.0	59	11.7	53	7.8	46	5.6	42

Table 3: Nairobi Kenya WMO #637410 is on latitude 1.3013°S and 36.7597°E

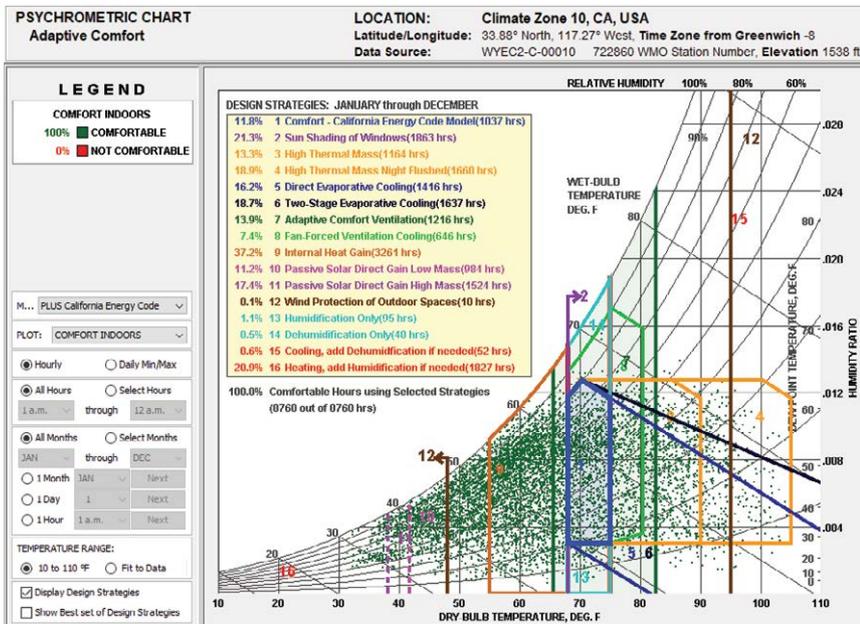|	Jan		Feb		Mar		Apr		May		Jun		Jul		Aug		Sep		Oct		Nov		Dec	
High °C (°F)	26.1	79	27.2	81	26.7	80	25.0	77	23.9	75	22.8	73	22.2	72	22.8	73	25.0	77	26.1	79	24.4	76	24.4	76
Low °C (°F)	15.0	59	15.0	59	16.1	61	16.1	61	15.0	59	13.3	56	12.2	54	12.8	55	13.3	56	15.0	59	15.6	60	15.0	59

Figure 2: Psychrometric Chart for Riverside, CA (generated by Climate Consultant version 6.0)

current ASHRAE comfort standards in naturally ventilated spaces. Hence, this study is one in a series aimed at trying to answer and explain some of the factors. Figures 5 -8 are simulated data. Observation of the measured and simulated data showed the energy used annually in the building to keep students within the Psychrometric Chart comfort zone as defined by dry bulb temperature and humidity. Most of the energy was largely used for cooling, lighting and equipment, as expected. The primary difference between the three comfort models, namely California Energy Code, ASHRAE Standard-55 PMV/PPD,

and Adaptive model was the length of comfort hours. The adaptive model was the longest. Duration of the test period was three hours of studio work when the students in the occupied spaces were assessed for thermal comfort conditions.

ASHRAE Handbook of Fundamentals (2025) noted that "the conscious mind appears to reach conclusions about thermal comfort and discomfort from direct temperature and moisture sensations from the skin, deep body temperatures, and the efforts necessary to regulate body temperatures). It has been

demonstrated that comfort occurs when body temperatures are "held within narrow ranges, skin moisture is low, and the physiological effort of regulation is minimized" (ASHRAE, 2025:9.1). Thermal comfort has also been observed to depend on "behaviors that are initiated consciously or unconsciously and guided by thermal and moisture sensations to reduce discomfort.

Some examples are altering clothing, altering activity, changing posture or location, changing the thermostat setting, opening a window, complaining, or leaving the space…. Surprisingly, although climates, living conditions, and cultures differ widely throughout the world, the temperature that people choose for comfort under similar conditions of clothing, activity, humidity and air movement has been found to be very similar." (ASHRAE, 2025:9.1). This research question arose from observations regarding the role of architecture in attainment of thermal comfort within the built environment.

"Buildings have their own internal environment, but they also are part of the large external environment" (Ogoli, 2000). Some studies on college-age students noted in ASHRAE 2025 Handbook of Fundaments that Rohles (1973) and Rohles and Nevins (1971) showed "correlations between comfort, temperature, humidity, gender, and length of exposure" (ASHRAE, 2025:9.12). The studies led to the development of ASHRAE thermal sensation scale of +3 (hot), +2 (warm), +1 (slightly warm), 0 (neutral), -1 (slightly cool), -2 (cool), and -3 (cold). Based on the ASHRAE Standard 55 PMV/PPD model, the occupants thermally dissatisfied with the indoor environment in the CBU Architecture building was 42%. Using PMV = -1.35, the PPD graph is shown below (Figure 8):

Adaptive thermal comfort models were typically done where people live and work in buildings. When people can adjust their surroundings for adaptation, they tend to be

Figure 3: Architecture Digital Model (a)

Figure 4: Architecture Digital Model (b)

comfortable at wider ranges. Adaptive activities were found to increase the perception of comfort to a range of air temperatures from about 63°F (20°C) to 88°F (31.1°C) (Humphreys and Nicol 1998). They showed that the adaptive model when applied to a wide range of buildings, climates, and cultures is given by the formula below and values in Table 4:

The climate of Nairobi is generally most agreeable with only two months (February and March) being outside the comfort zone. On the other hand, Riverside CA is outside the comfort zone every month except May and October. The study suggests that non-domestic buildings in Nairobi do not need HVAC systems for most of the year. Adaptive models can help to make architectural design and energy-efficiency decisions. Such decisions must integrate

thermal comfort, lighting and energy efficiency. According to a recent study (Sandeep, Haberl, Clayton, & Yan, 2014) "Building performance analyses are important aspects of designing sustainable buildings. One of the performance analyses done by architects is to predict how buildings are performing in terms of their luminous environment as a result of daylighting". Another study (Chen & Yang, 2015) observed that "Indoor thermal comfort and daylight access are two major concerns of building occupants, as they spend about 80% to 90% of the time on indoor activities". Added to this study is the fact that natural ventilation is an effective sustainable design strategy that can promote indoor air quality, thermal comfort, lighting comfort and energy efficiency as observed by many researchers. The paper suggests that there is a distinction
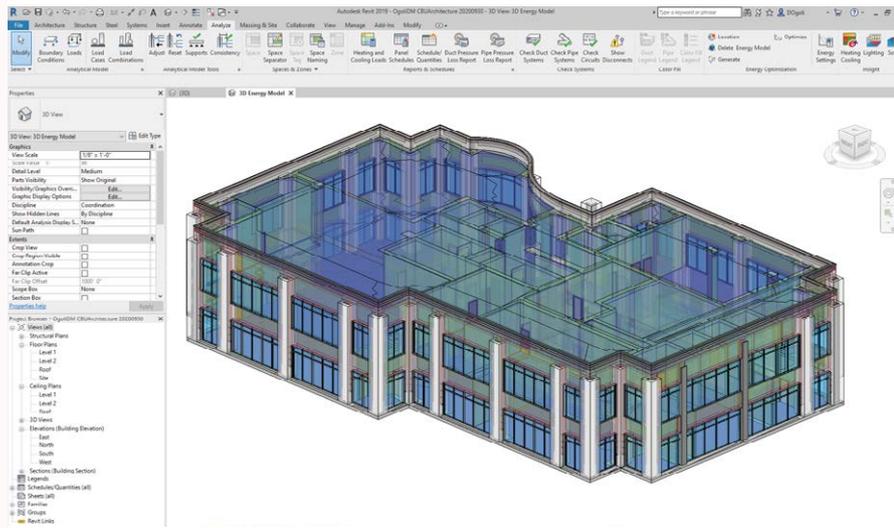
between thermal comfort responses in air-conditioned versus naturally ventilated buildings. It implies that an emerging need of adaptive factors for thermal comfort may influence results of one's thermal experiences and expectations. Observation of the measured and simulated data showed that students were within the Psychrometric Chart comfort zone as defined by dry bulb temperature and humidity. The primary difference between the three comfort models, namely California Energy Code, ASHRAE Standard-55 PMV/PPD, and Adaptive model was the length of comfort hours. The adaptive model was the longest. Different comfort models have a different effect on the number of hours that fall within the comfort zone.

FINDINGS – POLICY LESSONS FOR KENYA

The Kenya National Building Code 2024 provides the foundational policy regarding energy efficiency in buildings that will require mandatory smart systems in all new buildings. The California Title 24 is divided into different "Parts" including California Building Code (CBC) with related codes for Electrical, Mechanical, Plumbing, Fire, and Energy Code (Energy efficiency requirements for lighting, HVAC [heating, ventilating and air-conditioning], insulation, windows, etc.). Compliance ensures safe construction practices, mandates energy efficiency for energy use in buildings and limitation of greenhouse gas emissions.
A Kenyan version of Title 24 could and should ensure that Kenyan buildings use less energy through efficient envelopes, lighting, HVAC, water heating, and controls. The lessons are that buildings in Kenya can borrow from

California Title 24, namely:
1. Building Envelope (Walls, Roofs, Windows, Insulation) must meet insulation requirements by setting minimum R-values for walls, ceilings, and floors to reduce indoor heating/cooling losses. Windows (fenestration) must meet

210 OGOLI ▼ | Cooling | Heating

Conditions at Time of Peak

Time at Peak: 6/21 14:00:00

Outside
- DB: 25.1 C
- HR: 0.0109 kg/kg
- WB: 16.3 C

Zone
- DB: 23.9 C
- HR: 0.0087 kg/kg
- RH: 37.9 %

Engineering Checks

Capacity per Floor Area
185.46 W/m²

Floor Area per Capacity
0.0054 m²/W

Outdoor Air Percentage
2.86 %

Airflow per Floor Area
0.017986 m³/s-m²

Airflow per Capacity
0.000097 m³/s-W

Number of People
1.0

Peak Loads [W]

- 2062 Cooling
- 252 Heating

	Instant Sensible [W]	Delayed Sensible [W]	Latent [W]	Total [W]	Percent of Total [%]
Envelope					
Roof	-	74	-	74	3.6
Other – Roof	-	0	-	0	0.0
Ceiling	-	0	-	0	0.0
Glass – Conduction	120	-	-	120	5.8
Glass – Solar	-	1,150	-	1,150	55.7
Door	-	-3	-	-3	-0.1
Wall	-	32	-	32	1.6
Below-grade Wall	-	0	-	0	0.0
Partition	-	287	-	287	13.9
Other – Wall	-	0	-	0	0.0
Exterior Floor	-	-46	-	-46	-2.2
Interior Floor	-	0	-	0	0.0
Slab	-	0	-	0	0.0
Other – Floor	-	0	-	0	0.0
Infiltration	1	-	7	9	0.4
Subtotal	122	1,494	7	1,623	78.7
Internal Gains					
People	51	21	59	131	6.3
Lights	120	0	-	120	5.8
Return Air – Lights	0	-	-	0	0.0
Equipment	156	0	0	156	7.5
Subtotal	326	21	59	406	19.7
Systems					
Zone Ventilation	6	-	30	35	1.7
Transfer Air	0	-	0	0	0.0
DOAS Direct to Zone	0	-	0	0	0.0
Return Air – Other	0	-	-	0	0.0
Power Generation Equipment	0	0	-	0	0.0
Refrigeration	0	-	0	0	0.0
Water Use Equipment	0	-	0	0	0.0
HVAC Equipment Loss	0	0	-	0	0.0
Subtotal	6	0	30	35	1.7
Total					
Sizing Factor Adjustment	0	-	-	0	0.0
Time Delay Correction	-	-1	-	-1	-0.1
Grand Total	454	1,513	96	2,062	100.0

Figure 5: Energy Load Summary for a Typical Office in the CBU Architecture Building in Kenya
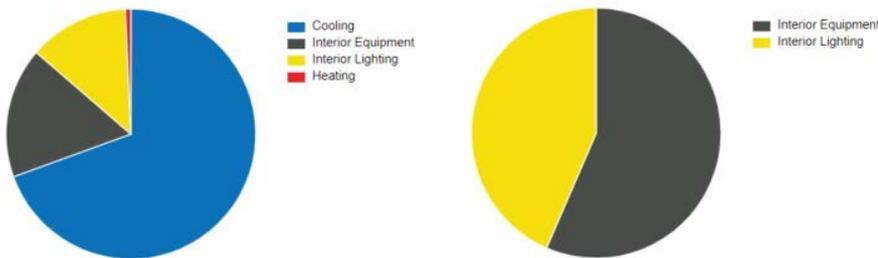

Figure 6: Simulation Data for Total Energy Use in the CBU Architecture Building in Kenya
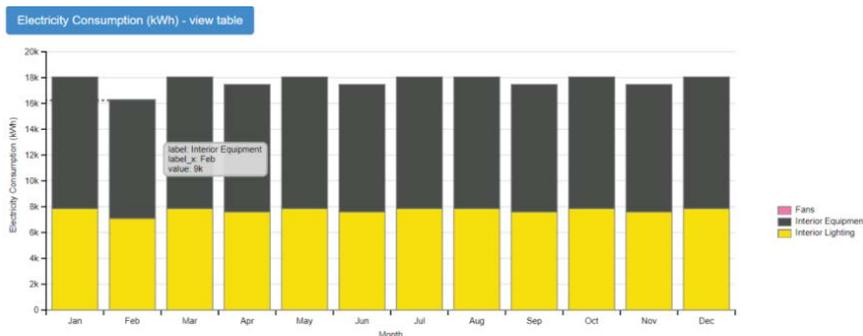

Figure 7: Electricity Consumption (kWh)

limits on heat transfer U-values and Solar Heat Gain Coefficient (SHGC) for windows to prevent unnecessary heat gains in warm periods or heat loss in cooler periods.

2. Lighting for all buildings must have permanently installed lighting of high efficacy (LED or equivalent), with advanced lighting controls such as occupancy sensors, daylight sensors, automatic shutoff.

3. (HVAC)Heating, Ventilation, Air Conditioning must have efficiency ratings with ducts that must be sealed to minimize air leakage, programmable or smart thermostats and adequate indoor air quality for natural ventilation.

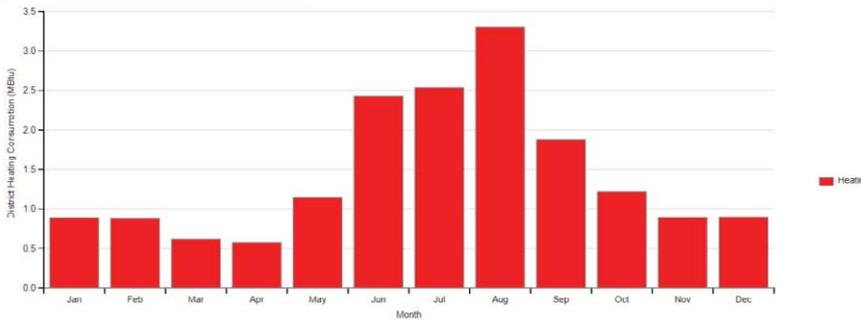4. Controls and Commissioning must include commissioning (testing

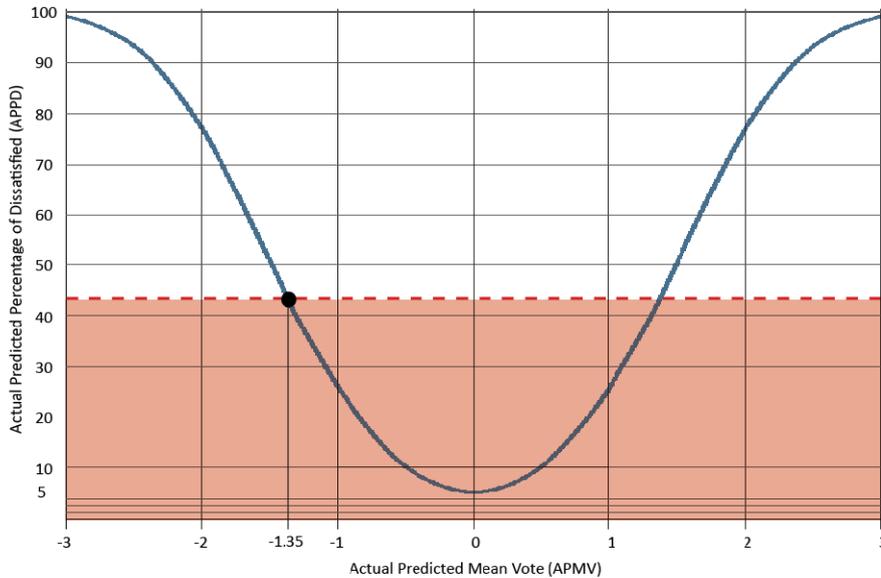Figure 8: District Heating Consumption (MBtu)

Figure 8: District Heating Consumption (MBtu)

$$t_c = 75.6 + 0.43(t_{out} - 71.6)exp - \left(\frac{t_{out}-71.6}{61.1}\right)$$

Where: t_c = comfort temperature (°F), and t_{out} = monthly mean outdoor temperature

Table 4: Adaptive Comfort Temperatures (°C)

Riverside CA	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Riverside CA	10.0	10.6	13.6	18.1	22.9	28.0	33.5	34.0	30.8	24.0	15.3	8.7
Nairobi, Kenya	25.0	26.0	26.5	25.0	22.9	20.3	18.7	19.8	22.4	25.0	24.0	23.5

that Kenyan buildings use less energy through efficient envelopes, lighting, HVAC, water heating, and controls. Building Envelope (Walls, Roofs, Windows, Insulation) must meet insulation requirements by setting minimum R-values for walls, ceilings, and floors to reduce indoor heating/cooling losses. Windows (fenestration) must meet limits on heat transfer U-values and Solar Heat Gain Coefficient (SHGC) for windows to prevent unnecessary heat gains in warm periods or heat loss in cooler periods. Simulation as described in this article is a Performance Method used to show the building's overall energy use is equal or better than a standard baseline.

A Prescriptive Method is a simple but less flexible method found in many building codes in highly industrialized countries. Performance methods allow design flexibility and are considered superior to prescriptive methods.
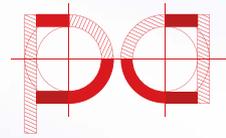
Prof. David Ogoli is committed to the study and practice of architectural design through innovative building control systems that enhances thermal, acoustic and visual comfort, and, energy-efficiency by integrating architectural acoustics, lighting, thermal systems, advanced technologies and passive solar strategies (sustainable design). Professor at California Baptist University, Judson University, University of Nevada, Las Vegas, Cornell University, University of Florida, and JKUAT.

and verificatio Bibliography n of energy systems). Simulation as described in this article is a Performance Method used to show the building's overall energy use is equal or better than a standard baseline. A Prescriptive Method is a simple but less flexible method found in many building codes. Performance methods allow design flexibility and are considered superior to prescriptive methods.

CONCLUSION

The paper suggests that there is a distinction between thermal comfort responses in air-conditioned versus naturally ventilated buildings. There is an emerging need for adaptive factors for thermal comfort may influence results of one's thermal experiences and expectations. Observation of the measured and simulated data showed that students were within the comfort zone.
A Kenyan version of the California Title 24 could and should ensure

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Proposed Headquarters building for United Winners Sacco, Nairobi

Proposed Residential Block for Zanzibar Housing corporation in Nyamanzi, Zanzibar.

