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INSTITUTIONAL FRAMEWORKS AND HOUSING AFFORDABILITY FOR LOW-INCOME GROUPS IN KHARTOUM, SUDAN: A LONGITUDINAL ANALYSIS OF ENABLING STRATEGIES (2000–2023)

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ABSTRACT

This paper examines how institutional design has shaped housing affordability for low-income groups in Khartoum, Sudan, over the volatile period 2000–2023. As the country's primate city and the focal point of major geopolitical ruptures – including the 2011 secession of South Sudan and the 2023 conflict – Khartoum provides a critical setting for reassessing the “enabling approach” to housing in a fragile institutional environment. The analysis evaluates the performance of the Khartoum State Housing and Development Fund (H.D.F.) through two interrelated conceptual lenses: The Hybrid Trap, an institutional condition in which the H.D.F. adopts market-oriented discourse while retaining centralized control over land and regulation, and the Infrastructure Tax, the cumulative, regressive service costs borne by residents of formal schemes that lack reliable basic infrastructure such as water and electricity. Using a mixed-methods design that combines annual Interrupted Time Series analysis with qualitative evidence from key stakeholders and residents, the study shows that standardized, one-size-fits-all enabling prescriptions have been only partially effective and, in some respects, counterproductive under Sudan's weak and politicized governance conditions. The results indicate that the Affordability Gap widened over time as macroeconomic volatility – including the Dutch Disease dynamics of the 2005–2011 oil boom, the post-2011 revenue collapse, and sustained hyperinflation – interacted with institutional hybridity and service deficits to push the real cost of formal housing beyond the reach of many low-income households. The paper argues that these outcomes reflect not merely implementation shortfalls but structural constraints embedded in the way enabling strategies were translated into local institutional arrangements. It concludes by proposing a reorientation toward infrastructure-first, serviced-land provision, clearer separation of regulatory and development roles within the H.D.F., and stronger protections for residual income, offering broader lessons for the design of housing governance frameworks in post-conflict and fragile urban contexts.

KEYWORDS: Institutional Frameworks, Housing Affordability, Low-Income Groups, Khartoum, Sudan, Enabling Strategies, Longitudinal Analysis.

1. INTRODUCTION

The urban landscape of Khartoum has been profoundly reshaped over the first two decades of the twenty-first century by the combined effects of oil-driven economic expansion, large-scale internal displacement, and far-reaching institutional change, a trajectory clearly illustrated in Figure 1, which traces the succession of macro-economic and political shocks between 2000 and 2023. As Sudan's administrative and economic center, the city has faced intensifying pressure on land and services, with demand for housing rising fastest among low-income groups who make up a substantial share of its growing population. Central to the government's formal response has been the Khartoum State Housing and Development Fund (H.D.F.), established to shift from direct public provision towards a facilitative or "enabling" role intended to leverage private investment in serviced land and housing; however, as the downturns and inflationary spikes shown in Figure 1 accumulate over time, the effectiveness of this shift has become increasingly contested, with the gap between the supply of formal

housing and what low-income households can realistically afford widening rather than narrowing.

During the early 2000s, when GDP growth was buoyed by rising oil revenues and the relative stability associated with the Comprehensive Peace Agreement period, the state enjoyed greater fiscal space for urban infrastructure and housing-related investment, yet these gains were unevenly distributed and only partially consolidated in Khartoum's peri-urban areas. The secession of South Sudan in 2011—clearly marked in Figure 1 as a turning point—removed most oil income and ushered in a prolonged phase of low or negative growth and accelerating inflation, eroding both households' purchasing power and the state's capacity to subsidize serviced plots. Subsequent episodes of political instability, including the 2019 uprising and transitional period and the renewed large-scale conflict from 2023, coincide in the figure with sharp output contractions and price surges, further weakening institutional ability to plan, finance, and implement conventional housing programs.

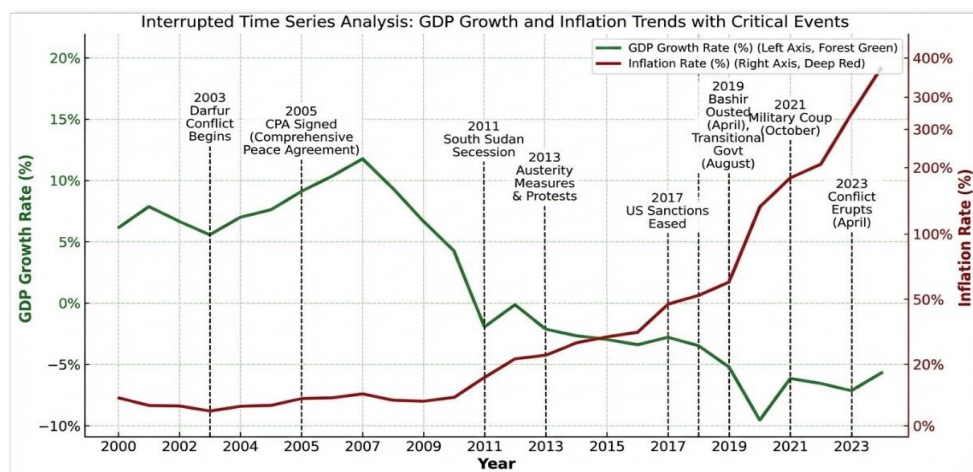


Figure 1: Interrupted Time Series Analysis: GDP Growth and Inflation Trends with Critical Events (2000–2023)

Source: Author's analysis based on World Bank Development Indicators (GDP growth and inflation rates) (World Bank, 2024).

Against this backdrop, the paper addresses a central paradox in Khartoum's recent urban development: enabling strategies that were ostensibly designed to lower costs and expand access through market efficiency have coincided with formal housing schemes that remain financially out of reach for the bottom 40 per cent of households. The critical events highlighted in Figure 1 encompass a range of macro-economic and political shocks, including periods of significant economic

expansion and contraction, major political transitions, and outbreaks of large-scale conflict, all of

which profoundly influenced the urban context. To interrogate this paradox, the study develops the concept of the Hybrid Trap, a condition in which an agency such as the H.D.F. no longer possesses the resources to act as a direct provider yet retains monopolistic control over urban land allocation and key regulatory levers, thereby constraining private and community-based actors from effectively serving low-income segments. In parallel, it introduces the notion of an Infrastructure Tax to capture the indirect and recurrent costs that residents in ostensibly "formal" developments must bear to secure basic

services—such as water, electricity, sanitation, and waste management—when these are not reliably supplied by the state and must instead be purchased from fragmented, often informal providers.

By examining how these institutional arrangements and hidden cost structures interact with the macro-economic volatility and conflict dynamics depicted in Figure 1, the paper seeks to contribute to wider debates on urban planning and housing governance in the Global South, where similar boom-and-bust cycles and fragile institutions constrain pro-poor delivery. It highlights the tensions that emerge when standardized enabling policy models and idealized urban forms are transplanted onto cities characterized by segmented infrastructure systems, constrained public finance, and contested land regimes, as in Khartoum. The sections that follow review the evolution of enabling policy in Sudan, develop the Hybrid Trap and Infrastructure Tax as analytical lenses, and present empirical evidence on how successive economic cycles and political shocks over 2000–2023 have reshaped housing affordability and access for low-income groups in Khartoum. The operationalization of the 'bottom 40 per cent' of households, including specific income thresholds and their measurement in the Khartoum context, will be detailed in the methodology section.

1.1. Problem Statement

Despite two decades of reforms framed around international "enabling" housing strategies, formal schemes in Khartoum have remained largely inaccessible to low-income households, particularly those in the bottom 40 per cent of the income distribution (UN-Habitat, 2018). The Khartoum State Housing and Development Fund (H.D.F.) has shifted away from direct provision toward a hybrid "provider-facilitator" role, retaining centralized control over land allocation and regulation while lacking the fiscal and organizational capacity to deliver serviced, affordable plots at scale (World Bank, 2020). This institutional configuration has produced what this study terms the Hybrid Trap, in which neither the state nor market actors can effectively meet low-income housing needs, and has generated a regressive Infrastructure Tax whereby beneficiaries of formal schemes face high recurrent costs for basic services such as water, electricity, and waste management (Steel et al., 2019; Makki et al., 2023). Against a backdrop of macroeconomic volatility, hyperinflation, and conflict-related displacement—especially following the 2011 secession of South Sudan and the escalation of violence in 2023—the cumulative effect has been a

widening affordability gap, persistent peri-urban fragmentation, and growing misalignment between formal housing policy and the lived realities of Khartoum's urban poor (World Bank, 2024).

1.2. Objectives of the Study

In light of this problem, the study pursues four interrelated objectives:

1. To analyze longitudinally how macroeconomic shocks and political ruptures between 2000 and 2023 have affected formal housing prices, real household incomes, and the affordability of H.D.F.-supported schemes for low-income groups in Khartoum.
2. This entails constructing and interpreting House Price-to-Income and residual income indicators using deflated H.D.F. and Central Bureau of Statistics series, benchmarked against World Bank macroeconomic data (World Bank, 2024).
3. To examine the institutional design and evolution of the H.D.F. and related land-governance arrangements, and to assess how these have produced a Hybrid Trap that constrains pro-poor housing delivery.
4. The objective is to identify how centralized land control, opaque allocation criteria, and bureaucratic gatekeeping shape private-sector participation, project siting, and the distribution of benefits across income groups (UN-Habitat, 2018; Steel et al., 2019).
5. To conceptualize and empirically measure the Infrastructure Tax borne by residents of formal H.D.F. schemes, and to evaluate its contribution to the affordability gap relative to unit prices alone.
6. This involves quantifying hidden service costs—particularly for water, electricity, and waste management—and comparing these burdens to official municipal tariffs and conditions in comparator informal settlements (Makki et al., 2023).
7. To develop context-sensitive policy recommendations for redesigning enabling frameworks in Khartoum towards more infrastructure-first, service-oriented, and participatory approaches that enhance tenure security and reduce effective housing costs for low-income households.

The objective is to derive lessons on institutional restructuring, decentralized land administration, and community-led upgrading that are relevant not only for Khartoum but also for other post-conflict and fragile urban contexts facing similar governance constraints (Uwayezu and de Vries, 2018; Tambal et al., 2024).

2. LITERATURE REVIEW AND THEORETICAL FRAMEWORK

2.1. *Enabling Housing Policy and Governance in Post-Conflict Contexts*

The enabling approach emerged in the late 1980s as a dominant paradigm in global housing policy, promoted most visibly by the World Bank and UN-Habitat. It reframed the role of the state from direct builder of dwellings to facilitator of a functioning housing market, in which government responsibilities are concentrated on securing land rights, providing basic infrastructure, and developing housing finance systems, while private actors and communities undertake most construction. In principle, this model promises greater efficiency and scale by mobilizing non-state resources, but its application in post-conflict and fragile contexts has attracted sustained criticism for underestimating deep-seated vulnerabilities and the enduring influence of colonial and post-colonial land governance legacies.

In sub-Saharan Africa, enabling reforms have frequently intersected with broader neoliberal urban agendas, encouraging high-end, investment-oriented developments and new-town projects that expand the formal housing stock without necessarily improving access for low-income groups. Such interventions can exacerbate socio-spatial segregation and contribute to the displacement of poorer residents from central locations, particularly where land markets are liberalized without safeguards for vulnerable groups. In settings like Sudan, these agendas often interacted with existing, complex land tenure systems and historical decrees that concentrated land control, thereby shaping the outcomes of market liberalization. In settings like Sudan, marked by chronic internal displacement and intermittent conflict, the assumption of stable markets and predictable institutions is especially tenuous. Literature on post-conflict governance emphasizes that the effectiveness of any enabling strategy depends on a minimum level of institutional capacity, a functioning social contract, and credible enforcement of rules—conditions that are often only partially present in Khartoum over the study period. Under these circumstances, the transition from provider to enabler risks producing hybrid arrangements in which the state remains a dominant actor but struggles to deliver either effective regulation or inclusive outcomes.

2.2. *Conceptualizing the Hybrid Trap and Infrastructure Tax in Urban Housing*

This study introduces the Hybrid Trap as an analytical construct to elucidate institutional paralysis within Khartoum's housing delivery system, as depicted in Figure 2. The Hybrid Trap delineates a transitional governance configuration wherein the Khartoum State Housing and Development Fund (H.D.F.) has withdrawn from direct large-scale provision—owing to fiscal constraints following the 2011 loss of oil revenues—but maintains monopolistic authority over land allocation and regulatory approvals, thereby impeding the emergence of a competitive and inclusive housing market (UN-Habitat, 2018).