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Building Kenya's Net-Zero Future:
From Baseline to Action in the Buildings & Construction Sector

Arch. Mumbua Musyimi
Program Manager, Global Buildings Performance Network (GBPN)

Kenya's buildings and construction sector is at a decisive moment. With the State Department for Public Works co-leading a national process to develop a Buildings Decarbonization Roadmap, the country is translating global ambition into local action. This, as it aligns with its updated Nationally Determined Contribution (NDC) to cut economy-wide emissions by 35 percent below Business as Usual(BAU) by 2035 and its commitment to the Buildings Breakthrough, which aims to make near-zero-emission, resilient buildings the "new normal" by 2030.

GBPN, working alongside the Architectural Association of Kenya (AAK) and a broad coalition of Kenyan stakeholders, has completed a Situational Analysis and a Baseline Assessment that quantifies where emissions arise across Kenya's building stock and construction sector value chain. This evidence base, co-created with government, industry, academia and civil society, now underpins the development of a roadmap that will move the sector from diagnostics to delivery.

Why buildings and why now?

Globally, buildings account for roughly 37 percent of energy-related CO_2 emissions when both operational and materials ("embodied") emissions are included. In rapidly urbanizing countries, the sector's footprint can rise quickly without targeted policy, finance, skills and supply-chain shifts. The 2023 Global Status Report for Buildings and Construction warns that while efficiency and clean power are expanding, floor area and energy demand are growing faster, raising the urgency for integrated action on codes, retrofits, clean energy, and low-carbon materials. Kenya mirrors these dynamics: strong clean-power progress, fast urban growth, and a need to accelerate standards, enforcement, and market transformation.

What Kenya has achieved so far

Over the past ten months, the Ministry and GBPN convened six multi-stakeholder Working Groups (Spatial & Urban Planning, Existing Buildings, Building Materials & Construction Supply Chain, Energy Efficiency, New Buildings, and Enabling Factors) to shape the baseline and test policy options. Kenya's participation in the Buildings Breakthrough elevates this work internationally and opens pathways to peer learning and finance. Meanwhile, national policy instruments such as the NDC implementation, energy efficiency strategies, and the evolving building regulatory framework provide a platform to embed the roadmap into law and practice.

GBPN's recent updates on our website www.gbpn.org highlight this momentum: the Kenyan process is "a shared commitment to action," with government leadership, coalition-building, and structured engagement as core design features.

From evidence to implementation: what the baseline tells us

GBPN recently released a baseline assessment of the buildings and construction sector which can be found here, https://gbpn.org/foundations-for-change/.

The baseline consolidates survey data, key-informant insights and secondary sources to produce a first national picture of energy use and emissions across building types (residential, commercial, public/institutional) and across the value chain (design and planning, construction, operations, and materials). While data gaps remain especially on end-use intensities and embodied carbon in locally produced materials, the baseline provides a measurable, reportable and verifiable (MRV) starting point for policy design, financing instruments, and targeted pilots.

Three themes stand out:

1. **Operations matter:** Electricity and thermal energy used in buildings drive a significant share of sectoral emissions. Scaling minimum energy performance standards, building management systems, and high-efficiency equipment can deliver near-term, cost-effective savings, especially in public and commercial buildings where benchmarking and disclosure are feasible.

2. **Materials matter:** Cement, steel, and other construction products carry high embodied carbon. The roadmap will encourage "whole-life-carbon" thinking through actions such as specifying low-carbon cements, recycled steel, optimized structural design, and verified environmental product declarations as the market matures.

3. **Planning and enforcement matter:** Urban form (density, orientation, transit access), passive design, and drainage/green infrastructure choices influence lifecycle energy and resilience. Stronger integration of planning approvals, code enforcement and utilities coordination can lock-in lower emissions and reduce long-term costs.

Call to Action- Kenya's pathway: what cooperation agreements can unlock

To move from analysis to action, GBPN and the Ministry are inviting partners to formalize cooperation agreements that set out roles, data-sharing, and delivery commitments. This model mirrors international best practice and Kenya's own multi-stakeholder ethos. Outlined are ways different stakeholders can cooperate for implementation:

Government agencies (such as NCA, NHC, Energy actors) can embed Roadmap actions in mandates within codes, permitting, audits, public-building retrofits, and disclosure. **Private sector practitioners and industry leaders** can run pilots (net-zero public buildings, green procurement, low-carbon materials) and help quantify business cases.

Academia and training bodies can create curricula, credential programs, and support MRV.

Cities and counties can champion planning-led decarbonization (such as passive design and nature-based stormwater solutions).

Finance actors can structure green bonds/credit lines to de-risk upgrades and reward verified performance. Formal collaboration would boost accountability and visibility for signatories, connect Kenyan actors to technical tools and peer networks, and reduce duplication which is key for a fast-moving agenda with finite resources.

KENYA'S DECARBONIZATION ROADMAP: A SHARED COMMITMENT TO ACTION

Tools and methods:

A credible Roadmap needs a credible MRV backbone. The Kenyan process has employed a tiered methodology, from top-down national energy/emissions factors to bottom-up audits and building-level analysis, which has enabled triangulation of the data and a defensible baseline.

GBPN and partners such as SEforALL have pioneered practical tools such as the Carbon Metric Tool and Open Buildings Insight respectively, which help standardize inputs (floor area, occupancy, end-use splits) and translate measured or reported consumption into comparable intensity and emissions indicators, aligned with international frameworks.

As more Kenyan data enters these tools, national benchmarks will become increasingly local, granular, and policy ready.

A shared commitment to action

Kenya's Roadmap process is intentionally co-owned by the State Department for Public Works, by professional associations like the AAK that convene the sector, and by practitioners who will ultimately implement it on sites and in cities nationwide. As AAK's Convention brings the industry together, it's the perfect moment to sign cooperation agreements, nominate pilot projects, and align upcoming capital programs

with Roadmap objectives. GBPN's role is to support and connect: we bring global evidence, practical tools, and peer learning from Africa and beyond; we help turn ambitions into standardized methods, measurable targets, and investable projects. But the Kenyan community both public and private, will define what success looks like: safer, healthier, more resilient, and near-zero-emission buildings that serve people and the economy. The groundwork is done. The baseline is in place. The next chapter is delivery- together.

Mumbua Musyimi leads the national Buildings Decarbonization Roadmap process in partnership with the State Department for Public Works, advancing evidence-based policy, partnerships, and action to drive Kenya's transition to resilient, low-carbon, and inclusive buildings.

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Integrating Climate-Conscious Design in Urban Spaces:

A Pathway to a Livable and Resilient Kisumu City

Arch. Christopher Ondwasi Omondi

Registered architect

1. Introduction

Urbanization worldwide is intensifying exposure to climate-related risks, particularly in cities where the expansion of impervious surfaces and rapid population growth outpace infrastructure development. As a result, urban areas are increasingly vulnerable to flooding, drainage failures, and urban heat island effects, driven by warming trends and inadequate planning. In Kenya, these challenges are both mirrored and often magnified by accelerated urban growth in cities such as Nairobi, Mombasa, and Kisumu, where infrastructure deficits and informal developments heighten vulnerabilit .

Kisumu City provides a critical case study due to its geographical, demographic, and climatic characteristics. Situated on a natural flood plain along the shores of Lake Victoria, Kisumu is exposed to multiple flood risks, including shoreline, riverine, flash, and inland flooding.

Its climate is marked by frequent heavy rainfall, rising lake levels, and high humidity, while densely built-up zones with minimal vegetation experience significant heat. Informal settlements and the Central Business District (CBD)—particularly in areas such as Kanyakwar and Bandari—regularly experience waterlogging and sanitation breakdowns during flood events. Furthermore, post-2023/2024 rainfall assessments have linked the increasing frequency and severity of these floods to both climate change and rapid urbanization trends across East Africa3.

Climate-conscious design offers a dual-purpose solution: passive strategies, such as shading, cool roofs, and permeable surfaces, reduce heat buildup and storm water runoff, while active measures—such as storm water storage systems and bio-swales—manage excess water effectively. This integrated approach aligns closely with this year's convention theme, as it promotes both urban livability and climate resilience.

This introduction sets the stage for examining how climate-conscious interventions in Kisumu's CBD can serve as replicable models for climate-resilient design in other Kenyan cities facing similar challenges.

2. Methodology

This study adopts a literature review approach to identify climate-conscious design strategies applicable to Kisumu's CBD. The methodology involved a systematic review of peer-reviewed articles, technical reports, and policy documents focusing on urban flooding, heat stress, drainage management, and climate-resilient design in sub-Saharan African cities. Meteorological and hydrological records reported in the Rapid Climate Risk Assessment for Kisumu City by the Global Center on Adaptation (2024) document an increase in the frequency and intensity of high-precipitation events over the past decade. GIS-based flood mapping and vulnerability profiles from the Kisumu County Climate Change Vulnerability Assessment Report (2020), identifying high-risk zones within the CBD.

Design guidelines and case studies from UN-Habitat's City Resilience Profiling Toolkit and NMT & Drainage Design Guidelines for African Cities (2023), detailing best practices for integrating green infrastructure, stormwater management, and non-motorised transport corridors. Peer-reviewed journal articles on the performance of bio-swales, underground stormwater storage, and urban tree planting in mitigating flood and heat impacts in comparable urban contexts1.

3. Findings

The Kisumu CBD was selected for intervention due to its status as a major economic and social hub, combined with its high vulnerability to flooding, pedestrian congestion, and urban heat stress. Rainfall records confirm that short-duration, high-intensity storms regularly overwhelm drainage systems.

GIS-based mapping (Google Earth Pro as well as QGIS, 2025) identifies Bus Park, Kanyakwar, and Oginga Odinga Street as particularly at risk due to high impervious surface coverage, undersized drainage infrastructure, and encroachment on stormwater pathways. The literature review and analysis of best-practice case studies identified four main strategies suited to Kisumu's context:

Stormwater Capture & Underground Storage

Underground modular tanks placed beneath public plazas or NMT corridors, storing storm water during peak events and releasing it gradually to reduce street flooding. Figure 1 shows rhe PL6 Stormwater Storage Tank in Cambridge, Massachusetts, designed to reduce chronic flooding and sewer backups in the Port neighborhood.

Figure 1: The PL6 Stormwater Storage Tank in Cambridge

Landscaped Bio-swales

Vegetated channels integrated into streetscapes to slow water flow, filter sediments, and promote infiltration, using indigenous species for durability and low maintenance. Figure 2 shows a bioswale, a planted channel that slows, filters, and retains stormwater, ideal for use along streets and parking areas.

Figure 2: A bioswale

Non-Motorised Transport (NMT) Routes

Separated pedestrian and cycling paths that also serve as stormwater conveyance channels, improving both safety and drainage performance. Figure 3 shows separated pedestrian and cycling paths

Figure 3: Separated pedestrian and cycling paths

Urban Tree Planting

Planting native, drought-tolerant trees such as Markhamia lutea and Croton megalocarpus along streets and open spaces to provide shade, lower temperatures, and improve air quality. Figure 4 Shows a descriptive image of urban tree planting.

Figure 3: Separated pedestrian and cycling paths

Anticipated benefits based on comparable projects include:
- 30–40% reduction in peak runoff.
- 2–3°C reduction in surface temperatures in shaded areas.
- Over 50% reduction in pedestrian–vehicle conflicts in redesigned corridors.

4. Discussion

Analysis of rainfall records for Kisumu CBD5 indicates a recurrent pattern of intense short-duration storms that frequently overwhelm existing drainage infrastructure, leading to flash flooding. Stakeholder consultations with county officials, urban planners, local business owners, and community representatives highlighted the urgent need for a balanced approach that addresses both immediate flood risks and long-term urban resilience.

From these engagements, two broad intervention categories emerged: active strategies and passive strategies. Active strategies, such as underground stormwater storage tanks and engineered drainage systems, were identified as essential for rapid water capture and controlled discharge during peak rainfall events. Passive strategies, including urban tree planting, landscaped green spaces, and bio-swales, were recognised for their role in reducing runoff volumes, enhancing infiltration, cooling urban microclimates, and improving air quality. Stakeholders agreed that the effectiveness of these measures depends heavily on multi-stakeholder collaboration. County governments provide planning and regulatory oversight, the private sector can integrate climate-responsive features into developments, and civil society can mobilise communities for maintenance and public awareness. However, concerns were raised about high initial costs, limited technical expertise in smaller municipalities, and occasional disputes over land use. Nevertheless, a number of participants noted that cost–benefit analyses often show the long-term savings from reduced flood damage, improved health outcomes, and increased

economic activity outweigh initial investments. Overall, the findings suggest that a hybrid approach, combining active and passive measures, offers the most robust and sustainable pathway for climate-conscious urban design in Kisumu CBD.

5. Conclusion & Recommendations

The Kisumu CBD case illustrates that integrating climate-conscious design into urban planning can significantly reduce the impacts of flooding, heat stress, and unsafe pedestrian environments. Evidence from rainfall data and stakeholder perspectives confirms that combining underground stormwater storage, landscaped bio-swales, dedicated non-motorised transport (NMT) corridors, and urban tree planting can address both the immediate hazards caused by intense storms and the long-term needs for climate resilience.

Recommendations

- Institutionalise Climate-Conscious Design Standards
- Integrate clear resilience requirements into county and national building codes, ensuring that new developments include both active and passive stormwater management measures.
- Implement Pilot Projects in High-Risk Zones
- Launch demonstration projects in flood-prone areas of Kisumu CBD to showcase impact, gather operational data, and build public and political support.
- Leverage Public–Private Partnerships (PPPs)
- Mobilise private sector funding for infrastructure-heavy interventions such as underground tanks, while offering incentives for developers who adopt green infrastructure.
- Strengthen Community Engagement
- Foster active participation in tree planting, bio-swale maintenance, and awareness campaigns to ensure sustainability beyond the initial project phase.
- Build Technical Capacity in Local Authorities
- Train municipal staff in the planning, design, and maintenance of integrated stormwater and green infrastructure systems.

Adopting such integrated, evidence-based approaches across Kenyan cities will not only mitigate flood and heat-related risks but also create more livable, economically vibrant, and environmentally sustainable.

Christopher Ondwasi Omondi specializes in sustainable urban planning and currently serves as a Compliance Officer at the National Construction Authority. He holds a Master's Degree in Nuclear Power Plant Engineering from KINGS, South Korea, and a Bachelor of Architecture from JKUAT. He has contributed to projects that integrate resilience into infrastructure and is passionate about designing climate-adaptive urban environments across Africa.

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Project Name:
Auditorium and Dining Hall Fit-Out Works on the 11th floor at CPA Center Building

Client:
The Institute of Certified Public Accountants of Kenya (ICPAK)

Location:
CPA center, Thika Road

Year:
Feb 2025 – August 2025

Short Description:
State-of-the-art auditorium (165 pax) equipped with advanced video conferencing technology, power-enabled seating on raised flooring, a premium dining facility (88 pax) with a fully fitted kitchen and high-grade catering equipment.

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Cool Cities in a Warming World?

Lessons from Nairobi's highrise buildings

Peter Onyango Osore
Graduate Architect

In the gentle highlands of central Kenya, lies a place of cool waters, a place of hope and a place of life-Nairobi they call it. But across this city, massive glass towers rise into the sky, shimmering under the equatorial sun. Inside them, people meet to work, dream and hustle. But the invisible battle in these buildings'corridors and offices is just one: the fight to stay comfortable in a warming world. Thermal comfort is basically the "cool spot" in a space-where the air feels just right; not too hot, not too cold. At a time when climate change is pushing global temperatures to record highs, even Nairobi's subtropical highland climate isn't immune. The city's rapid urban growth manifested in steel and glass architecture, and changing weather patterns are combining to create new comfort challenges and massive energy bills in buildings. That's where my research began: in the heart of Upper Hill, between two of Nairobi's most iconic buildings-Britam and KCB. Both are gleaming, modern, and proudly energy conscious. I wanted to know: how well do they really keep people comfortable? And what lessons can they offer for building a climate-resilient Nairobi?

THE TUG OF WAR AND SEARCH FOR COZINESS:

Buildings are more than walls and windows; they are living environments that shape us; how we feel, think, and interact. And in a city like Nairobi that is heading towards net-zero, comfort can't just be about air conditioning your way out of heat. That's expensive and not energy sensitive.A deeper view into the cases studies, both Britam and KCB buildings use strategic design solutions to stay cool: shading systems that block harsh sun before it heats the glass, low E-Value glass facade, double-skin façades that trap and release heat strategically, and natural ventilation strategies that let the buildings "breath." Data obtained from the field indicated that Britam averaged 24.0°C indoor temperatures while KCB averaged 24.6°C indoor temperatures with both comfortably within the acceptable indoor temperature ranges for most people. For indoor air velocity, KCB was at an average of 0.30 m/s, about 23% higher than Britam which was at 0.23 m/s. But the real take away was that these two buildings proved that design can enhance thermal comfort and keep people comfortable.

LESSONS FROM PREVIOUS STUDIES:

Thermal comfort isn't really a new concept. Even before the modern skyline of Nairobi, older buildings like the View Park Towers built in the 1980's already faced backlash from various scholars and architects on its thermal performance and contribution to sustainability. In contrast to this, The Kenyatta International Convention Centre (KICC) has previously stood out as one of the early buildings with a good taste of thermal comfort. Comparison from previous studies has been very clear-*Buildings that work with Nairobi's climate are cheaper to run, more comfortable to inhabit, and more climate resilient.*

pictures of the Britam building (a), The facade shading and the low E-Value glass (b), Outdoor seating (C)

pictures of the KCB Tower (a), The facade shading and the low E-Value glass (b), Indoor seating (C)

THE RESILIENT FUTURE:

This study has pointed out that climate resilience isn't just about a trick or a building component but it's about balance. We need buildings that can keep us cool and don't guzzle energy just to fight solar heat and equally make the most of Nairobi's unique climate. That means we need to rethink our glass-heavy facades, embrace hybrid systems that combine passive cooling with smart mechanical backup, and learn from both the old wisdom and the new tech. This is just where policy, not just design, comes in. Imagine a Nairobi where building codes reward designs that naturally regulate temperature.

A pictures of the KICC(a-b),View Park Towers (c) and Britam,KCB (d)

Where developers see lifecycle savings in passive design, not just upfront cost. Where every apartment block, office and school is built for both comfort and climate resilience. Imagine!

BEYOND ARCHITECTURE: DOES IT MATTER?

As technical as it might sound, thermal comfort is deeply human. It affects our daily livelihoods; how well children learn, how productive workers are, how safe the elderly feel in their homes etc. It touches our health, our energy bills, and our carbon footprint. When we get it right, we create cities that feel lively where you can step inside a building on a sweltering day and feel a soft, cool breeze without a single machine humming in the background.

The future, our future, is already under construction. Let's make sure it's a future where our buildings are partners in resilience, not liabilities through crisis!

Peter is an award-winning graduate architect from Kenyatta University and has previously earned the 2021 AAK climate-responsive design award and Crown Paints Award of Excellence. He has contributed entries to international and regional design initiatives, focusing on environmental design and humanitarian architecture, with aspirations for advanced climate-resilient urban research.