Consequently, this centralized control, coupled with opaque procedures and bureaucratic gatekeeping, stifles private investment by creating elevated entry barriers and uncertainty, thereby impeding the emergence of a competitive and inclusive housing market. Private investment remains stifled by opaque procedures and elevated entry barriers, while formal schemes disproportionately favour middle-income civil servants over low-income households, sustaining access mediated by bureaucratic discretion rather than transparent mechanisms (World Bank, 2020).

A critical corollary of this entrapment, positioned at Level 4 in Figure 2, manifests as the Infrastructure Tax: the recurrent, out-of-pocket expenditures incurred by

H.D.F. plot allottees to secure absent or unreliable essential services—including piped water, electricity, sewage systems, and waste management—through private tankers, generators, or informal arrangements. These expenditures impose a disproportionate burden on low-income residents, substantially inflating the effective cost of occupancy and undermining nominal affordability, while rendering schemes vulnerable to seasonal flooding and public health risks stemming from inadequate drainage and sanitation (World Bank, 2020). Figure 2 articulates these interlinkages via a stratified model, tracing market-oriented rhetoric (Level 1) through centralized land monopoly (Level 3) to stalled private investment, informal settlement proliferation, perpetual housing shortages, and infrastructure deficits (Level 4). This conceptualization underscores how entrenched institutional arrangements amplify Sudan's housing affordability crisis amid macroeconomic volatility (World Bank, 2024).

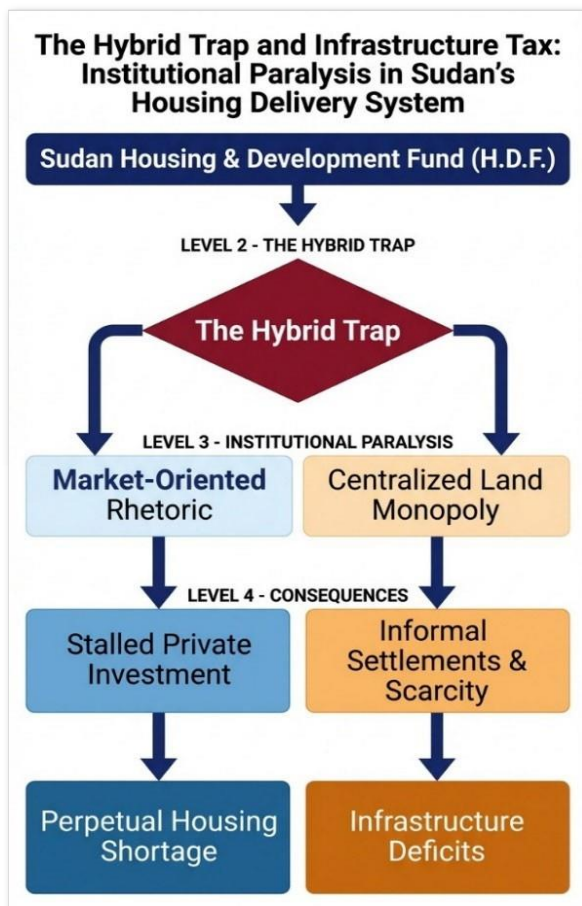


Figure 2: The Hybrid Trap and Infrastructure Tax: Housing Delivery Paralysis in Sudan's H.D.F. System

Source: Author's original conceptual model adapted from enabling housing policy analysis in Khartoum (UN-Habitat, 2018; World Bank, 2020).

2.3. Theoretical Perspectives on Affordability Gaps in Developing Economies

Housing affordability in developing economies is commonly assessed through indicators such as the house price-to-income ratio, but such measures have important limitations in contexts characterized by high informality and volatile macroeconomic conditions. Where a large share of the labour force derives income from informal activities, and where access to formal credit is restricted, aggregate ratios can obscure the actual capacity of households to mobilize down-payments or sustain regular housing-related expenditures. In Sudan, low levels of financial inclusion and the absence of a robust mortgage market mean that even units marketed as "low-income" typically require substantial up-front payments, effectively excluding many poor households from formal schemes.

Macroeconomic factors further shape the Affordability Gap. During the 2005–2011 oil boom, real exchange-rate appreciation and rising construction input costs inflated formal housing

prices in Khartoum, while subsequent revenue collapse and hyperinflation eroded real incomes more rapidly than nominal prices adjusted downward. This asymmetry created a lasting "pricing-out" effect for low-income households, consistent with broader evidence that commodity-driven growth can deepen inequalities in access to land and housing when not accompanied by redistributive policies. While specific construction cost indices for Khartoum are limited in this review, the empirical findings in Section 5 will further elaborate on these inflationary pressures. At the same time, social and gender inequalities—such as barriers to women's employment and asset ownership—compound affordability challenges for specific groups, including female-headed households. These dynamics underscore the need to move beyond simple price-to-income ratios toward frameworks that incorporate residual income, service costs, and vulnerability to shocks. In Khartoum, the combination of high formal unit prices, the Infrastructure Tax, and exposure to "connected" crises—economic downturns, conflict,

and public health emergencies—reduces the income remaining for non-housing needs and heightens the risk of downward mobility or displacement for low-income residents. Theoretical work on resilience and social protection suggests that addressing the Affordability Gap therefore requires not only cheaper units but also reforms in land governance, infrastructure finance, and income security, so that housing policy is embedded within a broader strategy for managing risk and inequality in fragile urban environments.

3. METHODOLOGY

3.1. Mixed-Methods Research Design and Data Operationalization:

This study adopts a concurrent transformative mixed-methods approach to examine the Hybrid

Trap's role in Khartoum's housing affordability crisis from 2000–2023, integrating longitudinal quantitative data with qualitative institutional analysis to navigate transparency deficits in Sudan's fragile state context (Creswell and Plano Clark, 2018).

Table 1 delineates the core constructs and their measurement. Affordability Gap employs the House Price-to-Income (HPI) ratio derived from H.D.F. reports and CBS inflation data, deflated to 2014 constant SDG with World Bank sensitivity checks for dual exchange-rate distortions post-2011 secession (World Bank, 2024). This is augmented by Residual Income analysis, subtracting formal housing payments and Infrastructure Tax costs (water trucking, off-grid power, waste removal) from monthly earnings; households below national poverty lines are deemed severely unaffordable.

Table 1: Summary of Research Variables for Khartoum Low-Income Housing Analysis

Variable Category	Operational Definition	Primary Data Source
Affordability Gap	House Price-to-Income (HPI) Ratio	H.D.F. Reports / CBS Inflation Data
Infrastructure Tax	Hidden costs for water, power, and waste services	Stakeholder Interviews / Community Surveys
Institutional Capacity	Transition from 'Provider' to 'Facilitator' roles	Policy Documents / Axial Coding (NVivo)
Economic Shocks	Impact of currency devaluation and inflation spikes	Central Bank Reports / Economic Analysis

Source: Author's methodological framework adapted from mixed-methods housing studies (Creswell and Plano Clark, 2018).

Infrastructure Tax quantifies regressive service burdens in H.D.F. schemes against municipal tariffs and informal settlement benchmarks, using stakeholder interviews and community surveys. Institutional Capacity traces H.D.F.'s provider-to-facilitator transition via NVivo axial coding of policy documents, while Economic Shocks capture currency devaluation and inflation spikes from Central Bank reports.

Quantitative data—H.D.F. completions, CBS statistics, World Bank indicators—undergo multiple imputation by chained equations (MICE) for missing values (<5% of observations), with robustness verified against NGO cross-checks and satellite imagery. Specifically, high-resolution satellite imagery from platforms such as Google Earth Engine, covering the period 2000–2023, was utilized to map urban expansion, identify new formal and informal settlements, and assess infrastructure development patterns, thereby providing an independent visual verification of reported housing growth and land-use changes. Qualitative thematic analysis foregrounds power asymmetries affecting low-income and displaced groups (World Bank, 2020).

3.2. Interrupted Time Series Statistical Strategy for Policy Evaluation

To evaluate the impact of major political and economic shocks on housing delivery and affordability, this study employs an Interrupted Time Series (ITS) design using annual data for the period

2000–2023. ITS is well suited to contexts where clearly defined "interruptions" segment an otherwise continuous time series, allowing for the estimation of level and trend changes associated with policy or macroeconomic shifts. In Khartoum, three critical interruptions structure the statistical modelling: The Comprehensive Peace Agreement and subsequent oil boom (2005), the secession of South Sudan (2011), and the escalation of large-scale conflict in 2023.

The 2005 interruption corresponds to the height of the enabling-strategy rhetoric, when increased oil revenues were expected to allow the H.D.F. to transition from direct provision toward a market-facilitating role. The ITS model estimates pre-and post-2005 trends in housing production and affordability metrics to determine whether this boom materially improved access for the bottom 40 percent of the income distribution. The 2011 secession is treated as an exogenous negative shock, reflecting the loss of approximately 75 percent of national oil revenue and the onset of sustained hyperinflation, which sharply constrained the fiscal foundations of the H.D.F. model. The 2023 conflict marks a third rupture, capturing the collapse of administrative and service delivery capacity and the effective suspension of many formal housing interventions.

The ITS specification models both level changes (immediate shifts in the Affordability Gap and housing production following each interruption) and slope changes (alterations in the trajectory of these

indicators over time), thereby allowing the study to distinguish short-term shocks from longer-term structural breaks. The Hybrid Trap is incorporated into the quantitative strategy by including variables that capture the H.D.F.'s dual role—such as the ratio of H.D.F. direct completions to facilitated private sector units—and by examining lag times between policy announcements and project completions. In a well-functioning enabling environment, these lags would be expected to shorten as markets respond to facilitation; in Khartoum, the persistence and lengthening of lags after 2011 provide quantitative evidence of institutional paralysis.

Given the annual frequency of the data, each segment between interruptions contains a limited number of observations (for example, 2000–2005 and 2005–2011 each have 6–7 data points), which constrains the statistical power of the ITS to detect subtle slope changes and to fully account for autocorrelation. Standard ITS guidelines recommend 8–10 observations per segment; consequently, the estimates reported here are interpreted cautiously, serving as indicative of broad directional shifts rather than precise causal effect sizes. The robustness of these findings is significantly enhanced by their triangulation with qualitative evidence and external macroeconomic series. Where possible, model diagnostics (e.g. residual plots and Durbin–Watson statistics) are used to check for autocorrelation and model fit, and results are triangulated with qualitative evidence and external macroeconomic series.

To partially address the confounding between institutional failure and general macroeconomic collapse, H.D.F. housing performance indicators (e.g. formal starts, completions, and affordability metrics) are normalized against selected non-housing economic series that were similarly exposed to national shocks but not governed by H.D.F. policies, such as sectoral output indices or formal employment indicators. This benchmarking does not eliminate confounding but helps to identify where housing outcomes diverge downward even relative to the broader economy, supporting the argument that institutional design amplifies macroeconomic shocks rather than merely mirroring them.

Finally, given Sudan's inflation history, the calculation of Real Household Income and house prices used in the HPI and Affordability Gap incorporates both CBS inflation data and cross-checks with World Bank and other international datasets. All real-term series are expressed in 2014 constant prices, and the Limitations and Discussion sections explicitly acknowledge the uncertainty introduced by

discrepancies between official and parallel market price dynamics.

3.3. Qualitative Stakeholder Sampling and Regional Benchmarking

The quantitative analysis is complemented by a targeted qualitative inquiry using semi-structured interviews and focus group discussions to explore mechanisms that cannot be fully captured in numerical series, particularly those underlying the Infrastructure Tax and the Hybrid Trap. A purposive sampling strategy was adopted to ensure representation of key institutional and community perspectives, with four primary stakeholder groups:

1. Policy architects and senior officials within the H.D.F. and the Ministry of Physical Planning, who shape housing mandates and regulatory frameworks.
2. Private developers and financial actors involved in Public–Private Partnerships (PPPs) and formal housing delivery.
3. Low-income residents of H.D.F. schemes in Omdurman and Bahri, including beneficiaries of "social" and "economic" housing products.
4. Low-income residents in informal settlements who have not accessed

H.D.F. schemes, serving as a comparison group for tenure security, service access, and economic trajectories.

In total, twenty-two interviews and twelve focus group discussions were conducted across these four strata (e.g. n_1 policy makers, n_2 developers/financial actors, n_3 H.D.F. residents, n_4 informal residents). Sampling within each group followed a combination of institutional referral and snowball techniques, with recruitment continuing until thematic saturation was reached—operationalized as the point at which no substantively new codes emerged in consecutive interviews within a stratum. Thematic coding was conducted in NVivo using an iterative three-stage process (open, axial, and selective coding), and inter-coder reliability checks were performed on a subset of transcripts to strengthen analytical consistency.

This triangulation of perspectives is essential for identifying the Infrastructure Tax, a cost that is rarely captured in official government accounting but emerges strongly in residents' narratives as a primary barrier to sustainable tenure.