Towards Greener Bytes:

Architectural Strategies for Sustainable Data Centre Design in Kenya

Cynthia Chepchirchir

A final-year architecture student at the Technical University of Kenya, currently conducting her undergraduate research on the architectural integration of sustainability in data centre design within the Kenyan context. She is a recipient of multiple awards in AAK student design competitions and serves as a volunteer in IEEE.
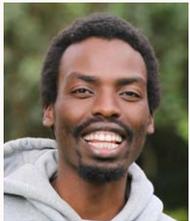
Brian Boit

A graduate architect and BIM Coordinator at Symbion Kenya Limited. He researches the intersection of digital technologies, sustainability, and architectural practice, with published research and conference contributions on HBIM and the digitalization of heritage conservation.

As Kenya forges its path through the digital era, the data centre has emerged as a defining typology of contemporary architecture; an infrastructural necessity supporting cloud computing, artificial intelligence, and digital economies. Yet, beneath the streamlined façades and

Image by rawpixel.com on Freepik

secure enclosures lies an architectural imperative: how do we house the backbone of the digital world without compromising the integrity of the physical structure?

Data centres, with their intense energy loads, conditioned environments, and 24/7 operational demand, represent one of the most environmentally consequential building types in operation today. For the architect, this presents not only a technical challenge but a disciplinary opportunity to reimagine data infrastructure as a site for spatial innovation, ecological sensitivity, and long-term resilience.

Kenya's Digital Ascent and the Burden of Embodied Infrastructure

Kenya currently hosts 11 operational data centres and eight others in various stages of development, largely concentrated in Nairobi, Kiambu, and Konza Technopolis. Collectively, these facilities account for over 18,000 square metres of 'white space' – the IT equipment zone – and are projected to surpass 92,000 square metres by 2028. While this growth reflects Kenya's strategic role in East Africa's digital economy, it also introduces a high-stakes environmental footprint.

Globally, data centres consume nearly 2% of total electricity, a figure expected to double by 2030. Within this context, the architect's role extends far beyond the aesthetic expression of the building shell. It becomes one of designing performance, adaptability, and environmental stewardship.

Rethinking the Typology: Architectural Parameters for Sustainable Data Centres

1. Climatic Responsiveness and Site Optimisation

Site-specificity remains foundational to sustainable design. In the context of Kenya's diverse microclimates, altitude and ambient temperature are critical to minimising mechanical cooling loads. The Safaricom Data Centre in Limuru demonstrates this through strategic site selection that leverages highland temperatures for free air cooling. From an architectural standpoint, orientation, prevailing winds, solar gain, and thermal mass must be harnessed in the design of the building form and spatial organization, rather than intervening post-design using mechanical systems. Site planning must also anticipate future expansion, infrastructure access, and renewable energy proximity, forming a coherent ecological and logistical diagram.

Safaricom Data Centre, Limuru. Image by Author.

2. Modularity as a Design Language

Modular construction is not merely a construction method. It is a design approach that offers flexibility, phased growth, and efficient use of materials. Modularity allows architects to speed up project delivery, prioritise prefabrication, minimise site disruption, and reduce embodied carbon through repetition and precision.

Yet, despite these gains, the adoption of modularity in Kenya faces notable barriers. High production and transportation costs, compounded by the limited scale of local uptake, result in heavy reliance on imports. This prevents the realisation of economies of scale that make modular systems more affordable and competitive elsewhere.

3. Renewable Integration as Infrastructure and Identity

The visual and spatial integration of renewable systems, whether photovoltaic canopies, geothermal intakes, or wind harvesting structures, offers more than performance gains. It contributes to the architectural language of sustainability. In Olkaria, the upcoming G42-Microsoft campus is designed to run entirely on geothermal energy, embedding the site's tectonics into the building's narrative.

Solar PVs can be configured as shading elements, roof expressions, or even modular façade systems, moving energy generation from concealed service to architectural gesture. The grid mix, orientation angles, and storage solutions must be reconciled in early design phases to ensure that renewable integration is not only technical but tectonic.

## Material Ecologies: Building for Circular Performance

Sustainable material strategies within data centres extend from structural systems to envelope detailing. Low-carbon steel, cross-laminated timber, recycled aluminium, and green concrete all offer viable alternatives to conventional high-emission materials. Microsoft's ongoing CLT-integrated data centre developments in Virginia report a 35–65% reduction in embodied carbon.

Adaptive reuse also offers potent architectural potential. Google's Hamina Data Centre in Finland, a repurposed paper mill, is a case in point, demonstrating how industrial typologies can be rehabilitated for high-performance digital infrastructure. In Kenya, post-industrial zones near railway corridors or ageing telecom facilities present similar spatial opportunities for transformative reuse.

Thermal Performance: Containment, Control, and Cooling as Design Systems

The architecture of thermal regulation demands more than HVAC specification. Envelope treatments such as insulated panels, reflective membranes, green roofs, and double façades can significantly lower internal loads. Case studies like Sora Data Centre in Cyberjaya, Malaysia, Benguerir Data Centre in Morocco, and Safaricom Data Centre in Limuru demonstrate how climate-responsive design can limit heat gain at source. At Sora, vertical timber louvres provide passive solar shading while landscaped setbacks and courtyards temper the surrounding microclimate. Benguerir employs a naturally ventilated double roof to block solar radiation and channel airflow, supported by solar chimneys that draw warm air upward, and a central vegetated patio with a water basin that cools incoming air through
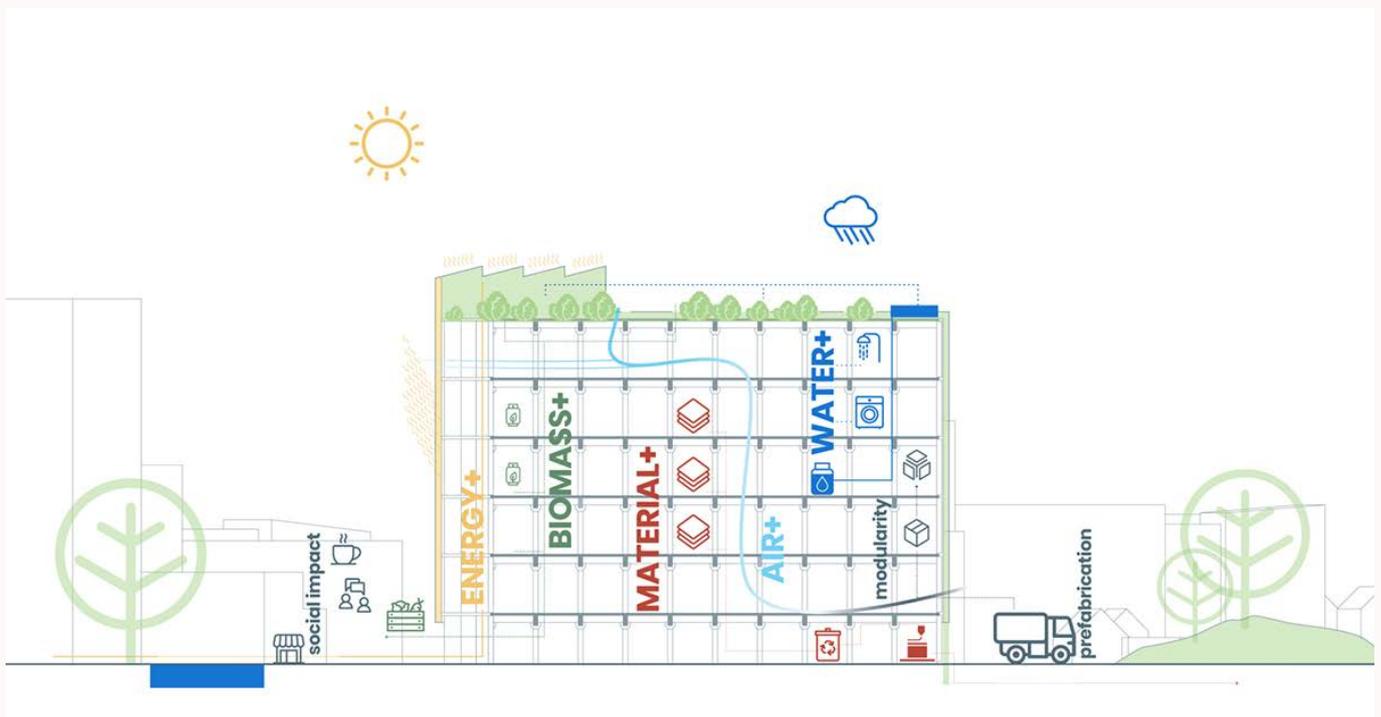
Sustainability Aspects. Image by World Architecture.

evapotranspiration. In Limuru, high-altitude siting offers consistently cooler ambient temperatures, reducing overall heat stress on the building.

Across these precedents, insulated façades, shaded openings, landscaped courtyards, and precise airflow containment work together to minimise thermal loads, allowing mechanical cooling to operate less frequently and more efficiently.

Metrics as Design Tools: Towards Measurable Architecture

Architects increasingly design not just for form and programme, but for performance. Metrics such as Power Usage Effectiveness (PUE), Carbon Usage Effectiveness (CUE), Renewable Energy Factor (REF), and Water Usage Effectiveness (WUE) must be incorporated into the design brief from the outset, not as post-occupancy assessments but as generative design constraints.

Kenya's adoption of rating frameworks such as EDGE and LEED presents a formal structure

for these evaluations. EDGE's regional calibration and resource-focused thresholds are especially suitable, mandating at least a 20% improvement in baseline PUE and material/water use. These systems allow architects to position performance as both process and product.

Practice, Policy, and the Profession: Architecture's Expanded Role

Sustainable data centre design in Kenya must be understood as a multivalent architectural challenge balancing climatic, technological, and regulatory pressures within a rapidly evolving context. Yet the profession is uniquely positioned to respond, provided it extends its remit beyond form-making to systems thinking. This involves collaboration with energy consultants, environmental engineers, IT specialists, and policy makers, as well as influencing standards through education, research, and professional advocacy.

The Ministry of ICT's Data Centre Standards (ICTA.2.002:2019) offers a baseline, but architects must push

towards greater integration of passive design, circular economy principles, and local material innovation.

Conclusion: Architecture for a Digital-Climate Future

In the data centre, the architecture of the future is quietly taking shape. Often overlooked due to its austere function and hidden interiors, it is precisely here that questions of climate, performance, scale, and resilience converge most clearly.

As Kenya expands its digital backbone, architects must assert leadership in defining how data is housed, spatially, materially, and ethically. In doing so, they will not only ensure operational efficiency but craft a typology that reflects our responsibility to both technological and ecological futures.

AAK ANNUAL CONVENTION 2025 PROGRAMME

DAY 01: WEDNESDAY (1ST OCTOBER 2025)

SESSION ONE: OFFICIAL OPENING

TIME	ACTIVITY	
ALL DAY	Arrival and Registration of Delegates	
	Golf Tournament	
0800 – 1400	Grow A Classroom Mentorship at Shauri Moyo Primary School, Kisumu	
1700 - 1710	Welcome Remarks by President, Architectural Association of Kenya **Arch. George A. Ndege**	
1710 - 1725	Guest Speech by Kisumu County Governor **H.E. Prof. Anyang' Nyong'o**	
1725 - 1740	Guest Speech by a representative of the Ministry of Lands, Public Works, Housing and Urban Development	
1740 - 1810	Key Note Presentation by UN Habitat Executive Director **Ms. Anacláudia Rossbach**	
1810 - 1900	Panel Chat moderated by **Arch. George A. Ndege** **H.E. Prof. Peter Anyang' Nyong'o** **Ms. Anaclaudia Rossbach** Representative of the Ministry of Lands, Public Works, Housing and Urban Development	
1900 - 1930	Media Q&A	
1930 - 2100	Opening Cocktail	

DAY 02: THURSDAY (2ND OCTOBER 2025)

SESSION TWO: From Plans to Reality:
Delivering Effective Urban Systems through Data, Policy, and Finance. (1 hour 5 minutes)

0800 - 0900	Delegates' Code Scanning, Early bird gifts and Entertainment		
0900 - 1000	International Delegates Panel moderated by **Arch. Brenda Nyawara Vice President, AAK**	**Arch. Nenpin Dimka,** Royal Institute of British Architects (RIBA) council member, co-Chair of the AI expert group	
	Arch. Vinesh Chintaram, African Union of Architects (AUA) East Region Vice President	**Arch. Mecky T'Chawi,** President East Africa Institute of Architects (EAIA), President Architectural Association of Tanzania (AAT)	

1005 - 1025	Partner Message
1025 - 1030	Presentations Agenda setting
1030 - 1050	**Presentation 1:** Rural Urbanism: The Role of County Governments in Shaping Livable Urban Areas in Kenya's Rural Landscape. A Case Study of Taita Taveta County **Arch. Martin Tairo,** CECM Public Works, Infrastructure, Housing, and Energy, County Government of Taita Taveta
1050 - 1110	**Presentation 2:** Transport Systems That Move Cities Forward **Eng. Fanuel Kalugendo,** Regional Manager – Lindi, Tanzania Rural and Urban Road Agency (TARURA)
1110 - 1140	Plenary discussion
1140 – 1210	Health Break Exhibition footfall & Prize surprise

SESSION THREE: Designing Spaces for Life: Integrating Homes, Workplaces, Public Spaces, and Communities for Safe, Inclusive, and High-Quality Living.

Moderator: **LArch. Ruth Wanjiku**		**Rapporteurs:** **Mercy Ateka and Brenda Waruinu**
1215 - 1220	Partner Message	
1220 - 1310	Agenda Setting	
Panel discussion	**Rethinking Public Space Through A Gendered Lens-** **Arch. Mumbi Maina,** Vice President, Women in Real Estate	**Architecture of Dignity -** **Arch. Yasir Brek,** Founder, Morphosis Limited
	Compact and Mixed-Use Development: Live, Work, and Play in One Place - **Eng. Lawrence Njue,** Resident Engineer, Tatu City Infrastructure Projects	
1310 - 1330	Plenary discussion	
1320 - 1430	**Lunch Break**	
1430 - 1600	Exhibition footfall & Prize surprise Breakout sessions	

Break Out Sessions

Session 1
Topic: Adapting Sustainable Transformation and Green Growth

Moderator:	**Rapporteurs:**
Eng. Nashon Tambo	**Arch. Michael Mathenge and Alex Otieno**

Increasing Urban Resilience to Water Scarcity and Flood Control - Eng. Elam Babu, Water and Sanitation Engineer	**Incorporating Nature-based Solutions and Green Infrastructure in Planning - Dr. Joan Nyagwalla, Lecturer,** Technical University of Kenya

Session 2
Topic: Integrating Homes, Workplaces, Public Spaces, and Communities for Safe, Inclusive, and High-Quality Living.

Moderator:	**Rapporteurs:**
Michelle Ouma	**Paul Adesa and Mary Ngaruiya**

Designing Cities for Life Through the Senses- Arch. Samuel Thuo, The Senses Architect	**The Social Design Approach in the Co-Creation of Digital Hubs in Marginalized Urban Areas- Steven Nyagaya,** Research Associate at Nuvoni Research/ICFI

Urban Better: Healthy Cities- Maryam Wangechi, Coordinator, UrbanBetter Nairobi Cityzens Hub

DAY 03: FRIDAY (3RD OCTOBER 2025)

SESSION FOUR: Building Climate-Resilient Cities: Advancing Sustainable Transformation and Green Growth. (3 hours)

Moderator:	**Rapportuers:**
Arch Oscar Ogunde	**Arch Michael Mathenge and Paul Adesa**

0800 - 0900	Delegates Code Scanning Early bird gifts, Entertainment and Agenda setting

Time	Description
0900 - 0920	**Presentation 03:** Unlocking Urban Growth through the utilisation of alternative financing models - QS. Charles Wambua, Director, Trimax Project Management
0920 - 0940	**Presentation 04:** Evaluation of Thermal Comfort in Institutional Buildings in Nairobi: A Case Study of Britam Towers and KCB Towers in Upper Hill **Prof. Alfred Omenya,** CEO Eco-Build Africa & Adjunct Prof. University of Canberra
0940 - 0950	Plenary discussion
1000 - 1005	Partner message.
1000 - 1010	Quiz & Gift
1010 - 1030	**Health Break**
1035 - 1100	Entertainment Quiz & Gift

SESSION FIVE: Breakout Sessions:

Harnessing Cross-Disciplinary Collaboration for Next-Generation Cities.

1100 - 1300

Breakout Session 3
Topic: Urban Thinkers Campus

Moderator:
Plan. Cyrus Mbisi

Rapporteurs:
Mercy Ateka and Brenda Waruinu

Eng. Lawrence Njue,
Resident Engineer,
Tatu City Infrastructure Projects

Smart Cities, Smarter Systems:
Leveraging AI to Transform Urban Kenya-
Esthlynn Okhabi,
graduate architect

LArch. Dempsey Murage,
Landscape Architect Consultant

Breakout Session 4
Topic: Delivering Complex Projects: What It Takes to Get from Plan to Completion

Moderator:
CPM Ndindiri Waweru

Rapporteurs:
Paul Adesa and Mary Ngaruiya

Nashon Okowa, Managing Director, Beacon Africa Consultants	**Prof. Alfred Omenya,** **CEO Eco-**Build Africa & Adjunct Prof. University of Canberra
Eng. Shammah Kiteme, President, Institution of Engineers of Kenya	**QS. Charles Wambua,** Director, Trimax Project Management

1300 - 1400	**Lunch Break**

SESSION SIX: Driving Urban Innovation: Harnessing Cross-Disciplinary Collaboration for Next-Generation Cities.

Session Chair: **Arch. Brenda Nyawara**		**Rapportuers:** **Donald Oluoch and Alex Otieno**

1400 - 1410	Agenda setting and Prize surprise
1410 - 1420	Partner Message
1420 - 1440	**Presentation 05:** Designing our Kenyan Urban Areas as Sustainable Cities: A Case Study of the Kisumu Sustainable Mobility Plan (KSUMP). **Judy Balla,** Municipal Manager, Maseno Municipality
1440 - 1500	**Presentation 06:** Building Kenya's Net-Zero Future: From Baseline to Action in the Buildings & Construction Sector. **Arch. Mumbua Musyimi,** Kenya Program Manager for the Global Buildings Performance Network (GBPN)
1500 - 1520	**Presentation 07:** Exploring Construction Cost Overruns in the Pursuit of Sustainable, Equitable, Resilient, and Smart Urban Futures **QS. Francis Mureithi,** Projects lead Lolacom group
1520 -1540	Plenary discussion
1545 - 1600	**Call to Action: Rapporteur General Report**
1600 - 1900	Gala Dinner Preparation
1900 - Late	**Closing Gala Dinner.** Student Design Competition Awards

POST CONVENTION: SATURDAY (4TH OCTOBER 2025)

ALL DAY	Engagement with Western Kenya AAK members. **Build Tour of Kisumu CBD** • **Water Bus Tour** • **KIT Mikayi Stone Tour** • **Siaya County Business Investment Tour**

Reclaiming Nairobi's Public Realm for Active Mobility and Human Dignity

Sam Rholex Odhiambo
Urban and Transport Planner-Founder and Director of CityGrid Transport Consultants.

1. Introduction

Nairobi is at a critical juncture in its urban transformation journey. With a projected population of over 7 million by 2030, the city faces growing pressure on its mobility systems and public spaces. Urban streets, originally conceived as social, commercial, and mobility corridors—have progressively become vehicle-dominated zones, leading to the marginalization of pedestrians, cyclists, and other vulnerable road users.

Despite the dominance of active mobility in Nairobi, over 45% of daily trips are undertaken by walking or cycling[1] , street design remains heavily skewed toward motorized transport. The National Transport and Safety Authority (NTSA) reported that 41% of all road traffic fatalities in Kenya in 2022 involved pedestrians. Such statistics underscore the urgent need to reimagine our streets not just as transport conduits, but as vibrant public realms that foster equity, dignity, and safety.