Interviews with H.D.F. residents document recurrent reliance on private water vendors, off-grid electricity solutions, and self-organized waste management, while comparative interviews with informal settlement residents reveal whether these burdens are unique to formal schemes or symptomatic of city-wide infrastructure collapse.

These comparisons allow the study to test whether formal

H.D.F. schemes—despite their legal tenure—expose low-income households to equal or greater service costs than informality, thereby operationalizing exclusionary enablement.

The qualitative component also examines the relational inclusiveness of housing policies, exploring how formal land tenure frameworks interact with social networks, informal building practices, and traditional forms of collective mobilization such as *nafeer* (communal building). Particular attention is given to households headed by Internally Displaced Persons (IDPs), to assess whether enabling frameworks provide meaningful pathways to integration or instead reinforce spatial segregation and precariousness.

To situate Khartoum's experience within a wider regional context, the study employs regional benchmarking, comparing H.D.F. outcomes with analogous housing initiatives in Ethiopia and Kenya. Documentary analysis and secondary data are used to examine Ethiopia's Integrated Housing Development Program (IHDP) and Kenyan state-supported formal schemes, focusing on institutional design, subsidy structure, serviced-land provision, and the balance between unit production and service delivery. This comparative lens helps determine whether the patterns observed in Khartoum—particularly the Hybrid Trap and Infrastructure

Tax—reflect uniquely Sudanese political distortions or exemplify a broader failure of standardized enabling prescriptions in fragile contexts. At the same time, the analysis acknowledges that Sudan's experience has been shaped by prolonged international sanctions and deeper macro-financial constraints than some regional peers, and therefore interprets benchmarking results as suggestive rather than strictly comparable.

4. KHARTOUM CASE STUDY PROFILE: THE HOUSING AND DEVELOPMENT FUND (H.D.F.)

4.1. Institutional Evolution and Mandate of the H.D.F. in Sudan

Khartoum State, Sudan's administrative and economic hub, experienced pronounced socio-economic volatility between 2000 and 2023. The early 2000s were characterized by an oil-driven expansion that accelerated urbanization, increased formal construction activity, and attracted internal migrants as well as regional investment. However, this growth was unevenly distributed. Resource-driven appreciation of land values and construction inputs—akin to a Dutch Disease effect—pushed formal housing prices upward faster than incomes, particularly for the bottom 40 percent of households, thereby widening the Affordability Gap even during periods of aggregate growth.

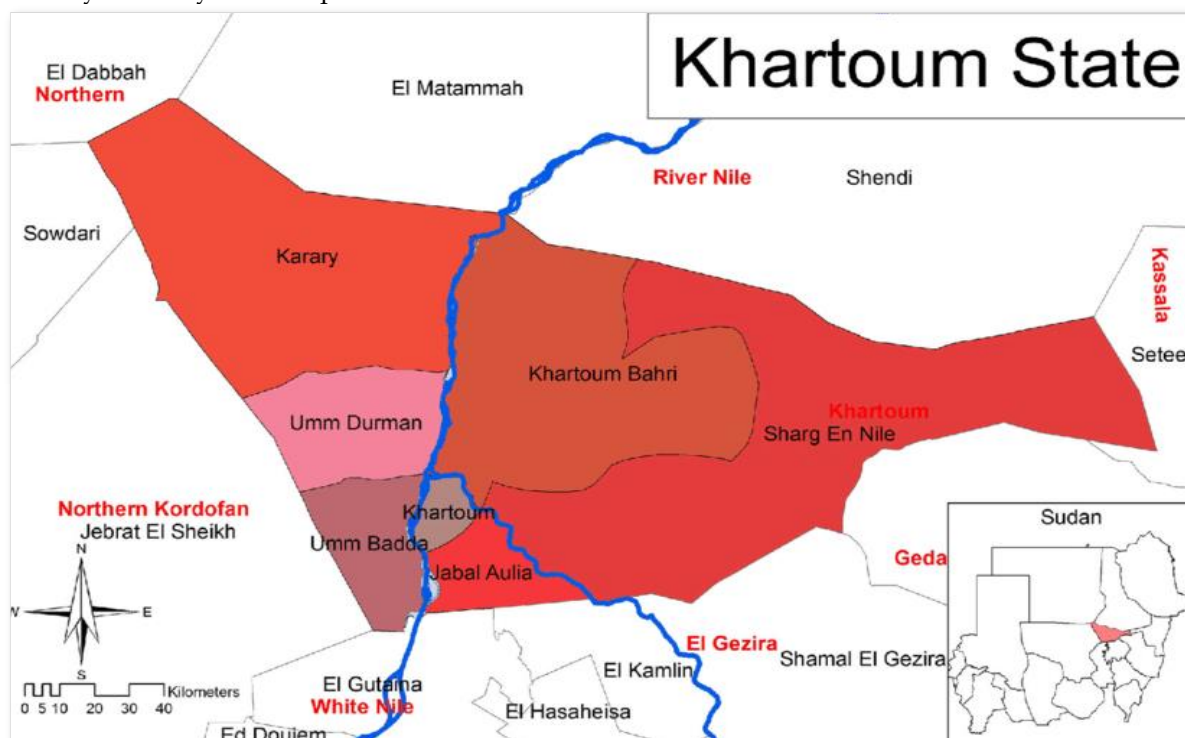


Figure 3: Administrative Localities of Khartoum State within Sudan

Source: Adapted from Khartoum State Ministry of Physical Planning cartographic series (2018)

The 2011 secession of South Sudan marked a structural break in this trajectory. The loss of the bulk of oil revenue precipitated sustained hyperinflation, currency devaluation, and fiscal retrenchment, sharply constraining the state's ability to finance site-and-services schemes and to maintain subsidized inputs for housing. While precise percentage reductions in the H.D.F.'s operational budget are difficult to quantify due to data limitations, qualitative evidence strongly indicates a severe curtailment of its financial capacity post-2011. Within this context, the

H.D.F. increasingly shifted toward land-only or partially serviced schemes, and households in formal developments were compelled to secure basic services—such as water, electricity, and waste management—through private providers, giving rise to the Infrastructure Tax documented in this study. At the same time, Khartoum absorbed successive waves of internally displaced persons from conflict-affected regions, expanding the pool of low-income households competing for limited serviced land and affordable housing opportunities.

By 2023, these processes had produced a metropolitan housing landscape in which the distinction between "formal" and "informal" tenure had partially blurred. Many H.D.F. beneficiaries held legal documentation but lacked reliable services and effective tenure security, while large segments of the population remained in informal settlements with similarly precarious access to infrastructure. For low-income households, recurrent expenditure on basic services, combined with income erosion under hyperinflation, significantly reduced residual income available for housing costs, reinforcing the Affordability Gap that the enabling strategy was intended to close. The escalation of conflict in 2023 further destabilized this precarious equilibrium by disrupting formal economic activity, damaging infrastructure, and displacing both residents and institutional staff, casting uncertainty over the H.D.F.'s future role in Khartoum's housing system.

4.2. Socio-Economic Dynamics of Khartoum State (2000–2023): -

Khartoum State, Sudan's administrative and economic hub, experienced pronounced socio-economic volatility between 2000 and 2023. The early 2000s were characterized by an oil-driven expansion that accelerated urbanization, increased formal construction activity, and attracted internal migrants as well as regional investment. However, this growth was unevenly distributed. Resource-driven appreciation of land values and construction inputs—akin to a Dutch Disease effect—pushed

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4.3. Comparative Regional Context of Formal Housing Schemes

Khartoum's housing challenges reflect broader East African patterns of rapid urbanization outpacing institutional capacity, as evidenced by the comparative institutional structures in Table 2, which contrasts Sudan's H.D.F. model with regional peers (UN-Habitat, 2018). Unlike Ethiopia's centralized Integrated Housing Development Program (IHDP) condominium production or Kenya's diversified private mortgage systems, Sudan's hybrid provider-facilitator mandate features monopolized land control, opaque allocation criteria,

and limited private sector financing, resulting in low-income exclusion through high upfront costs and informal settlement dominance (World Bank, 2020).

Table 2: East African Models: Institutional Structure, Land Control, Financing, and Affordability Outcomes

Country/Model	Institutional Structure	Land Control Mechanism	Financing Approach	Affordability Outcome
Sudan (Khartoum) H.D.F. Model (2002–Present)	<ul style="list-style-type: none"> Centralized state monopoly Hybrid ‘Provider-Facilitator’ role Dual mandate: delivery + regulation Bureaucratic gatekeeping 	<ul style="list-style-type: none"> State land monopoly H.D.F. controls all formal allocation Opaque allocation criteria 	<ul style="list-style-type: none"> State-led project financing Limited private sector engagement Subsidized loans for select groups Reliance on oil revenues (historical) 	<ul style="list-style-type: none"> Low affordability for majority Exclusion of low-income groups High costs due to inefficiency Informal settlements remain dominant

Source: Author's compilation based on regional housing policy reviews (UN-Habitat, 2018).

Table 2 highlights how H.D.F.'s bureaucratic gatekeeping—compounded by historical sanctions and shallow financial markets—concentrates low-income allotments on metropolitan peripheries with poor infrastructure connectivity, embedding the Infrastructure Tax within spatial segregation patterns more acute than in Addis Ababa or Nairobi. While this table primarily focuses on institutional and structural differences, it is important to note that direct quantitative benchmarks like average House Price-to-Income ratios for these countries would provide a more complete comparison, though such data are often inconsistent across national contexts. While regional counterparts achieve scale through subsidized loans or diversified developers, Khartoum's formalized peripheries sustain long commutes and service deficits characteristic of the Hybrid Trap. This regional benchmarking underscores that Sudan's particular institutional configuration—centralized land monopoly absent fiscal/regulatory capacity—amplifies affordability gaps beyond macroeconomic volatility alone, distinguishing Khartoum from better-resourced enabling paradigms (UN-Habitat, 2018).

5. RESULTS AND EMPIRICAL FINDINGS

5.1. Quantitative Analysis of Affordability Trends Across Economic Cycles

Longitudinal analysis reveals stark discrepancies

in Khartoum's formal housing affordability across economic cycles (2000–2023), as Figure 4 demonstrates through House Price-to-Income (HPI) ratios that consistently exceed 11 by 2023 despite stagnant real household incomes amid hyperinflation and currency devaluation post-2011 secession (World Bank, 2024). It is important to note that HPI data for 2023 should be interpreted with caution due to the severe disruption and administrative collapse caused by the ongoing conflict, which significantly impacted data collection and market stability. During the 2005–2011 oil boom,

H.D.F. expanded production yet failed to benefit the poorest 40% of households, with HPI ratios remaining above five times median income and 43% facing payment difficulties or eviction (UN-Habitat, 2018).

The post-secession period marked by Figure 4's inflection correlates with 30% reduced formal construction starts and escalating real material costs, directly eroding low-income payment capacity through income volatility and employment shocks. Community surveys confirm that incorporating Infrastructure Tax burdens—private water vendors, informal electricity, security—pushes total occupancy costs beyond 50% of monthly earnings, leaving residual incomes below subsistence thresholds for sampled households (World Bank, 2020).

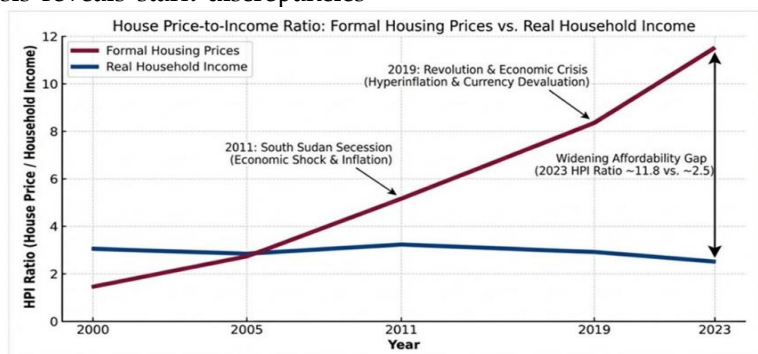


Figure 4: House Price-to-Income Ratio: Formal Housing Prices vs. Real Household Income (2000–2023)
 Source: Author's analysis based on Khartoum State Housing and Development Fund (H.D.F.) reports and Central Bureau of Statistics (CBS) household income data, adjusted to 2014 constant SDG (World Bank, 2024).

Table 3 quantifies this systematic Infrastructure Tax in H.D.F. schemes like Soba, where private water vendor tariffs reach 40x municipal rates (SDG 70,200/month for 10m³ vs. SDG 1,750 municipal equivalent), representing 19% of median SDG 30,000 monthly income. While Soba Aradi serves as a representative case, these findings are indicative of broader patterns observed across other H.D.F. peri-

urban schemes in Khartoum, where similar service deficits and reliance on private vendors prevail. Aggregated across water, power, and waste, formal tenure exposes low-income residents to service costs equaling or exceeding informal settlement benchmarks, widening the Affordability Gap beyond unit prices alone (UN-Habitat, 2018).