This paper proposes a comprehensive framework for reclaiming Nairobi's public realm by focusing on active mobility, inclusive design, and participatory governance. It explores not only physical interventions but also policy, funding, political, and institutional strategies to achieve real and lasting change.

2. Problem Statement and Research Gap

Numerous studies have addressed Non-Motorized Transport (NMT), complete streets, and tactical urbanism in African cities. However, implementation in Nairobi has been minimal and fragmented. The lack of dedicated infrastructure, disjointed planning efforts, and the dominance of vehicle-centric urban development paradigms have rendered many of these studies academic rather than actionable.

A real gap exists in contextualizing and operationalizing these findings within Nairobi's socio-political realities. Previous projects such as the Luthuli Avenue pedestrianization, were successful in form but lacked scalable frameworks. Moreover, there has been insufficient exploration of informal economy integration, political resistance, funding mechanisms, and human dignity as a guiding design principle. This study addresses these gaps by merging urban design theory with grounded, actionable proposals tailored to Nairobi's evolving urban form and stakeholder dynamics.

3. Objectives

The key objectives of this paper are to:

i.   Assess the current gaps between planning policy and street-level implementation.

ii. Identify barriers and provide practical solutions for funding, governance, and stakeholder inclusion.

iii. Propose design and policy interventions that elevate Nairobi's streets into active, inclusive, and dignified public realms.

iv. Align proposed strategies with existing tools such as the 2025 Roads Design Manual, the NMT Policy (2017), and international sustainability frameworks (e.g., SDG 11, New Urban Agenda).

4. Literature Review

Globally, the recognition of streets as multidimensional public spaces rather than mere conduits for motorized transport has been gaining momentum. The New Urban Agenda emphasizes the need for inclusive street design that supports walking, cycling, and informal activities as part of sustainable urbanization. Similarly, Sustainable Development Goal(SDG 11) calls for cities that are "inclusive, safe, resilient, and sustainable," with specific targets on access to safe transport systems and green public spaces .

The Global Designing Cities Initiative (GDCI) and its flagship publication, the Global Street Design Guide, offer practical, adaptable frameworks for transforming streets into people-centered environments, including pedestrian priority zones, street greening, and accessible mobility solutions . These global standards highlight the critical role of street design in promoting equity, health, safety, and climate resilience. These are core principles that resonate with Nairobi's mobility challenges.

Case studies from cities like Bogotá, Paris, and Addis Ababa demonstrate how low-cost, politically supported redesigns of street space have led to significant increases in active travel, reduced fatalities, and revitalized public life. These experiences inform and validate the call for similar transformations in African cities like Nairobi.

Kenya has made important policy strides toward promoting NMT, though implementation remains inconsistent. The Kenya National Urban Development Policy and the Kenya Vision 2030 recognize the role of sustainable mobility in economic growth and environmental stewardship. However, evidence from road tenders and budget allocations shows a continued bias toward vehicle-centric designs. The recently launched Kenya Roads Design Manual represents a critical step forward in mainstreaming NMT standards, with clear design specifications for sidewalks, cycling lanes, crossings, and traffic calming . Yet, this manual's success hinges on capacity-building, local government enforcement, and institutional harmonization across agencies such as the Kenya Urban Roads Authority (KURA), the Kenya Rural Roads Authority (KeRRA), the Kenya Highways Authority (KeNHA), and county governments. Nationally, the legal architecture exists but must be matched with political will, funding, and technical application at the local level.

Nairobi has seen incremental but uneven progress in integrating active mobility into its urban planning agenda. The Nairobi Integrated Urban Development Master Plan (NIUPLAN 2014– 2030) provides a long-term roadmap for inclusive mobility, envisioning a hierarchy of streets that support walking, cycling, and mass transit . The Nairobi NMT Policy articulates the city's vision for safe and inclusive non-motorized mobility . However, poor coordination between agencies, underfunding, and weak enforcement have limited its effectiveness. Initiatives such as the Luthuli Avenue pedestrian corridor

and the Aga Khan Walk revitalization project, implemented through partnerships with UN-Habitat and the Nairobi City County Government, serve as important local proof-of-concept interventions. Despite their impact, these pilots often remain isolated, disconnected from wider mobility systems and rarely replicated elsewhere. Moreover, public engagement has been limited, and informal economy actors like street vendors and boda boda riders are frequently excluded from design processes.

Local development control policies and ward-level planning tools still prioritize vehicle flow over public life, and infrastructure maintenance remains reactive rather than systemic. These gaps underscore the need for a city-wide approach that is participatory, evidence-based, and anchored in the realities of Nairobi's evolving urban form and user diversity.

5. Methodology

The research methodology integrates both quantitative and qualitative approaches:

- **Spatial Analysis & GIS Mapping:** Baseline surveys of Nairobi's CBD, Eastlands, and peri-urban zones using satellite data and on-ground surveys.
- **Policy and Literature Review:** Reviewed documents include the Nairobi NMT Policy (2017), the new Kenya Roads Design Manual (2024), NIUPLAN (2014–2030), and various UN-Habitat mobility frameworks.
- **Stakeholder Workshops:** Conducted participatory design engagements with street vendors, boda boda riders, persons with disabilities, transport engineers, and community organizations.
- **Pilot Evaluation:** Examined outcomes of implemented pilots such as Aga Khan Walk revitalization, Luthuli
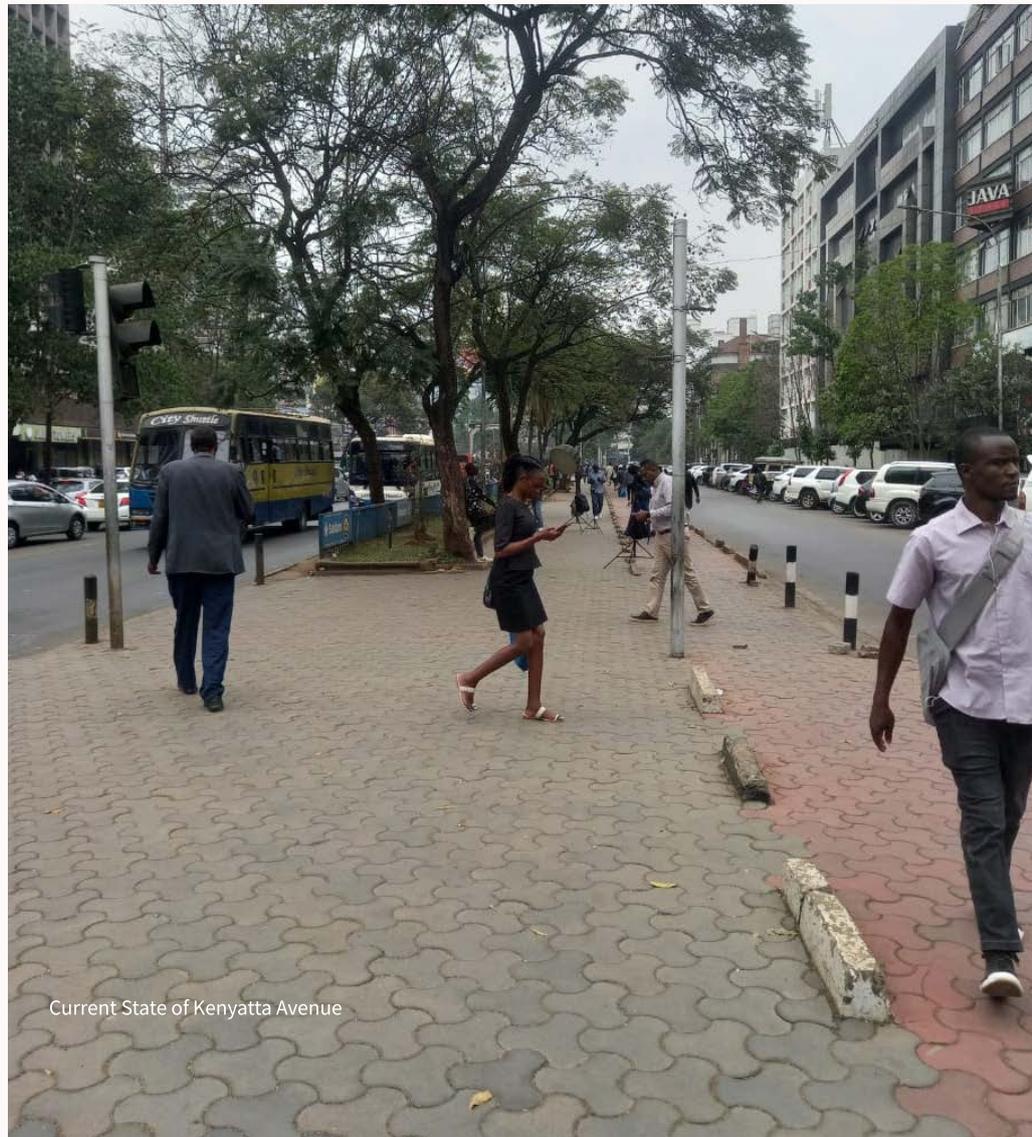
Current State of Kenyatta Avenue

Avenue pedestrian corridor, and footpath improvements in Kibera.

6. Research Findings

5.1 Stakeholder Engagement: Formal and Informal Actors

Stakeholder workshops revealed key insights into the everyday challenges and priorities of Nairobi's diverse street users. Participants—including street vendors, boda boda riders, persons with disabilities (PWDs), engineers, and community groups—consistently emphasized the need for safer, more inclusive, and better-maintained public spaces. Street vendors called for designated vending areas, while boda boda riders highlighted the lack of safe drop-off zones. PWDs pointed out critical accessibility barriers, such as broken pavements and absence of ramps. Across all groups, there was a strong demand for co-creation in planning processes, greater transparency, and infrastructure that reflects the realities of informal economies. Safety, accessibility, and inclusion were identified as top priorities, along with calls for community-led stewardship and civic education on user rights.

6.2 Pilot Evaluation

The pilot evaluation of projects such as the Aga Khan Walk revitalization, Luthuli Avenue pedestrian corridor, and Kenyatta Avenue has promising but uneven outcomes. These interventions improved walkability, reduced traffic conflicts, and enhanced the aesthetic and social quality of public spaces—particularly on Luthuli Avenue, where pedestrian volumes increased and petty crime decreased. However, maintenance issues, lack of integration with adjacent streets, and unclear roles among implementing agencies limited long-term impact. In Kibera, community uptake was high, but challenges included encroachments, inadequate lighting, and limited follow-up.

Overall, the pilots demonstrated the feasibility and public demand for active mobility infrastructure, while underscoring the need for better coordination, phased scaling, and local stewardship.
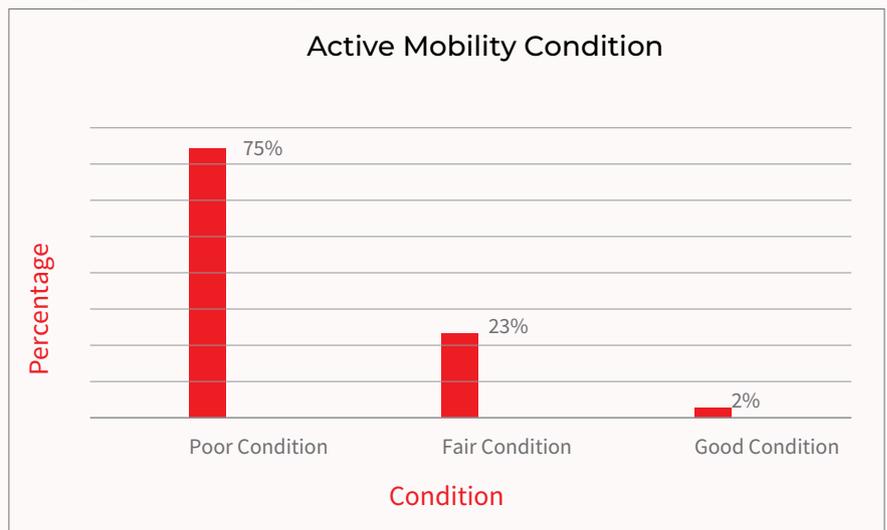
6.3 Spatial Analysis and Ground Survey

Baseline survey conducted across Nairobi's Central Business District (CBD), Eastlands, and selected peri-urban zones provided a comprehensive picture of the current state of active mobility infrastructure. These surveys combined high-resolution satellite imagery, GIS spatial analysis, and on-the-ground surveys to assess road segments, intersection safety, pedestrian volumes, and infrastructure continuity. The findings revealed that over 75% of Nairobi's primary roads either lack sidewalks entirely or have discontinuous, narrow, or obstructed walkways, often broken by encroachments, open drains, or commercial activity. Cycling infrastructure was found to be virtually non-existent across most corridors, with no dedicated lanes or safe crossings in high-traffic zones like Jogoo Road, Mombasa Road, and Outer Ring Road. The situation is particularly severe in peri-urban areas, where unpaved shoulders force pedestrians and cyclists to share lanes with fas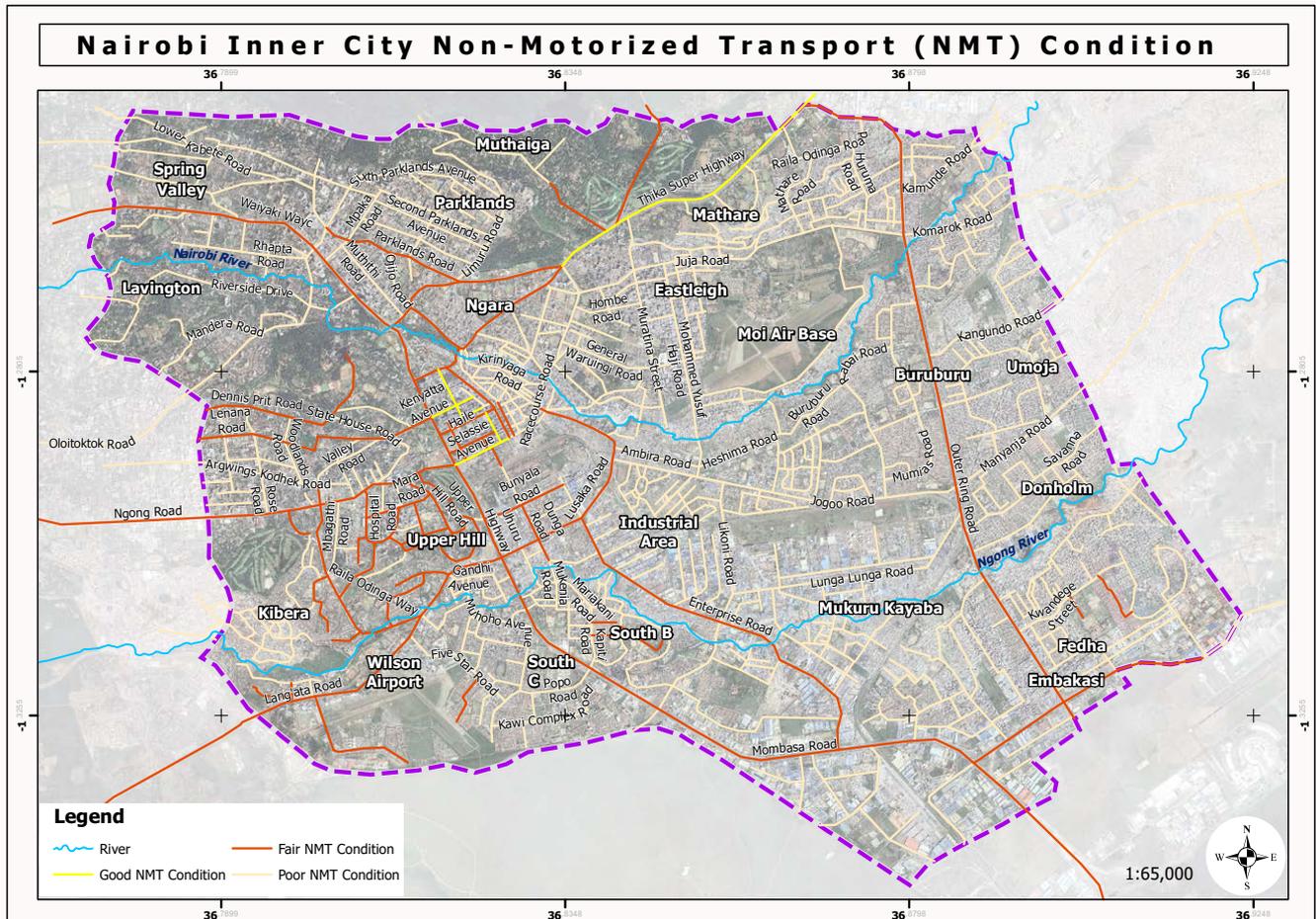t-moving vehicles, increasing their exposure to danger. The map below highlights the existing NMT conditions. These deficiencies not only compromise safety but also limit access to essential services and economic opportunities, especially for low-income and vulnerable populations who rely heavily on walking and cycling as primary modes of transport. The survey confirmed a systemic neglect of non-motorized transport in Nairobi's street planning, highlighting the urgent need for integrated, inclusive infrastructure upgrades.

5.4 Funding and Governance Barriers

Nairobi's active mobility transformation faces several significant challenges. A major obstacle is the fragmentation of mandates, with overlapping responsibilities among key agencies such as Nairobi City County, the Kenya National Highways Authority (KeNHA), and the Kenya Urban Roads Authority (KURA). This lack of clear coordination hampers unified planning and implementation efforts. Additionally, there is chronic underfunding of Non-Motorized Transport (NMT) in Nairobi. Despite Nairobi County's official policy requiring at least 20% of road construction budgets to be allocated to pedestrian and cycling infrastructure, in practice the actual

Active Mobility Condition

75%

23%

2%

Poor Condition   Fair Condition   Good Condition

Percentage

Condition

Source, field survey

Nairobi Inner City Non-Motorized Transport (NMT) Condition

Legend
- River
- Good NMT Condition
- Fair NMT Condition
- Poor NMT Condition

1:65,000

Source: Author, 2025

annual allocation to NMT generally falls well below that . One study found that less than 2% of Nairobi's annual road infrastructure budget typically reaches non-motorized and public transport facilities .

Political interference also often disrupts progress, as top-down decisions override participatory planning processes, sidelining community needs and undermining local ownership.

6. The Framework: Reallocating, Redesigning, and Reclaiming Streets

This framework is structured around three interlinked pillars:

6.1 Reallocate Space

Nairobi's streets are disproportionately dedicated to motor vehicles, despite the fact that over 45% of trips are made on foot8. Reallocating space involves redesigning the physical right-of-way

to prioritize non-motorized transport (NMT) and public transit.

- Convert excess road lanes into well-defined, continuous, and shaded footpaths and dedicated cycling lanes. Many wide roads such as Jogoo Road or Lang'ata Road can accommodate such reconfiguration without compromising traffic flow. Shaded pedestrian routes also mitigate urban heat and improve walkability for all age groups.
- Prioritize Bus Rapid Transit (BRT) and active modes over private car use. This means creating transit-priority corridors that include NMT infrastructure, ensuring that walking and cycling connect seamlessly to BRT stations and stops.
- Remove obstructive parking, especially illegal on-street parking and encroachments by vendors or private developments. These limit pedestrian space and pose safety

risks. Replacing these with public walkways and open zones fosters inclusivity and mobility equity. The goal is to shift the design logic from car to human access, in alignment with Nairobi's climate and social equity goals.

6.2 Redesign for Safety and Comfort

This pillar responds to the unsafe and hostile street environments faced daily by Nairobi's pedestrians, cyclists, and persons with disabilities. The redesign approach focuses on universal accessibility, visual cues for safety, and comfort amenities that support dignified urban movement.

- Raised pedestrian crossings, curb extensions and pedestrian refuge islands are critical for making crossings visible, safe, and convenient especially for the elderly, children, and PWDs. These features reduce crossing distance and vehicle speed, which is essential in high-footfall areas.

Reclaimed Aga Khan Walk
Source: Author, 2025

7. Pilot Projects and Phasing Strategy

Transforming Nairobi's street infrastructure to prioritize active mobility requires a pragmatic, phased approach that balances ambition with political feasibility and technical capacity. A pilot- based rollout strategy allows planners to test interventions, engage communities, learn from failures, and build institutional momentum before citywide scaling. The proposed three-year phasing framework is structured as follows:

Phase 1: Pilot Launch-Testing Concepts in High-Impact Zones

The initial phase focuses on implementing tactical urbanism interventions in a few high-footfall, strategically selected corridors. Target areas such as River Road, Moi Avenue, and the Mwiki– Kasarani stretch serve large volumes of pedestrians, cyclists, and informal traders, making them ideal for impact testing. Low-cost, reversible interventions such as paint markings for pedestrian zones and bike lanes, traffic bollards to restrict vehicle access, planters to delineate safe spaces, and benchesor shaded kiosks can be deployed quickly and adjusted based on real-time feedback. These pilots also serve as visual and experiential advocacy tools, helping both the public and political stakeholders understand what "people-first streets" look and feel like.

Phase 2: Institutional Embedding- Building Capacity and Policy Backing

After successful pilots, the next phase involves formalizing systems and institutions to support broader rollout. This includes:
- Developing localized Street Design Guidelines that incorporate lessons from the pilots and align with national frameworks like

- Tactile paving should be installed consistently at crossings, bus stops, and along sidewalks to support visually impaired users, while resting spots or seating every 250 meters to accommodate users with limited mobility, the elderly, and caregivers with children.

- 30 km/h speed limits in pedestrian-heavy zones such as market centers, schools, and transit hubs can drastically reduce fatality risks. This must be coupled with enforcement and visual design changes (e.g., narrowing lanes, signage, speed tables) that naturally calm traffic.

6.3 Reclaim Public Life

Urban streets should be more than channels for movement, they should be civic spaces that foster social interaction, economic activity, and cultural identity. This third pillar focuses on activating public life through inclusive and community-driven design elements.

- Vending zones are crucial to Nairobi's street economy. Rather than viewing vendors as obstacles, planning should allocate designated, well-serviced spaces for informal traders, with waste bins, shading, and storage to maintain hygiene and order.

- Public seating, greenery (trees, shrubs), and interactive street art such as painted crosswalks or child-friendly play installations make streets livable and vibrant. They invite people to linger, socialize, and enjoy the public realm.

- Murals and community events such as street fairs or temporary art installations promote a sense of place and belonging. They also deter crime through "eyes on the street" and foster intergenerational cohesion.

Ultimately, reclaiming public life on streets restores their role as democratic and cultural spaces where Nairobians can walk, rest, work, trade, and connect with dignity.

Current State of Luthuli Avenue

the 2025 Roads Design Manual and Nairobi's NMT Policy (2017). These guidelines should specify technical standards, right-of-way allocations, signage, street furniture specifications, and universal access requirements.

- Capacity-building for local contractors, engineers, and ward-level planning teams is essential to avoid dependency on external consultants. This phase should include training sessions, certification schemes, and technical toolkits to ensure

continuity and quality across all projects.

Phase 3: Citywide Scaling-Mainstreaming and Sustained Implementation

The final phase focuses on expanding the program across Nairobi's 17 sub-counties and embedding it within broader municipal governance and financing structures.

- Priority corridors in each sub-county should be selected based on pedestrian volumes, crash

hotspots, economic activity, and underserved populations (e.g., near markets, schools, health facilities, and transport nodes).

- Active mobility and street improvement projects should be included in annual capital investment plans, ward development plans, and road tendering frameworks. This ensures that funding is allocated annually and that NMT becomes a standing priority in infrastructure procurement processes.

8. Conclusion

Reclaiming Nairobi's streets for active mobility is no longer a luxury, it is a moral and practical necessity. As the city faces unprecedented population growth, inequality, and climate vulnerability, its streets must evolve into democratic, inclusive, and life-affirming spaces.

Only then will our streets cease to be battlegrounds and instead become platforms for public life.

Sam Rholex Odhiambo is an urban and transport planner and the Director of CityGrid Transport Consultants, driving innovative, sustainable urban mobility solutions across Africa, with expertise in urban design, streetscape design, transport policy, electric vehicle adoption and creating greener more connected cities.

Grow-A-Classroom Initiative

This project seeks to enhance learning environments in public schools nationwide. It involves developing new school master plans to guide sustainable growth, implementing landscape planning with diverse tree species to enhance learning environments, and establishing a renewable timber source to support future classroom construction and infrastructure development.

Partner with Us: https://aak.or.ke/grow-a-classroom/

GROW A CLASSROOM PROJECT

Rethinking Public Space Through a Gendered Lens

Figure 1:Section of Jeevanjee Gardens

Esther Wanjiku
Research and Advocacy Officer,
Women in Real Estate Kenya

Think about the last time you were in a public space. Could be a street, a park, a market etc. What did you notice? How safe did you feel in the space?

Truth is , men and women use and perceive public spaces differently. For a lot of men, public spaces are mainly about getting around, socializing or resting. They might see a plaza and think "great spot to meet friends" or "shortcut to work." Men often don't have to add "is it safe?" to their mental checklist every time they go out. For many women, though, that checklist is longer. Is there good lighting? Are there other people around?

Where are the toilets? Can I keep an eye on the kids while I sit? Will I have to walk a long, dark route to get home? Those everyday concerns coupled with caregiving responsibilities, personal safety and lack of facilities shape how women use the city. Safety is particularly a bigger concern for women especially given that most of the harassment that women face in public spaces is not classified as actual crime but still impacts their feeling of safety.

Public spaces are the heartbeats of city life. They ideally should be spaces where people rest to rejuvenate, socialize and take a break from the hustle and bustle that characterizes city life. But even though these places look open and inviting to everyone, too often their design takes a one-size-fits-all approach where they look okay on paper but don't actually fit a lot of people. For many women and girls, public spaces are uninviting and unwelcoming with safety being the main barrier that limits their use and interaction with the spaces.
Men thus end up being the majority of users of the public spaces. A spot check conducted in 4 public spaces within Nairobi and its environs at different times of the day revealed that at any

given time the number of men was more than the number of women in 3 of the public spaces. In addition, while most men were relaxing and socializing, most women were mostly passing through the spaces to other destinations and those who were not passing through were mostly on their own unlike the men who were socializing. Women also gravitated to sections of the public spaces where there were other women. The lack of disaggregated data on the usage of public spaces creates a gap between the design of the spaces and user needs. A research conducted by the Safer Parks Consortium in the UK confirmed this revealing that 89% of built environment professionals considered parks safe for women and girls while only 22% of girls and 37 % of women perceived parks as being safe for them. The magnitude of the gap between public spaces design and user needs in Kenya and Nairobi in particular is not well known due to limited research in the area. Good design should be informed by real stories and real habits. Collecting simple data such as who uses a place, at what times, and for what, in addition to talking directly to women, girls and caregivers can point built environment

Figure 2: Section of Agakhan Walk

professionals involved in the design of public spaces to appropriate design solutions. Participatory planning and design, short surveys, and time-use observations are simple ways to gather the evidence that will make interventions smarter and cheaper. Research has identified design principles that make public spaces feel more welcoming to women and girls.

Some of the design principles include;

- **Visibility and sightlines;** Spaces where one can see and be seen feel safer. Low hedges, clear paths and benches near activities make it easier to keep an eye on what's happening.
- **Lighting and upkeep;** Bright, working lights and clean, well-maintained paths create a sense of a well taken care of and secure space. Broken pavement, dark corners and overflowing bins show neglect and can keep women and girls away especially at night.
- **Seating and shelter;** Not all seating is suitable. People who're looking after kids, or who can't stand for long, need benches with

backrests and places to sit in the shade. A variety of seating options works better than a single kind of bench. In addition, seating installed next to the paths creates a feeling of over exposure which reduces the feeling of safety.
- **Toilets and baby-changing spots;** These are often overlooked in design plans, but they're crucial. Safe, clean toilets and private breastfeeding spots let caregivers spend time in public spaces without feeling restless.
- **Active edges and shops;** Shops, kiosks and cafes make public spaces feel alive. Isolated green spaces are quieter and can feel less safe. It is also important to provide for facilities that are popular with women to encourage more women to use the spaces. Facilities such as sports pitches for games mostly played by men and bars that are popular with men can make women feel unwelcomed. The facilities should also be located near entrances for ease of access and they should also not block paths.
- **Transport links;** If one has to take a long, poorly lit walk from a bus

stop, chances are they'll avoid that route. Safe, short connections to transport matter , especially for people traveling with children or after dark.

- **Programming and people;** Regular activities like markets, performances or kids' play times make places feel alive and safer because there are more people around at different times of day.

Public spaces should be for everyone, not just in theory, but in practice. When streets, parks and markets are designed with the everyday realities of women and girls in mind, it not only creates fairness but it also makes cities more vibrant, safer and more enjoyable for everyone. Design that listens to the needs of various users invites more people to come out, stay longer and take part in city life and that's how a city truly comes alive.

Esther is an Urban and Regional Planner with a deep passion for promoting sustainable and inclusive urban development, advocating for cities that are equitable and accessible to all and especially to women and children.

She currently leads the research department at Women in Real Estate Kenya.

Designing Cities Through the Senses:

A Multisensory Approach to Nourishing Urban Life and Well-being

Samuel Thuo
The Senses Architect

Why Urban Design Must Engage Our Senses

In the fast-paced expansion of our cities, we've mastered the art of concrete, steel, and glass. We've measured carbon footprints, energy performance, and debated sustainable materials. Yet, in our pursuit of "modern" cities, we've left behind an equally critical layer of human experience: the senses. We've forgotten that as human beings, we are fundamentally sensory beings, and our deepest connection with our environment, both artificial and natural, is forged through what we see, hear, smell, and touch. In essence, we have stopped designing for the full human experience. This oversight has created interconnected crises: sensory deprivation and overload. My journey from Eldama Ravine to Nairobi illustrates this perfectly. I experienced a profound "sensory shock" from the abrupt absence of organic sensory experiences. My senses, once pleasurably fed by the touch of earth underfoot, the rhythmic drumming of rain on a roof, and the scent of vegetation carried on the wind, were starved. The city became a sensory desert where the horizon was replaced by skyscrapers and the sounds of nature were forgotten. I'd often wake up surprised to learn it had rained the previous night. My subconscious discomfort with this new urban life led me to seek solace in places like Uhuru Park—a coping mechanism for the stress, anxiety, and social detachment I felt. Equally damaging is the opposite phenomenon of sensory overload: the overwhelming onslaught of unregulated noise, visual clutter, and unpleasant odors, a common reality in congested cities. Think of the incessant cacophony of traffic horns, the visual assault of uncoordinated signage and billboards, and the noxious fumes of exhaust that dominate a street like Tom Mboya. Both sensory deprivation and overload are two sides of the same coin, and are detrimental to our well-being. Research by neuroscientists and environmental psychologists has shown that environments directly influence mood, mental well-being, and even physical health. Studies have linked impoverished sensory environments to increased cortisol (stress hormone) levels, poorer sleep quality, and reduced social engagement. Architects and urban planners like Juhani Pallasmaa, Steven Holl, and Alberto Pérez-Gómez have long argued that the built environment should address all the senses, not just the visual. Multisensory design offers a powerful framework for creating more resilient, inclusive, and joyful spaces. This approach is not about a return to a romanticized past; it's about building a more life-centered future. Global Examples of Multisensory Urbanism

While the concept may seem novel in some contexts, cities around the world have already embraced multisensory urbanism.

1. **Yokohama's "Sensory City,"** Japan; uses smart lighting, environmental sensors, and textured urban surfaces to create spaces that adapt to the sensory sensitivities of neurodiverse populations.
2. **Singapore's "Sensory Walk";** This pedestrian route features scent gardens with aromatic plants, varied textures underfoot, tactile sculptures, and cooling water features, offering a sensory respite from the tropical heat.

While these examples come from highly formalized urban contexts, their core principles are universal. The idea of layered sensory engagement, inclusive access, and adaptable design can be applied incrementally, even within strict space constraints. Locally, we can draw inspiration from projects like the Sensory Botanical Garden at Enaki and the Sensory Garden in Tigoni, Gathoni Farm, which are already pioneering these ideas.

Implementing Multisensory Urbanism in Nairobi

Critics may ask: Can this work in informal, high-density, and land-scarce cities like Nairobi? The answer is yes. In formal CBD areas, sensory interventions could include: Tactile navigation paving for universal accessibility. Pocket parks with indigenous scented plants like Lantana camara and Acmella caulirhiza. Water misters in pedestrian-heavy zones for cooling and microclimate regulation. Creating quiet refuges in noisy cities. Using soundscapes intentionally; water features, wind chimes, or vegetation to filter noise.

Informal settlements already have strong sensory identities: street food aromas, music, vibrant colors. The goal is not to erase this, but to balance and refine it, reducing sensory shocks like excessive noise and unmanaged waste odors, while enhancing positive cues. In an African urban context, multisensory design must feel authentically local. Scent should harness indigenous plants and familiar aromas (roasted maize, coffee flowers). Sound should support local street musicians, integrate water features where feasible. Touch borrows from tactile stone carvings inspired by Kenyan heritage patterns. Visuals could be drawn from local traditions. Multisensory design does not require vast new plots. It's about intelligently retrofitting existing infrastructure. My own Sensory Footbridge and Tunnel Prototype Proposal for Nairobi demonstrates how existing pedestrian infrastructure can be transformed into sensory pathways and community micro-markets without requiring additional land. This concept repurposes overlooked spaces into life-enriching civic assets. In this way, multisensory cities not only improve wellness but also serve to preserve and celebrate our rich cultural identity.

The Multisensory City Index and Policy Integration

To ensure we're not designing blindly, I propose a Multisensory City Index, a framework to measure the sensory quality of environments on:
1. Number of senses engaged (sight, sound, smell, touch, taste, vestibular, proprioception)

2. Quality of sensory stimuli (positive, neutral, negative)
3. Inclusivity score (neurodivergent and disability-friendly)
4. User satisfaction surveys (target sample size: 100–300 per site)
5. Health & economic indicators (e.g., reduced stress reports, increased footfall to local businesses)

For multisensory design to shape our cities, it must move from inspiration to legislation. This means:
1. Integrating Multisensory Design Guidelines into Kenya's urban planning codes, similar to existing accessibility standards.
2. Aligning with Nairobi's Public Realm Design Manual and the

Physical and Land Use Planning Act to embed multisensory principles in street upgrades.

3. Incentives for Developers who integrate sensory-rich public interfaces, such as green facades, public courtyards, or interactive art.

4. Public–Private Partnerships to co-fund sensory upgrades in busy districts, especially markets, transport hubs, and pedestrian zones.

The Tangible Returns on Investment

Multisensory design is not a wellness luxury, it's an investment. Research shows that sensory-rich public spaces are an investment with tangible benefits. Higher foot traffic and dwell time in commercial zones, boosting local economies. Improved community mental health and social cohesion, reducing public health costs. Enhanced tourist appeal through vibrant public spaces and memorable urban experiences. Cultural resonance via the use of locally meaningful scents, textures, and visual motifs.

Enhanced inclusivity for elderly and neurodivergent populations. African cities are at a crossroads. We can continue designing spaces that serve only the eye, or embrace a multisensory future that nurtures our full humanity. By addressing sensory starvation and mitigating sensory shock, we can create urban environments that do more than function, they can heal, connect, and inspire. By offering deliberate sensory nourishment, our cities can unify health, heritage, and humanity. The journeys we create through our built environment should not only be seen, they should be deeply felt. In doing so, Nairobi and other African cities can pioneer a model of sensory urbanism that is both deeply human and uniquely our own.

Samuel Thuo, The Senses Architect, is a multisensory designer, educator and researcher. He publishes The Senses Architect weekly newsletter on LinkedIn and Substack, highlighting environmental challenges and proposing sensory design solutions. He serves as the Conscious Nairobi Chapter Representative and Convening Fellow of The Centre for Conscious Design.

Reclaiming Urban Mobility:

A built environment call to action from the coast

Arch. Stephanie J.M.,
Asst. Secretary, AAK Mombasa Branch

In the heart of Mombasa's mobility chaos lies an opportunity for professionals in the built environment to reimagine how people move, live and thrive. As our cities grow and strain under the weight of poor connectivity and underdeveloped infrastructure, mobility is no longer just a transport issue — it is a question of livability, equity and urban resilience.

With the 2025 AAK Convention calling for new solutions for climate-smart, resilient and people-centered cities, the AAK Mombasa Chapter, in collaboration with the IEK Coast Branch, has taken a bold step into advocacy. We are working to influence how our city moves — not just physically, but structurally — toward a more efficient, inclusive future.

Through a recent communique submitted to the County Government of Mombasa and the Kenya Railways Corporation, we are championing smarter commuter rail systems and regulated last-mile connections to shift the urban experience in Mombasa for the better.

The Mombasa Transport Dilemma

Urban transport in Mombasa is marked by some inefficiencies that affect thousands of residents daily. We appreciate the convenience brought about by the development of the Standard Gauge Railway (SGR), which also spurred improvements in road infrastructure, particularly between Miritini and its environs. However, the project inadvertently introduced a critical last-mile connectivity challenge that continues to burden commuters, especially within the Mombasa mainland and surrounding satellite towns.

A passenger arriving at the SGR Terminus in Miritini often pays exorbitantly high fares by taxi or endure disorganized matatu rides to reach the Island. Those living further out rely heavily on unregulated paratransit systems that are largely unreliable and congested.

Congestion on the Island, especially during peak hours, has worsened due to increased private vehicle ownership and fragmented modal transitions. While much focus is placed on road expansion, little attention has been paid to rail-based urban mobility — a tool that many cities around the world are re-integrating not only as a long-term solution to sustainable movement but also as a cleaner, more climate-friendly alternative.

In this context, it became clear to the AAK Mombasa Branch that the built environment fraternity must be more vocal and proactive in shaping transport infrastructure policy. After all, if mobility defines how cities function, then architects, planners and engineers must help define mobility.

The Coast Branch Proposal: Built Environment Advocacy in Action

In July 2025, the AAK Mombasa and IEK Coast branches jointly issued a communique proposing the development of a commuter railway line running from the Island Railway Station to Mariakani, with intermediate stops at Mikindani, Changamwe, Miritini and Mazeras. This route would not only serve existing SGR passengers but also decongest key road arteries while creating a reliable, affordable commuter option for thousands. The proposal includes a 3-hour interval frequency to allow for predictability and coverage throughout the day. Additionally, we advocated for the replication of Nairobi's railway shuttle model that boasts of affordable, organized last-mile bus services linking commuters from rail stations to neighborhood like Westlands, Kilimani and Ngong Road.