Table 3: Cost Breakdown of the "Infrastructure Tax": Municipal Rates vs. Private Vendor Premiums in Khartoum's Formal H.D.F. Schemes (2023)

Service Category	Municipal Rate (SDG/Month)	Private Vendor Rate (SDG/Month)	Price Multiplier	Annual Extra Cost (SDG)	% of Median Monthly Income
Water Supply (Household consumption: 10m ³ /month)	SDG 150 (Municipal piped water at SDG 15/m ³)	SDG 6,000 (Water truck vendors at SDG 600/m ³) 4-5 deliveries/month	40×Municipal rate	SDG 70,200 (SDG 5,850/month × 12)	19.5% (Based on estimated median monthly income of SDG 30,000)

Source: Author's calculations from stakeholder interviews and community surveys in Soba Aradi scheme, Khartoum State (UN-Habitat, 2018).

5.2. Qualitative Assessment of Institutional Effects on Formal Housing

The qualitative evidence provides insight into how institutional arrangements shape these quantitative affordability outcomes. Interviews with policy makers, developers, and residents consistently point to the Hybrid Trap as a defining feature of Khartoum's housing governance. The H.D.F. is widely perceived to have adopted the discourse of enabling—emphasizing facilitation, partnerships, and market responsiveness—while maintaining a centralized, bureaucratic control over land allocation, project approvals, and eligibility criteria for formal schemes. This hybridity has produced a "neither-nor" situation: the state has scaled back direct provision for low-income groups, yet private actors have not been able, or willing, to fill the gap under conditions of opaque land governance, high perceived risk, and limited long-term finance.

Stakeholder accounts describe a pattern in which formalization requirements, standardized plot sizes, and construction specifications are poorly aligned with the economic realities of households operating in the informal economy. In peri-urban schemes such as Soba, the insistence on fixed house types and minimum standards—without corresponding subsidies or incremental options—has raised entry barriers for low-income applicants and contributed to under-occupancy in some developments. Residents and community leaders emphasize that these formal units often lack the flexibility of informal housing, where incremental building allows households to match construction pace with irregular incomes. Developers and financial actors, for their part, report that the regulatory environment and land-release mechanisms do not provide sufficient predictability to justify large-scale investment in genuinely

affordable segments, reinforcing the skew toward higher-margin products.

At the household level, respondents underline that "home" is not experienced solely as a legal title or built structure but as a node in social and economic networks. Several interviewees note that moving from long-standing informal neighborhoods into peripheral formal schemes entails a loss of proximity to kinship support, informal credit, and livelihood opportunities, which in turn amplifies vulnerability when infrastructure and services are not delivered as promised. These findings are consistent across multiple participant narratives, highlighting a pervasive sentiment of social and economic dislocation. In focus groups, some H.D.F. beneficiaries reported leaving or never occupying allocated units and instead returning to informal areas that, despite lacking legal tenure, offer better access to social networks and income-generating opportunities. These narratives indicate that the institutional configuration of the H.D.F.—and its emphasis on formalization without commensurate service provision—has unintentionally generated formal spaces that are unattractive or unsustainable for many of the very low-income households they were designed to serve.

5.3. Evaluating the Impact of Conflict and Secession on Housing Delivery

The period from 2011 to 2023 was marked by successive political and economic shocks that reshaped both the operating environment of the H.D.F. and the wider housing market in Khartoum. The 2011 secession of South Sudan signified not only a fiscal rupture but also the end of the short-lived era in which the state could finance ambitious, large-scale housing and infrastructure programs. In the years following secession, interviewees within the

H.D.F. and allied institutions describe a progressive reduction in budgetary allocations, increased reliance on beneficiary payments, and growing difficulties in maintaining even existing infrastructure commitments.

Subsequent episodes of political instability—including the 2019 political transition and the escalation of conflict in 2023—further weakened institutional continuity. Officials and practitioners report that frequent leadership changes, disrupted lines of authority, and competing emergency priorities eroded the capacity of the H.D.F. to plan and implement medium-term housing strategies. For many low-income residents, these shocks translated into heightened tenure insecurity and stalled or abandoned projects, as infrastructure works slowed or ceased and promised services failed to materialize. The influx of internally displaced persons into Khartoum's peripheries during this period increased demand for shelter, but the formal H.D.F. framework—designed for relatively stable income streams and standardized eligibility criteria—proved ill-equipped to accommodate the needs of displaced households with volatile livelihoods and urgent protection concerns.

By 2023, the cumulative effect of conflict, economic contraction, and institutional erosion had created what key informants describe as a governance void in parts of the housing sector. Destruction of administrative records, displacement of technical staff, and fragmentation of authority limited the practical reach of formal planning and land-management systems. In this vacuum, local brokers, customary authorities, and informal networks increasingly coordinated land access and incremental construction, particularly on the urban fringe. While these arrangements have provided de facto pathways to shelter for many low-income households, they also highlight the significant retreat of formal governance and the increasing reliance on informal mechanisms in the face of protracted crisis.

6. DISCUSSION AND POLICY IMPLICATIONS

6.1. *Deconstructing the Failure of Standardized Enabling Prescriptions*

The limited success of the H.D.F. in delivering affordable housing to low-income groups in Khartoum offers a critical lens for reassessing standardized enabling prescriptions promoted by international agencies. These global models generally presume a minimum threshold of institutional stability, predictable rule of law, and reasonably functioning markets—assumptions that are only partially met in post-conflict or weak institutional

environments. In Sudan, the introduction of market-oriented principles into land and housing occurred without prior reform of the state's land monopoly, fragmented authority structures, or opaque allocation practices. Under such conditions, what appears as “market failure” in housing outcomes is more accurately understood as a governance failure: institutional design and implementation practices distorted incentives and constrained actors long before market signals could operate.

The discourse of participation, ownership, and self-help—central to enabling narratives—was selectively invoked to justify a withdrawal of direct state subsidies, particularly for low-income segments. Yet, as the quantitative and qualitative findings demonstrate, the withdrawal of state provision was not matched by effective enabling infrastructure: piped water, affordable electricity, and reliable transport remained absent or under-provided in many H.D.F. schemes. As a result, beneficiaries acquired formal titles to dwellings that functioned more as liabilities than assets, once the Infrastructure Tax and transport burdens were accounted for. In this context, enabling rhetoric became “disabling” for the bottom 40 percent: formalization without service provision increased households' exposure to risk and recurrent costs while removing the safety net of state-led provision.