Mombasa could replicate this model to serve routes from Miritini to Likoni, from the Island to Nyali (via Links Road), and Mtwapa (via Bombolulu). These services could be managed by a County-aligned transit authority or a structured partnership model with a limited number of large-scale SACCOs. We emphasized avoiding PPPs with fragmented matatu SACCOs and instead proposed consolidating paratransit into three licensed County-wide operators. This would enable regulation of vehicle sizes (phasing out inefficient 14-seaters), ensure professional crew employment terms and allow for eventual integration into a cashless fare system tied to M-Pesa or a County mobility card. These proposals are grounded in real commuter pain points that are high last-mile costs, fragmented service and poor commuter dignity, and are backed by the idea that spatial systems should be human-centered.

Why Built Environment Professionals Must Step In

Traditionally, urban mobility has been left to transport economists, civil engineers and policy-makers. However, the way people move within a city is directly linked to how that city is designed. Street widths, land use zoning, modal separation, climate comfort at transit stops, walkability are all spatial and design issues at their core. Built environment professionals are uniquely positioned to bridge the technical and human aspects of mobility. We are trained not just to plan systems, but to plan for people.

By contributing to transport advocacy, we affirm our role not only as designers of space but as stewards of urban resilience and public health. This shift in role is not optional — it

is essential. As cities like Mombasa prepare for rapid demographic growth, climate pressures and economic shifts, the efficiency of urban transport systems will be key to sustainable development.

A Call to Action

The Mombasa Branch's advocacy journey is not just a local initiative — it is a model. We call upon other AAK chapters to begin similar dialogues with their County Governments and transport agencies. Whether in Kisumu, Nakuru, Eldoret or Nairobi, the need for integrated, resilient transport systems is shared across the country. We also propose the establishment of interdisciplinary Urban Mobility Taskforces within professional bodies like AAK and IEK, with regional representation. These can act as think-tanks and

"The future of our cities lies not only in the architecture of buildings, but in the daily rhythm of life — in the way a city breathes through the movement, interaction and connection of people with its spaces."

action centers for influencing policy, advising counties and guiding public infrastructure investments.

Ultimately, the success of our cities will not be measured only by their skylines but by the dignity and ease with which citizens can move through them.
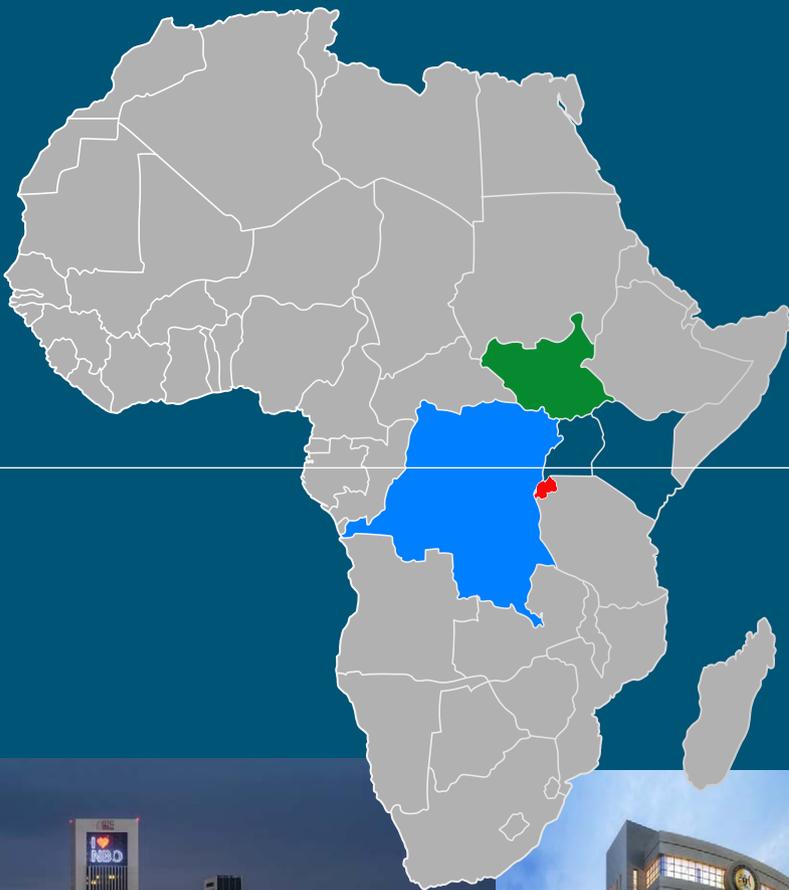
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Transport as the backbone of affordable housing

Margaret M. K. Kiboi

Architect and Environmental Design Consultant

Affordable housing is one subject that people from all walks of life can relate to. Making housing affordable in a developing country requires a multi-faceted approach. As people work towards self-reliance and autonomy a key factor to be considered is whether they can live and work in their preferred urban or rural settings without the fear of slipping into poverty due to rapid rise in cost of living in urban areas.

The environmental impact of construction is evident in the housing sector. The goal should be to reduce the overall environmental impact of housing while ensuring comfortable and healthy living conditions for residents. In the past we have observed the growth of our cities owing to improved transport systems such as the Thika superhighway, Standard Gauge Railway and Nairobi/Mombasa road Expressway among others. However, this has come at a heavy cost to home owners and business owners alike as they are priced out of their preferred locations. In a bid to take advantage of these developments, many satellite towns have developed, with people enduring long commutes to the capital city. These satellite towns are unfortunately a far cry from the living and working conditions in the Capital city.

As people try to mitigate the high cost of living by opting for lower rental and property costs in neighbouring counties or satellite towns, great pressure is applied on users from immense traffic jams to flooded drainage systems, overcrowding and lack of walkable public spaces. Unfortunately, infrastructure necessary to support such development such as transport and energy are often unavailable, with our governments working to improve infrastructure many years later after development has already taken place. What follow from this is increased gentrification pressures due to the limited infrastructure at the time of development, loss of community character and reduced access to opportunities. The government as well as private developers have responded by coming up with high-rise, high density housing units in a bid to curb the urban housing crisis. This has led to major changes in land use where parcels of land previously zoned for industrial, commercial or even recreational purposes are now used for high density housing. Little has been done to mitigate the effects of rapid increase in population density, which brings about the challenges of poor transport, environmental degradation and hazards, poor air quality as well as loss of public cohesion. There is also an effort to have varied housing typologies in one area. The aim here is to attract mixed income groups to afford them access the same social and commercial amenities. However, this has led to high income activities such as businesses converting these properties for commercial use. Proximity to business districts and other crucial amenities also drives costs higher. From the onset, high-rise buildings demand high costs of construction and maintenance; therefore they are not usually the best solution for affordable housing. Housing cannot be addressed in isolation, where buildings are built independent of solutions for transport and social amenities. Housing also encompasses social and economic activities of dwellers and so the housing solutions should always take these as part and parcel of housing projects.

The major challenges that arise from fast development of housing units without consideration for maintaining environmental and community character include potential displacement of low-income residents, differences in lifestyle needs and expectations, possible resistance from existing communities (business or residential) and managing diverse housing types and prices. Some strategies that could ensure the success of affordable housing are inclusive zoning laws, which enforces planning for mixed income developments and density, government subsidies and microfinance options for providing affordable loans for home-buyers, community-led development empowering local communities to drive housing initiatives, use of sustainable locally available building materials, collaborating with private developers to leverage resources through public-private partnerships, and streamlining building regulations to simplify construction approval processes.

Affordable housing

One major aspect of affordable housing is transport. Allowing a mix of housing types and strict enforcement of zoning regulations avoids creation of the urban favelas. These individuals and families face challenges such

as inadequate shelter, none or limited access to basic services, and dangerous living conditions. Affordable housing focuses on creating sustainable, energy-efficient, and resource-conscious homes within the constraints of affordability with access to shared amenities such as employment, education, healthcare, and recreational spaces.

In addition to provision of mixed-income housing, investing in a reliable and efficient transportation system could be a more effective way to provide access to amenities and opportunities for low-income residents. This approach would allow people from different income groups to live in their preferred neighborhoods while still being able to access benefits elsewhere. Proper zoning for varied land uses as well as enforcement of the set out land use policy ensures sustainable solutions for housing. For instance if an area is zoned for industries then the amenities provided to those zones such as energy, sewerage, transport etc., can be tailor-made for these areas. This in turn ensures that people do not reside in areas with poor air quality, which puts them at risk of respiratory illness and other health hazards.

The same applies for residential areas. Housing works within a system of other related and fundamental social activities. To provide a sustainable and affordable housing solution it is important to consider a reliable and efficient transportation system. This perspective acknowledges the potential drawbacks of urban sprawl and prioritizes community preferences for distinctiveness. It also recognizes the importance of mobility in enhancing social and economic opportunities. These strategies can help increase the availability of affordable housing options preserve community character and increase access to opportunities. Potential strategies for developing an effective transportation system include, investing in public transportation infrastructure (buses,

trains, trams etc.), improving road conditions and traffic management, providing infrastructure for non-motorized transport such as cycling, walking implementing affordable, accessible fare systems and developing integrated transportation systems combining different modes of transport. Some innovative approaches include Bus Rapid Transit (BRT) systems and electric or hybrid vehicle adoption. These measures consider affordability reliability accessibility and sustainability.

Final thoughts

In our developing country, private cars also play a significant role in transportation, especially for rural-urban commuters with specific needs like luggage and family travel. Given the rural-urban commute pattern, strategies could also focus on developing parking facilities near public transport hubs such as the SGR stations and enhancing last-mile connectivity such as rural feeder services. County Governments could prioritize this public transport connectivity which could grow their local economies and ease the pressure on the environment from greenhouse gas emissions. To bolster affordable urban housing while respecting neighbourhood preference, our development, leadership could consider neighbourhood preservation initiatives that protect community character, transport-oriented development which prioritizes public transport walkable and cyclist-friendly infrastructure as well as connectivity, for peri-urban and suburban areas.

To support rural-urban connectivity and sustainable transportation Private car usage could also be optimized. This can be done through affordable financing options and adoption of fuel-efficient or electric vehicles. To further support this, governments and organizations could, offer subsidies or tax incentives for eco-friendly vehicles and invest in charging infrastructure for electric vehicles.

Margaret M. K. Kiboi is an architect and Environmental Design Consultant with over 15 years of experience. Holding a Bachelor of Architecture degree and a Master of Architecture degree, Margaret's expertise encompasses architecture, interior design, and environmental design. Her work focuses on building aesthetics, acoustic design, thermal comfort in buildings and the environmental impact of construction. With a commitment to sustainable and functional design, Margaret continues to advance the field through her work and research."

Beyond the Surface

The Strategic Impact of Interior Design in Designing Human Centered Spaces

Jacinta Serem

Director and Co-founder of Vinca Interiors Ltd.

As professionals in the built environment, our collective charge is to mold the physical world. We raise structures from the ground up, shaping skylines and communities. Yet, the ultimate success of a building is determined, not by its shell, but by the human experience within it. Here is where the crucial role of the Interior Designer moves from a secondary, downstream consideration, to a primary, core strategic partner.

Beyond aesthetics, Interior Design deals with behavioral systems. It embeds emotional triggers, behavioural instructions and covert cognitive cues into the designed spaces. It shapes behaviour, through manipulating layouts, lighting systems and colour psychology. For a project to achieve its maximum potential - measured by tenant wellbeing, employee mental health & productivity or sustainability and long term asset value - the Interior Designer must be at the table from the earliest planning stages. Our most crucial role is bridging the gap between architectural form and human function, ensuring the finished

space is not just occupied, but truly inhabited.

Data-Driven Environments: From Biophilia to Building Performance

The modern Interior Designer's toolkit is grounded in research and evidence. We translate data derived from environmental psychology into actionable design specifications. This ensures measurable impact on a building's occupants. A good example is the well documented principles of Biophilic Design, where systematic integration of nature directly impacts performance metrics. When we advocate for green space integration, we reference data such as meta-analyses in publications like The

Lancet Planetary Health, which show that high exposure to green space is correlated with significant reduction in the risk of poor mental health. When our specifications call for natural materials and access to nature, we cite evidence from research studies on "forest bathing" that document cortisol reductions of about 12-15%. Applied in corporate settings, this directly translates to lower stress and consequently less absenteeism; in healthcare facilities it leads to faster recovery times.

Our continuous reference to neuroaesthetics informs the geometry and balance in our design approach. In collaboration with architects, we can champion the use of curved forms

over sharp, angular ones. Although this may seem like an arbitrary style choice, fMRI studies confirm that curved architecture is perceived as safer and less stressful, reducing activity in the brain's fear center. Spaces that incorporate curves are thus instinctively more desirable, command higher value and foster a greater sense of well-being for the users.

The Interior Designer's Role in Systems Integration

One of our most vital functions is as integrators, working collaboratively with the entire project team to orchestrate the internal systems of buildings.

• LIGHTING

We work hand-in-glove with Architects and Electrical Engineers. While the Architect defines the building envelope and apertures, we as Interior Designers analyze the specific tasks and human factors within each space to help develop a holistic lighting strategy.

Through our input, we ensure that daylighting is maximized effectively, reducing energy costs and boosting occupant health. Citing data from the World Green Building Council that views of nature can improve productivity by up to 18%, we can help justify glazing specifications that have a tangible ROI.

• LAYOUT

Starting with a floorplan as a blank slate, we embark on designing the layout and flow. As Interior Designers, we bring the space to life by meticulously planning circulation paths, adjacencies and spatial volumes that support the end-user's needs. In corporate spaces, our space planning can break down silos and foster collaboration while in hospitals, the same can reduce staff fatigue and patient anxiety. This spatial problem solving directly impacts the operational efficiency of the building for its entire lifecycle.

• MATERIALITY & COLOUR

Our specifications for colour and

materials for varied spaces go far beyond aesthetics; we apply them as functional and psychological tools. We select finishes based not only on performance, maintenance, durability and sustainability, but also on their proven psychological impact. For instance, the use of greens to enhance creativity in an R&D facility or specific hues to aid in wayfinding for an elderly housing complex. These aren't solely aesthetic effects, they aim to influence behavioral outcomes through engineered design systems.

Building a New Narrative Together

Undeniably, the most successful and innovative projects are born from early and sustained collaboration. When the Interior Designer is engaged from the project's inception, our insights into human behaviour can inform the architectural massing, the engineering systems and the overall project strategy.

When included from the onset, we can ensure that the building's interior is not a reaction to the shell, but a perfectly integrated component of a unified whole. This integrated, collaborative approach is the future of our industries. It leads to buildings that are more resilient, more valuable and more attuned to the occupants they serve.

As a collective of built environment professionals, we have a profound opportunity to shape the human experience. When we build environments that honour human dignity, we don't just change spaces, we inadvertently create the foundation for equitable, inclusive and lasting transformation.

Jacinta Serem is a director and Co-founder of Vinca Interiors Ltd. with over 14 years of professional experience spanning corporate, hospitality and residential interior design. Guided by a dedication to human-centered and sustainable design, she continues to influence the industry's evolution. Jacinta currently serves as the Secretary of the Interior Design Chapter of the Architectural Association of Kenya (AAK).

Designing Spaces for Life:

Nature-Based Solutions for Kenya's Urban Future

Anthony Kimondo,
Landscape Architect

Introduction

This year's convention theme speaks to moving beyond cities as mere containers for people and economic activity, towards creating dynamic, responsive environments that actively enhance human well-being, foster connection, and thrive in harmony with nature.

58% of the world's population (approximately 4.8 billion people) lives in urban centres. This is projected to rise to 62% by 2035 and 68% by 2050, driven by rapid urbanization in Asia and Africa. (United Nations 2018). In Kenya, 31.93% of the population (about 18.37 million people) resides in urban areas as of 2025. This is a significant increase from 27% in 2018 but remains below the global average. By 2050, Kenya's urban population is projected to reach 52.9%, rapid urbanization presents immense opportunity and significant risk (Population. net 2025).

Metric	Global	Kenya
Urban Population (2025)	58%	31.93%
Urban Population (2050)	68% (projected)	52.9% (projected)
Annual Urban Growth Rate	1.7–2.0%	~4.23%

Table 1: Urbanisation Metrics (Population.net 2025)

According to Pascal Mittermaier in 2016, discussions about "greening" cities often acknowledge the significance of sustainable infrastructure and smart urban planning. However, they frequently overlook the fact that nature serves as the world's original infrastructure. Nature-based solutions can assist cities in addressing some of their most pressing planning challenges, including air and water pollution, water scarcity, and extreme heat, all of which are exacerbated by climate change.

Within the theme "Shaping the Urban Future" and subtheme "Designing Spaces for Life", elevating nature-based solutions in our built environment offers a resilient, inclusive path forward.

Policy Foundations

Vision 2030 under Kenya's Social and Environmental Pillar pledges a society living "in a clean and secure environment" supported by conservation of natural resources for economic growth, with targets like increasing forest cover to 10 % by 2030.

Kenya's environmental strategy includes promoting Nature based solutions explicitly as a sub-strategy: "Promote Nature-Based Solutions for livelihoods, biodiversity conservation, and climate resilience of communities in priority landscapes." The Urban Areas and Cities Act (2011) operationalizes Article 184 of Kenya's Constitution and lays the legal groundwork for integrated urban planning.

It mandates:
1. Preparation of integrated development plans that align with county strategies (Section 38–42)
2. Institutionalizing public participation through Citizen Fora, empowering residents to influence urban governance and service delivery.

These frameworks embed ecological stewardship and inclusive governance into Kenya's urban policy architecture.

Nature-Based Solutions: Local Imperatives

Nature based solutions in our cities such as urban wetlands, bioswales, green roofs, street trees, and riparian restoration deliver multiple benefits: regulating stormwater, cooling microclimates, enhancing biodiversity, filtering air, and engaging communities. As noted, "Nature is the world's original infrastructure" and can address many urban planning challenges including pollution, heat, and flooding.

A recent Nature-based Solutions Compendium for Urban Resilience in Kenya published by the Global Centre on Adaptation (GCA) provides county-specific guidance for scaling Nature based solutions across secondary cities translating global concepts into Kenyan reality.

Action Pillars

1. Embed Nature based solutions in Planning Instruments
County Integrated Development Plans (CIDPs) and urban spatial plans must explicitly include greening targets and Nature based solutions-based infrastructure interventions such as permeable surfaces, drainage swales, riparian buffers and urban canopy expansion along technical and legal mandates.

2. Meaningful Public Participation
The Urban Areas and Cities Act citizen fora provide a platform for communities to co-design, monitor and steward Nature based solutions projects from neighbourhood wetlands to peri-urban reforestation sites as part of urban governance.

3. Pilot and Scaling-Up Demonstration projects green corridors in Nairobi, wetland restoration in Nakuru or bioswales in Kisumu should serve as technical models. These pilots can feed into Kenya's Nature based solutions Compendium and inform county level roll-out.

4. Multi-sector Collaboration & Financing
Vision 2030 emphasizes partnerships with private sector and international financiers. Nature based solutions can leverage climate finance, carbon credits, debt-for-nature swaps, and public-private partnerships to drive scalable urban resilience investments.

Local Examples:

Karura Forest in Nairobi a restored urban woodland spanning over 1,000 ha suffered severe degradation in the 1990's due to illegal encroachment, land grabbing, deforestation, charcoal burning and illegal dumping. The restoration efforts demonstrate how ecological regeneration, recreational space, native reforestation, and community stewardship intersect as a Nature based solutions flagship.

It underscores how regenerating degraded landscapes yields high returns in ecosystem services, public health and biodiversity.

Fig1: Karura Forest, Degradation and restoration timeline

Reviving the Auji River in Kisumu:

Originally a lush riverine corridor, the Auji River suffered heavy degradation due to domestic waste, population pressures, and biodiversity loss, transforming it into a polluted stream. In response, Kisumu County undertook a pilot project under UNEP's Generation Restoration Cities initiative, aimed at rejuvenating biodiversity hotspots, improving resident well-being, and enhancing livelihoods. This effort draws on multi-stakeholder action planning with active community involvement.

Policy & Practice Synergy

By aligning with the legislative mandates of Urban Areas and Cities Act, 2011 and strategic targets from Vision 2030, landscape architects and urban professionals can position Nature based solutions not as optional enhancements, but as core infrastructure:

1. Vision 2030 calls for sustainable, inclusive development
2. Urban Areas and Cities Act, 2011 demands integrated plans,

participatory governance, and service delivery mechanisms.

Nature based solutions Compendium and county planning documents offer technical roadmaps for implementation.

Together, these provide a foundation to reshape Kenya's urban futures with ecological, social, economic and regulatory coherence.

Conclusion

Navigating Kenya's urban transition demands systems-based thinking and ecological design frameworks. Nature based solutions is more than a design aesthetic it's the legal, technical, financial, and policy path to cities that are cooler, greener, safer, and more equitable.

As we gather at the AAK Convention and engage building industry professionals, let us not just share designs but advocate for meaningful integration of Nature based solutions into law, planning instruments, finance structures, and community life. Remember, the ultimate goal is to create cities that are not just functional, but nurturing, joyful, equitable, resilient, and deeply human. Spaces where people can flourish physically, mentally, socially, and economically – spaces truly designed for life.

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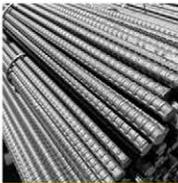# A ONE-STOP SHOP FOR ALL BUILDING MATERIALS

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Driving Urban Innovation:

Harnessing Cross-Disciplinary Collaboration for Next-Generation Cities

Plan. Christine Muchiri
Chairperson, AAK Town Planners Chapter

The Imperative for Integrated Urban Solutions

Rapid urbanization across the Global South creates unprecedented challenges that defy single-discipline solutions. Nairobi's six-million-day population has to battle with congestion, poor air quality and inadequate infrastructure. Mumbai also has informal settlements, which house over 40 percent of its population, yet remain largely invisible in traditional planning frameworks. These complex, interconnected challenges demand a fundamental shift from disciplinary silos to integrated collaboration.

The limitations of fragmented approaches are stark. When Sao Paulo's transportation engineers designed the initial metro system without meaningful input from social scientists and community representatives, entire low-income neighbourhoods found themselves cut off from economic opportunities. Conversely, when Medellin's urban transformation brought together urban planners, social workers, transport engineers, architects, and community leaders to reimagine its cable car system, the result was revolutionary. The Metro cable did not just move people up mountainous slopes; it became a catalyst for social inclusion, connecting marginalized communities to the city centre while transforming perceptions of informal settlements from zones of exclusion to neighbourhoods of possibility.

Technology and Collaboration in Practice

Cross-disciplinary collaboration reaches its full potential when powered by shared technological platforms that enable professionals to see beyond their traditional boundaries. In Accra's Jamestown district, a collaborative flood management initiative demonstrates this integration in action. Urban planners, hydrologists, environmental engineers, GIS specialists, and community health workers now use shared digital mapping platforms to overlay drainage patterns, settlement densities, disease outbreak data, and community vulnerability assessments. This integrated approach revealed that flooding wasn't merely a technical drainage problem but a complex socio-environmental challenge requiring coordinated interventions across infrastructure, health systems, and community resilience building. Similarly, Kigali's remarkable urban transformation since the 1990s exemplifies how Building Information Modelling and integrated planning platforms can coordinate multiple disciplines simultaneously. Urban planners designing new districts work alongside environmental engineers modelling watershed impacts, transportation planners optimizing connectivity, and social development specialists ensuring affordable housing integration. The result is comprehensive urban development that addresses multiple urban challenges simultaneously rather than creating new problems while solving others.

Overcoming Barriers Through Strategic Integration

Despite compelling success stories, cross-disciplinary collaboration faces substantial obstacles that require intentional strategies to overcome. Language barriers between disciplines often prove more challenging than technical complexities. When planners speak of "urban fabric," engineers focus on "load-bearing capacity," ecologists emphasize "ecosystem services," and sociologists highlight "social capital," these professional vocabularies can create communication gaps that undermine collaborative potential.

Medellin's urban transformation succeeded partly because early project phases included intensive cross-disciplinary workshops where professionals literally learned each other's languages. Planners shadowed community social workers to understand daily life patterns in informal settlements. Engineers worked alongside urban ecologists to comprehend how infrastructure interventions could support rather than disrupt natural systems. These relationship-building investments proved as crucial as technical expertise in achieving integrated solutions. Resource and capacity constraints present additional challenges, particularly in rapidly growing cities with limited municipal budgets. However, innovative financing and partnership models are emerging to address these constraints. In Rwanda, the government created integrated planning teams that combine international technical expertise with local knowledge holders, sharing costs across multiple sectors while building local capacity for sustained collaboration. This model demonstrates how resource limitations can actually drive more efficient, integrated approaches rather than perpetuating siloed interventions.

Building Collaborative Futures

Successful cross-disciplinary collaboration requires fundamental shifts in how urban challenges are conceptualized, funded, and implemented. Rather than viewing urban problems as discrete issues requiring specialist solutions, emerging best practices treat cities as complex adaptive systems where interventions in one area create ripple effects across multiple domains. Cape Town's response to the 2017-2018 water crisis exemplifies this systems approach. Faced with potential "Day Zero" when municipal water supplies would be exhausted, the city assembled integrated teams combining urban planners, hydrologists, behavioural economists, communications specialists, and community organizers. This collaboration produced not just technical solutions for water conservation but comprehensive behaviour change strategies that engaged diverse communities across the city's socio-economic spectrum.

The crisis was averted through coordinated interventions that addressed technical infrastructure, social behaviour, economic incentives, and political governance simultaneously. Building such collaborative capacity requires investment in shared tools, common languages, and relationship-building processes that enable professionals to work effectively across traditional boundaries. Universities are beginning to reform curricula to prepare graduates for interdisciplinary practice, while professional associations increasingly recognize collaboration as a core competency rather than an optional skill.

Conclusion: Integration as a Necessity

Cross-disciplinary collaboration has evolved from an innovative approach to a fundamental necessity for addressing the 21st-century urban challenges. Cities like Medellin, Kigali, and Chennai demonstrate that when diverse expertise combine effectively, the results transcend what individual disciplines can achieve independently. These examples reveal that successful urban innovation emerges not from technical solutions imposed on cities but from integrated approaches that recognize the interconnected nature of urban systems. The path forward requires commitment to breaking down professional silos, investing in collaborative tools and processes, and recognizing that sustainable urban development demands expertise from across the spectrum of urban professions working in genuine partnership with communities themselves. As global urbanization accelerates, particularly across the Global South, the cities that thrive will be those that master the art and science of cross-disciplinary collaboration, creating integrated solutions that address multiple urban challenges simultaneously while building long-term resilience and equity.

Harnessing Cross-Disciplinary Collaboration for Next-Generation Cities: Lessons from Small-Scale Design & Build Projects in Kenya

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PARTNER – QUANTYCOSTS
CONSULTANTS

Introduction

Next-generation cities are not simply denser or taller; they are more adaptive, resilient, and people-centred. In Kenya, delivering such cities demands a break from the conventional systems that have the traditional practices of architects, quantity surveyors and engineers. The Architectural Association of Kenya (AAK) is at the forefront of promoting cross-disciplinary practices, integrating traditional practices with emerging ones like construction project management, landscape architecture, interior design, urban planning, and environmental design. Further, incorporating employers, contractors and policymakers ensures next-generation cities are designed with the end user in mind. Currently in Kenya, there is a shift toward Design & Build (D&B) contracts for most small bespoke projects. This unique ecosystem offers a len into how cross-disciplinary collaboration can be streamlined — and how lessons from these compact projects could be scaled up to urban transformation efforts. The D&B approach integrates design and construction into a single contractual package, requiring consultants and contractors to work together from project inception. This model could become a template for how we deliver affordable, sustainable, and inclusive spaces for next-generation cities.

The Problem with Conventional Methods

The conventional project delivery method often follows a linear sequence where design is completed before construction begins. The consultant's involvement tapers off once the contractor takes over, with only periodic supervisory site visits required. While this approach allows for detailed upfront design control, it can also lead to:

- **Fragmented accountability** — with each party focusing on its deliverables rather than the holistic project outcome.
- **Cost and schedule overruns** — majorly caused by late-stage clashes between design intent and constructability.
- **Limited innovation** — design decisions may not fully incorporate the latest materials, methods, or technologies that may be available at the construction stage.

For small bespoke projects in Kenya, these inefficiencies are magnified. The cost of multiple consultants is higher relative to project value, discouraging innovation and thorough supervision. In some instances, employers refuse to engage Consultants due to such cost constraints. Employers are becoming increasingly attracted to D&B models that promise single-point accountability and faster delivery. However, these contracts end up breeding disputes when delivered outputs fall short of expectations due to inadequate contractual safeguards.

Design & Build Contracts: Templates of Cross-Disciplinary Collaboration

The principle behind D&B contracts forces early cooperation between design and construction teams. The contractor assumes responsibility for both, meaning the design team must consider risks associated with constructability, supply chain realities, and cost constraints from the outset. This early collaboration is exactly the kind of synergy next-generation cities require, where urban design, infrastructure engineering, sustainability planning, and community engagement must proceed simultaneously, and at project inception.

Kenya's current experience with D&B contracts in small projects exposes the downsides that parties to a contract may expect, such as:

- **Ambiguous Employer's Requirements** - Leading to mismatched expectations.
- **Inadequate design oversight** – This risks the lowering of project quality.
- **Limited stakeholder engagement** – Limiting project usability and public acceptance.

These challenges mimic those faced in large-scale urban design. Whether it's a single high-end villa or a new mixed-use development, ambiguous goals, inadequate quality assurance, and

narrow disciplinary teams constrain expected project outcomes.

Building a Collaborative Framework

The key to making D&B contracts, and by extension, next-generation city projects, successful is to formalize collaboration and align deliverables across the various project disciplines from inception. This can be done in the following stages:

1. Early and Clear Definition of Requirements

- For small D&B projects, this means lucid Employer's Requirements, well documented and prepared with the input of a multi-disciplinary design team, even before tendering of the works.
- In city-scale developments, this would be scaled to mean defining measurable targets for sustainability, inclusivity, and economic viability, agreed upon by all key actors in the ecosystem at the project inception stage.

2. Quality Design Review

- In small Kenyan D&B projects, appointing a skilled Employer's Representative ensures design quality without reverting to a conventional, fragmented model. Emerging professions like Construction Project Management give the all-rounded skills required to suit such positions.
- For urban projects, this could translate into an integrated project management office where all project consultants and contractors sit under one roof, reviewing and adapting designs in real time.

3. Incentivizing Collaboration

- Small D&B frameworks can incorporate performance incentives tied to timely project completion, budgeted lifecycle costs, and overall end-user satisfaction.
- Similarly, in next-generation city projects, contractual incentives

could reward achieving shared sustainability or liveability metrics rather than just delivering physical outputs.

4. Cross-Training and Knowledge Sharing

- In small projects, encouraging construction managers to understand design principles and designers to appreciate construction challenges reduces clashes during project implementation.
- In design for next-generation cities, cross-disciplinary knowledge builds mutual respect and problem-solving capacity, which is essential for adapting to changing needs for futuristic projects.

From Micro to Macro: Scaling Possibilities

Imagine a D&B contract for a small bespoke school in Nairobi, developed by architects, quantity surveyors, structural engineers, MEP engineers, and the contractor working together from the outset.

The Employer's Requirements balances design ambition with budgets, while a compact review team led by a construction project manager ensures compliance and innovation. This would result in a well-built, functional facility delivered on time and within budget.
Now scale this thinking to a next-generation city:

- The D&B contractor becomes a master developer.
- The architect becomes part of a permanent, embedded design team, influencing every construction stage.
- The quality review function expands into an urban design oversight board comprising all eight design consultant practices.
- The cost-control mechanisms apply across multiple project phases.

By translating this collaborative methodology of successful small D&B projects into the governance of large,

complex developments, it is possible to move closer to delivering truly integrated, people-focused urban environments.

How Kenya Benefits with this Shift

Kenya's urban growth is rapid and often uncoordinated, resulting in infrastructural strain, informal settlements, and mismatched land uses. As Nairobi, Mombasa, Kisumu, and other secondary cities expand, the question is not just how quickly we can build, but how well we can integrate built environment disciplines to build right.
The Affordable Housing Project has attempted to emulate this model, but their efforts seem to lean more towards the traditional designer-contractor approach. A more collaborative method, similar to D&B contracts, might ensure smoother project delivery and potentially better compensation for design consultants when the role of compensation shifts from the Employer to the Contractor.
Small bespoke D&B projects offer a controlled environment to test and refine collaborative frameworks before applying them to megaprojects. They allow for:

- Testing cost-efficient multidisciplinary design review systems.
- Refining Employer's Requirements templates for clarity and accountability.
- Piloting performance-based incentives that reward project outcomes.

Conclusion

Next-generation cities will not emerge from the siloed processes of the past. They require contracts, governance structures, and professional cultures that embrace continuous, integrated collaboration. Kenya's small bespoke D&B market, if structured to avoid the pitfalls of unclear requirements and weak oversight, can serve as a valuable laboratory for these new models. Perhaps this is an opportunity for the Joint Building Council, a branch

of AAK, to tailor-make a D&B Conditions of Contract that would be later modelled for application in next-generation city mega projects. By harnessing lessons from these D&B projects, the built environment can be equipped with the tools, trust, and teamwork needed to thrive in a fast-changing world. The future of our urban spaces will be built not just with concrete and steel, but with the shared vision and commitment of all disciplines working as one.

Martin practices as a construction project manager and an alternative dispute resolution [ADR] practitioner. He holds a Bachelor of Science in Construction Management [Hons.] from Jomo Kenyatta University of Agriculture & Technology, Application of FIDIC Contracts by the International Federation of Consulting Engineers, and an Advance Certificate in Arbitration from the Chartered Institute of Arbitrators [London].

HEALTHY HOMES

This is a comprehensive checklist covering every aspect of a home that users should consider. It provides a clear overview of the health-related aspects of the house, helping users assess whether it meets their criteria for a healthy living environment.

- Adequate ventilation for all habitable spaces
- Provide for vector control
- Good building/house accessibility
- Natural lighting for all habitable spaces
- Integrating greenery in our houses
- Select a good neighborhood
- Sustainable and clean Energy
- Adequate safety & security provision
- Use of appropriate available materials
- Proper noise control
- Incorporate good interior design
- Avoid overcrowding
- Adequate water, sanitation & drainage provision
- Orderliness in house layout design
- Proper & regular maintenance

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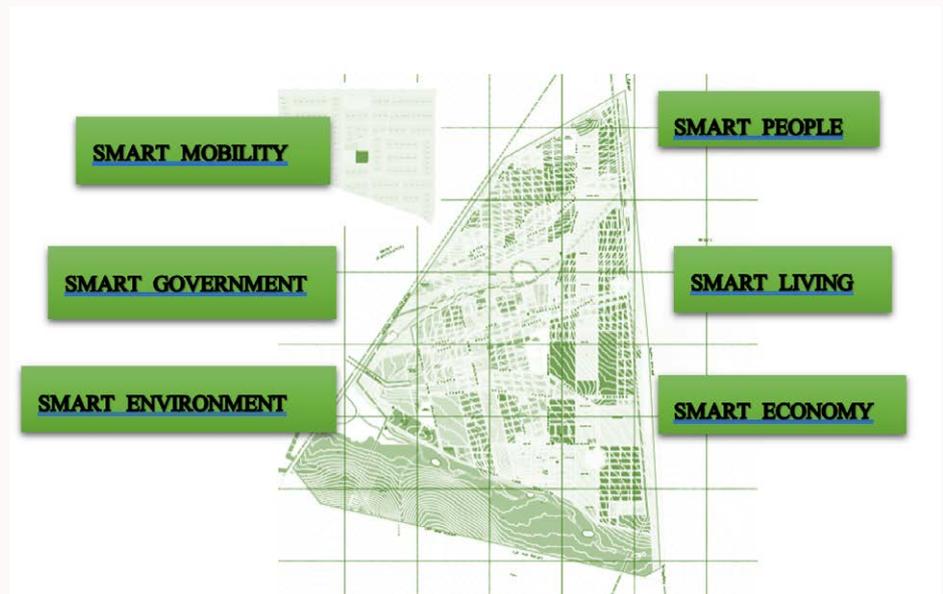# Smart Cities, Smarter Systems: Leveraging AI to Transform Urban Kenya

Esthlynn Okhabi
Graduate architect,
a communications intern at the
Architectural Association of Kenya

In Kenya's urban development discourse, few topics have stirred as much excitement and concern as Artificial Intelligence (AI). Across the globe, AI is reshaping how cities function: predictive algorithms are fine-tuning energy consumption in Singapore, autonomous shuttles are redefining mobility in Helsinki, and real-time environmental monitoring is informing policy in Copenhagen.
These global trends are steadily making their way to Africa, where urban populations are booming and the demand for innovative solutions is urgent.

As Kenya's cities grow denser, infrastructure demands escalate, and environmental pressures mount, AI emerges not merely as a technological novelty but as a strategic instrument for designing, managing, and sustaining urban spaces. The question is no longer whether AI will influence urban planning, it already has, but how to harness its potential ethically and effectively.

Kenya's Konza Technopolis, envisioned as a flagship smart city under Vision 2030, offers a fertile case study . This ambitious project promises to blend cutting-edge digital infrastructure with sustainable planning, positioning itself as a model for African smart cities. Yet, it is important to note that Konza's meticulously planned layout is worlds apart from Kenya's organically evolved urban centers like Nairobi's bustling downtown or Mombasa's historic Old Town, where infrastructure has grown in fits and starts. The challenge lies in translating the high-tech lessons from Konza into strategies that work for cities shaped by spontaneity, economic pressures, and layered histories.

> **"Artificial Intelligence is not the future, it is the present shaping how we build, live, and interact with our cities."**

AI in the Urban Design Process

AI is increasingly present in predictive urban management, forecasting traffic flows, modeling infrastructure resilience, and simulating environmental impacts.

In Konza, AI-powered platforms are to integrate data from Internet of Things (IoT) sensors to optimize energy use, reduce congestion, and monitor water consumption. The Nairobi Urban Data Platform applies similar principles, aggregating real-time data to support planning decisions, though with more complex challenges in informal settlements .

The implications are profound. AI enables scenario planning at unprecedented speed and scale. Planners can test the effect of a new road or public transit line before breaking ground. Predictive maintenance systems can alert municipal authorities before infrastructure fails, reducing costly repairs and service disruptions. Yet, outside of controlled developments like Konza, data inputs become more fragmented. Informal street layouts, unregistered businesses, and inconsistent service provision make predictive modeling more complex. Here, AI must adapt by integrating unconventional data sources such as mobile phone location patterns, satellite imagery, and community-driven mapping .

The Human Factor and Digital Equity

One of the recurring concerns is the risk of losing the human element in AI-driven planning. A city is not just infrastructure; it is a lived experience. Human-centered design principles must remain central. This includes ensuring digital literacy across communities, so residents can meaningfully engage with AI systems that shape their daily lives .

At Konza, public engagement is structured into the development process, but in established cities, such engagement requires creative approaches. Community workshops, gamified planning tools, and local-language digital platforms can bridge the gap between algorithmic decision-making and lived realities.

Equally important is digital equity. AI thrives on data, much of which is personal. Without robust data governance frameworks, citizens risk exploitation. The principle

> ## "AI can learn from the chaos if we feed it the right data and safeguard the people behind that data."

of Explainable AI (XAI) making algorithmic decisions understandable to non-technical audiences should be embedded in all urban AI applications.

Opportunities vs. Risks

Artificial Intelligence brings with it a wave of transformative opportunities for Kenya's emerging smart cities. One of the most promising opportunities lies in efficient resource allocation. Imagine energy grids that adjust dynamically to fluctuations in demand, ensuring no power is wasted, or waste management systems that can predict the optimal times and routes for garbage collection, saving both fuel and labor . AI can also play a crucial role in environmental monitoring. By continuously tracking air quality, water levels, and waste output in real time, AI-powered systems can trigger immediate responses whether it's alerting communities about deteriorating air conditions or activating flood defenses before disaster strikes.

In transportation, AI opens the door to transport optimization. Predictive traffic models can reduce congestion by rerouting vehicles before gridlocks occur, while public transport schedules can be dynamically adjusted to meet shifting passenger needs. Furthermore, AI enhances disaster preparedness, with early-warning systems capable of detecting signs of floods, fires, or droughts before they escalate into crises.

Yet alongside these benefits are significant risks. After complexity of implementation and the inadequate suitable AI tools to integrate in urban design; privacy concerns are among the most pressing issues. Without robust data protection laws, AI-driven surveillance technologies could be exploited, eroding personal freedoms . Algorithmic bias presents another challenge; if AI systems are trained on incomplete or skewed datasets, they may reinforce social inequities rather than dismantle them. The digital divide also looms

Challenges Faced integrating AI Technologies
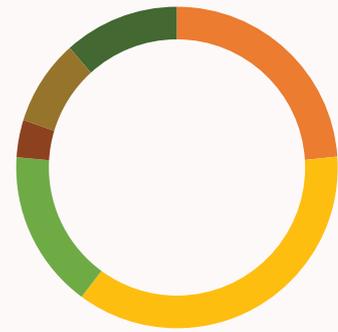
%	Challenge
24%	Lack of suitable AI tools
4%	Ethical concerns
36%	Complexity of implementation
8%	Resistance from team members
16%	Data provacy and security concerns
12%	Financial constraints

large if only certain groups have access to AI-enabled services, the benefits of smart city living will deepen existing inequalities. Finally, there is the danger of over-reliance on technology. A major failure whether due to cyberattacks, infrastructure breakdowns, or governance lapses could trigger cascading disruptions across essential services.

Kenya's Data Protection Act (2019) lays an important legal foundation for safeguarding personal information, but the complexities of urban artificial intelligence require governance measures that go beyond general data protection.

In the context of AI-enabled smart cities like Konza, sector-specific regulations are essential to address unique ethical and operational risks. This means instituting mandatory impact assessments before any AI system is deployed in public services, ensuring that potential social, economic, and environmental consequences are evaluated in advance.

It also calls for transparent reporting mechanisms so that data collection, storage, and usage practices are open to public scrutiny, thereby fostering trust. Finally, establishing citizen

oversight boards would provide a direct channel for community involvement, allowing residents to monitor AI operations, raise concerns, and hold both government and private operators accountable. Such proactive governance ensures that innovation serves the public good without compromising rights or equity.

From Konza to the Rest of Kenya

How can we adapt Konza's AI-driven approach to cities that already "have a life of their own"? The answer lies in incremental integration. Start with Transport; Nairobi's traffic chaos is both a data-rich environment and a high-impact area for AI intervention. Pilot projects could apply predictive traffic modeling, building public trust before expanding to other sectors.

Leverage existing networks like mobile money and ride-hailing apps that already generate vast datasets that can inform urban planning

"

Konza shows what is possible; Nairobi shows what is necessary."

without massive new infrastructure investments. Collaboration between government, tech firms, and universities through Public-Private Partnerships (PPPs) can accelerate adoption while ensuring accountability Such integration also requires clear implementation timelines. Urban AI strategies should outline phased rollouts, from pilot programs to citywide systems, with regular performance evaluations.

Towards Smarter, More Inclusive Cities

Konza Technopolis is a symbol of aspiration, a meticulously designed city where AI works hand-in-hand with urban planners to create a seamless, sustainable living

environment. But Kenya's urban future will be determined by how well we bring these innovations into existing, chaotic cities.

AI has the potential to predict problems before they occur, optimize limited resources, and amplify human creativity in designing cities. However, its success depends on human oversight, ethical safeguards, and community involvement. If we can merge the efficiency of algorithms with the wisdom of lived experience, Kenya could pioneer an urban model that is both technologically advanced and deeply human-centered.

Esthlynn Okhabi founded Okhabi Group, a design studio dedicated to innovative, sustainable solutions. She holds degrees in Communication and Architecture. Her interests lie in exploring AI integration in the built environment for resilient, inclusive urban development.

Photo courtesy: www.konza.go.ke

The social design approach in the co-creation of digital hubs in urban marginalized areas

Stephen Nyagaya

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In today's digital era, the internet is more than a tool. It's a lifeline. From accessing basic services such as education and healthcare to participating in governance activities, digitalization has become essential to driving modern society. Yet in many urban areas in Kenya, a digital divide exists, inhibiting those living in informal settlements from accessing and using ICTs. In Nairobi, the 'Africa's Silicon Savannah', digital accessibility remains a privilege to those who live in marginalized areas such as informal settlements.

Kenya has made bold steps towards digital inclusion. But for these efforts to sustain long-lasting changes, especially in informal settlements, the design of digital infrastructure must go beyond technology. It must be rooted in its beneficiaries' lived realities, needs and aspirations.

Digitalisation in Kenya: A Nationwide Commitment

Kenya is positioning itself as a leader in the digital transition phase, with major investments in ICT infrastructure, innovation and e-governance. The government is working with the private sector to promote internet connectivity, transforming key sectors such as education, healthcare, agriculture, and transport. This transition is anchored in the newly launched National Digital Masterplan 2022-2032. Developed and implemented by the Information and Communication Authority (ICTA) of Kenya, the plan positions ICT as a key enabler to realising Vision 2030 - accelerating a digitally-enabled economy, and providing a roadmap to achieving socio-economic development. The Digital Superhighway project sets out the development of 100,000 Km of fibre optic across the country, connecting government schools, public spaces, health facilities, and homes with internet. This project is accompanied by the installation of 25,000 public Wi-Fi hotspots in market centres, bus termini, and other public spaces. In addition, the government is establishing 1450 village digital hubs across all wards in the country by 2030. The digital hubs aim to promote digital connectivity in underserved and unserved areas, digital literacy, and increase access to e-government services.

For many communities, especially in marginalised urban areas, these hubs could offer the first real opportunity to participate in the digital economy. However, digital infrastructure alone cannot guarantee inclusion. Too often, top-down technological solutions fail because they overlook the social and spatial realities of the marginalised communities. Research shows that top-down models overlap with the existing socio-political ties of communities (Hoolohan et al., 2020), eventually leading to their failure by sabotage or rejection by the existing community structures (Guma & Wiig, 2022). Further research also show that digital hubs services do not reach their target

groups (Wamuyu, 2017). Rather than supporting those in need, digital support community members who are already employed (Taylor et al., 2023). This calls for the need to adopt a fresh approach in the design of the hubs. The Rise of Digital Hubs in Kenya Over the last decade, digital hubs in Kenya have evolved from elite tech innovations to more grassroots community centres offering literacy and job opportunities. The Ajira Digital Program, a pioneer project by the Government of Kenya, has been focused on providing digital literacy and connecting the youth to gig and freelance work online. Kamkunji Resource Centre in California, Eastleigh, is one example where the community accesses the services of the Ajira Digital program.

In informal settlements like Mathare, Mukuru, or Kibera, small community-led hubs are emerging, often run by local youth groups, individuals, or NGOs. While these spaces provide essential services like training and empowerment, most are not connected to the internet, operate with limited resources, and are not linked to the government's digitalization policy

(Nyagaya & Mwau, 2024). Other issues, such as restrictive hours, lack of ownership, and formal bureaucracies, discourage certain groups from accessing the services. Limited community participation in the design of such community hubs leads to underutilization, leaving them to serve a small fraction of the population.

Besides, ICTA designs digital hubs technically without considering how their location, governance, and services can best target heterogeneous residents in the informal settlements. This article, therefore, proposes a social design approach in developing digital hubs in informal settlements.

The approach centres on the participation of communities and relevant stakeholders in conceptualizing and designing hubs. Communities and the government form a mutual relationship, where the government understands the social and political dynamics better, while the community understands the government's digitalization standards.

The Social Design Framework

The social design approach offers a compelling alternative to top-down technical development models. It is founded on participatory design, social innovation and co-creation that ensure public spaces are created with the community, not just for the community. This approach allows communities and relevant stakeholders to design solutions tailored to solve their priority needs. It also enables the community to work with target groups – including the most marginalised groups to participate in the co-creation, centering their needs and proposals for developing inclusive and sustainable solutions. Further, other key stakeholders, such as the local service providers, are included in the co-creation and co-design processes.

The social design approach allows informal settlement communities and stakeholders to leverage their daily digital experience to co-create sustainable and inclusive digital hubs. The following table summarises the social design process for co-creating digital hubs in informal settlements.

The process	Anticipated Method(s)	Outcome
Assessment of the lived experiences	• Surveys & Mapping of infrastructure • Household interviews	• Everyday (digital) urbanism. • Describes the social, economic, political and cultural dynamics of the community.
Co-defining the problem	• Interviews with social (target) groups • FGDs • Community workshops	• Identifies the target groups. • Identifies the underlying social needs. • Participation of the most vulnerable and excluded groups such as PWDs.
Co-creation of solutions	• Best practices • Participatory design workshop • Co-creation workshops	• Prioritizes hub services. • Identifies the location of the hub(s). • Develops governance mechanisms • Develops monitoring and evaluation framework. • Institutes decision-making mechanisms. • Develops a framework for continual participation and feedback mechanisms. • Formulates dispute resolution mechanisms. • Defines the roles of community, government, the private sector and other relevant actors.

Phase 1: Assessment of lived realities

The process begins with an assessment of the area to capture residents' lived experiences within their everyday digital activities, providing a baseline understanding of social, economic, political, and cultural dynamics. For example, understanding how Community Health Promoters (CHPs) use digital tools like smartphones in their daily health activities.

Phase 2: Co-definition of the problem

This phase enables the designers, the community, and relevant stakeholders to identify varied needs and challenges of the heterogeneous community. This includes relating the digital connectivity challenges to the social, political, and economic realities of the informal settlement community, for example, describing how and why households access community centres, and the challenges related to their governance.

Phase 3: Co-creation of solutions

This phase enables the co-creation of services to solve the prioritized challenges. It uses methods such as participatory design or co-creation workshops to propose services, location, and governance structure of the digital hubs. This allows the community to link their needs to the digital hub's services. Participation of stakeholders, including local service providers, encourages acceptability and functionality of the digital hubs. The workshop participants propose continual participation, financing mechanisms, and leadership, thereby ensuring inclusivity and sustainability of the hubs.

ICTA's master plan aims to establish digital hubs in every ward in Kenya.

This is recommended as it potentially aims to bridge the digital divide. The government conducts technical designs to decide on the location and spatial layout of the plans. We recommend adding a social design approach tailored to the services and governance structure, making the hubs relevant and sustainable. This overcomes the risk of failure or deepening exclusion in marginalized urban areas.

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Reprogramming the Process:

Computational Design in Kenyan Architecture
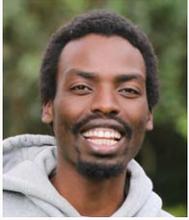
Brian Boit

A graduate architect and BIM Coordinator at Symbion Kenya Limited. He researches the intersection of digital technologies, sustainability, and architectural practice, with published research and conference contributions on HBIM and the digitalization of heritage conservation.

Telvin Gichuhi

Architectural Assistant at Symbion with a strong leaning toward BIM. As the co-founder of Akani Group, he harnesses technological innovation to optimise design and construction workflows, while actively mentoring students pursuing AEC disciplines. He is currently undertaking a postgraduate Program in Computational Design at Novatr.

In an era increasingly defined by data, dynamism and design complexity, the architectural profession in Kenya stands at a critical point of convergence.

As spatial challenges grow more intricate, demanding integration across performance, sustainability and user specificity, the question is not whether digital tools will shape architectural practice, but how deeply they will transform it. Computational design, as a methodology and mindset, offers one of the most significant reorientations of architectural thinking in our time. As architectural practitioners at Symbion Consulting Group and students of computational design, we approach our learning not as a purely academic exercise but as an extension of daily practice. While firmly grounded in real-world projects, we are increasingly aware that our professional futures demand a new kind of design literacy: one that is procedural (following a clear sequence of steps), informed by measurable data and open to emergent form, thus allowing designs to evolve based on set rules and conditions.

From Intuition to Intention: What Is Computational Design?

Computational design is not simply the use of software in design; it is the structuring of logic, data, and step-by-step instructions to generate, analyze, and optimize architectural outcomes.

It involves programming how spaces behave, setting relationships between elements, and engaging iterative processes to derive designs that are both functional and adaptable. Through tools such as Grasshopper (for Rhino), Revit Dynamo, and Python scripting, designers can move beyond modelling fixed forms to designing coded systems that produce shapes based on rules. For example, instead of manually placing every window, a parametric system can place and size them automatically according to rules about daylight or heat gain. This is at the heart of our training, which combines basic coding, mathematical geometry and environmental simulation, thus bridging conceptual design with real-world performance criteria.

Rewiring the Design Process

In Kenyan practice, the traditional design process remains largely linear: brief, concept, schematic design, design development, documentation, and construction. Computational design on the other hand, disrupts this structure by inserting performance and iteration at the conceptual stage. Design becomes a process of adjusting inputs (such as building orientation, material properties, or shading devices) and instantly seeing how they change outputs (such as daylight quality or temperature).For instance, during one of our explorations, we developed a form-generation script tied to solar orientation and prevailing wind directions on a Nairobi site. By adjusting window ratios, building depth, and façade articulation based on environmental feedback loops, we could generate dozens of alternatives optimized for thermal comfort and daylighting before producing a single rendering. This integration of simulation within the design loop opens the door to truly performance-driven architecture especially relevant for the Kenyan context, where passive design remains underutilised despite its climatic appropriateness.

Computational Design in Construction and Detailing

Beyond concept development, computational design supports construction and fabrication through automating repetitive detail drawings, parametric documentation (drawings and schedules that update automatically when the model changes), and digital prototyping. On global precedent projects, this has enabled non-standard geometries to be delivered with precision and material efficiency.In Kenya, where cost and time constraints often limit design exploration, the application of computational logic can streamline repetitive detailing tasks, improve

buildability, and reduce clashes through data-informed model validation. Scripted processes for laying out grids, walls, openings, or generating schedules and quantity take-offs are already part of global BIM workflows, and are increasingly being introduced in Kenyan firms. Our exposure to Revit-Dynamo workflows hints at how even entry-level automation could improve the efficiency of design documentation and reduce human error, particularly for projects with repetitive typologies such as housing, schools, or healthcare infrastructure. The Role of Data in Sustainable Design Perhaps the most transformative contribution of computational design lies in its treatment of data, not as a by-product but as a design material. Using tools like Ladybug and Honeybee, architects can test solar radiation, wind flow, and energy loads within the design environment.

This has deep implications for Kenya's sustainability ambitions. Rather than relying on prescriptive checklists or post-design certifications, architects can embed performance criteria from the outset, designing with daylight autonomy thresholds, ventilation rates, or carbon benchmarks already coded into the system. With growing attention on resource efficiency, climate-responsive architecture, and energy codes in Kenya, such approaches are no longer optional. They are integral to the profession's relevance in a warming and urbanizing world.

Challenges in the Kenyan Context

Yet, the adoption of computational design in Kenya is far from mainstream. Barriers range from limited access to training and tools, to a conservative industry culture that prioritizes short-term deliverables over innovation. In many firms, the notion of a "script-based design process" still sounds speculative or academic. Even in our student work, we have felt the steep learning curve of integrating scripting into design workflows. Concepts like conditional loops, data trees, or parametric
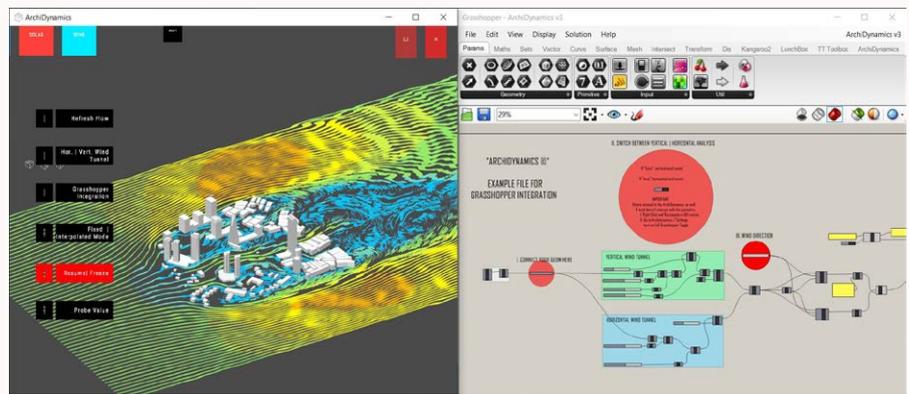
logic require a shift in mindset from static modelling to relational thinking. However, the value of these tools in enabling faster iteration, more informed decision-making, and deeper performance insight is already evident. With the rise of BIM adoption and a new generation of designers seeking global fluency, the trend will eventually shift. It is important to stress: computational design does not replace creativity or local cultural understanding. Rather, it enhances them by embedding logic into craft and enabling context-aware exploration at a scale and speed that was previously impossible.

A Call for Integration

Kenya's design challenges are complex: rapid urbanization, limited infrastructure, informal settlements and climate vulnerability. These are not problems that can be solved with form alone. They require systems thinking, an approach that computational design inherently supports. From urban-scale data visualization to modular housing design, from prefabricated school prototypes to climate-adaptive hospitals, the opportunity to embed computation across scales is immense. Architectural education must evolve to reflect this, integrating parametric thinking, scripting basics, and performance simulation into studio culture, not as a niche, but as a new standard.

Conclusion: Towards a Design Intelligence

Computational design is not a trend. It is a shift in architectural intelligence. As students and

practitioners navigating both traditional and emerging workflows, we believe its value lies not merely in producing complex forms, but in generating clarity, responsiveness, and rigor in the design process. For Kenyan architects, the challenge is not whether to adopt computational design, but how to do so meaningfully, rooted in local context, oriented towards performance, and integrated with practice. Tools exist and knowledge is increasingly accessible. What remains is the will to script a new kind of architecture, one that is as intelligent as it is inspiring.

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AAK Governing Council 2025-2027

AAK College of Fellows and Governing Council Meeting with the Heads of Built Environment Schools

AAK Reaserch and Advocacy Team with the PP Arch Florence and AAK President Arch. G. A. Ndenge at the SBE launch and Presidents' dinner 2024

Engineers Chapter Build Tour to Lamu

Architects Chapter Golf Tournament 2025

AAK Exhibition at the Devolution Conference

Architects and Engineers Chapter CPD

Town Planners Chapter Build Tour to Talanta Stadium

ESMT Berlin MBA students visit to AAK

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