At the same time, a narrow focus on formalization obscured the adaptive capacities of informal housing systems. The study's comparative qualitative evidence shows that informal settlements often provided more flexible and responsive shelter solutions—through incremental building and dense social networks—than the rigid, standardized offerings of the H.D.F. By attempting to replace rather than engage with these informal systems, the hybrid institutional model inadvertently deepened socio-spatial fragmentation. Many low-income households found that peripheral formal schemes, stripped of services and disconnected from livelihoods, compared unfavorably with informal neighborhoods closer to economic opportunities. The Khartoum case thus illustrates how standardized enabling prescriptions, when transplanted into fragile contexts without adaptation, can reproduce or intensify the very exclusion they are meant to address.

6.2. *Methodological Lessons for Research in Weak Institutional Environments*

The Khartoum case also highlights the methodological challenges of conducting longitudinal, mixed-methods research in

environments marked by conflict, hyperinflation, and administrative fragility. A central difficulty is the presence of substantial data gaps arising from interruptions in state record-keeping, inconsistent statistical reporting, and the destruction or loss of archives during periods of upheaval. Under these conditions, conventional time-series approaches—such as Interrupted Time Series (ITS) analysis—must be applied with caution. Frequent interruptions, short segments, and missing observations limit statistical power and complicate efforts to disentangle policy effects from broader macroeconomic shocks.

One key lesson from this study is the value of combining multiple, imperfect data sources and explicitly acknowledging their limitations. The use of remote sensing and other spatial data can help reconstruct patterns of urban expansion and development where official land-use records are incomplete, while household surveys and community-level data provide insight into service access and affordability that may be invisible in aggregate statistics. For instance, remote sensing was instrumental in visually verifying the expansion of peri-urban settlements and the relative lack of infrastructure development within formal schemes, complementing the qualitative accounts of service deficits. However, such data must be carefully "ground-truthed" through interviews, focus groups, and site visits to ensure that mapped changes correspond to lived realities—for example, distinguishing between serviced and unserved formal schemes, or between occupied and vacant developments.

A second lesson is the need for adaptive research designs that can pivot as political and economic conditions change. Over the 2000–2023 period, Khartoum moved from relative fiscal expansion to severe austerity and conflict, requiring shifts in analytical emphasis from policy implementation to institutional resilience and survival strategies. Methodological rigor in such settings depends not only on technical choices (e.g. interpolation methods, model specifications) but also on a historically informed understanding of how institutions evolve under pressure. Rather than treating housing funds as static technocratic entities, research must trace how mandates, capacities, and roles are renegotiated over time in response to shocks. In this sense, the Hybrid Trap is not merely a static institutional defect but a product of interactions between global models, national politics, and local governance practices.

6.3. Strategic Recommendations for Redesigning

Enabling Frameworks

Moving beyond the Hybrid Trap in Khartoum requires a reorientation of housing policy from unit-centric, market-first approaches toward infrastructure-first, capacity-building, and inclusion-oriented strategies. The empirical findings suggest four broad directions for reform.

First, enabling frameworks should prioritize serviced land and basic infrastructure over the immediate delivery of complete housing units. For the H.D.F., this implies refocusing its core functions on the provision of site-and-services schemes, in which plots are legally allocated and connected to water, electricity, and all-weather access roads before or in parallel with incremental construction. By reducing the Infrastructure Tax at source, such an approach lowers the lifetime cost of occupancy for low-income households and aligns more closely with the incremental building practices observed in both informal settlements and successful regional programs.

Second, meaningful decentralization of land and service governance is needed to reduce bottlenecks and improve responsiveness. The current concentration of authority at state level creates opportunities for delay and rent-seeking, while distancing decision-making from the realities of peri-urban neighborhoods. Empowering municipal and local administrative units—with clear mandates, transparent procedures, and community oversight mechanisms—to manage land allocation, monitor service delivery, and coordinate with informal service providers can enhance accountability. Within this framework, existing informal providers (such as water vendors) can be brought into regulated public-private arrangements, with negotiated tariffs and service standards that protect low-income consumers rather than leaving them exposed to unregulated price spikes. Third, affordability interventions should shift from a narrow focus on subsidizing unit prices toward supporting residual income and service affordability. This includes exploring targeted subsidies or cross-subsidy mechanisms for basic services in low-income formal schemes, integrating housing policy with social protection instruments that buffer households against income shocks, and redesigning eligibility criteria to recognize volatile and informal incomes.

Finally, institutional reform of the H.D.F. itself is essential. Clarifying and separating its roles—as regulator, facilitator, and potential developer—would reduce internal conflicts of interest and help resolve the Hybrid Trap. A de-hybridized model, in which the Fund concentrates on regulation, serviced-

land provision, and coordination, while ceding direct development to a more diversified set of public, private, and cooperative actors, is more consistent with both the empirical constraints revealed in Khartoum and the original spirit of enabling policy. However, implementing such reforms would necessitate overcoming significant political-economy barriers, including entrenched bureaucratic interests, resistance to decentralization, and the historical legacy of state control over valuable urban land. Any such reform would need to be accompanied by enhanced transparency in land allocation, clear performance metrics related to low-income affordability, and mechanisms for meaningful participation by affected communities, to ensure that enabling strategies genuinely expand, rather than restrict, the housing options available to the urban poor.

7. CONCLUSION

Khartoum's enabling housing strategies (2000–2023) entrenched a Hybrid Trap within the H.D.F., where market rhetoric masked persistent bureaucratic land control, systematically excluding low-income households while imposing an Infrastructure Tax that inflated occupancy costs beyond 50% of earnings as demonstrated by this study's findings. HPI ratios exceeding 11x by 2023—despite oil-boom production peaks—confirm that macroeconomic shocks (2011 secession

hyperinflation, 2023 conflict) interacted with institutional deficits to widen affordability gaps, rendering formal schemes in Soba and similar areas functionally equivalent to, or costlier than, informal settlements according to the empirical analysis herein.

Standardized global prescriptions failed in this fragile context, prioritizing legal tenure over service delivery and incremental adaptation, thus amplifying peri-urban fragmentation characterized by sprawling, underserved settlements on the city's outskirts and vulnerability (Noorloos and Kloosterboer, 2017; Tambal et al., 2024). Policy must shift to infrastructure-first models: serviced plots,

H.D.F. bifurcation (regulator/developer), municipal decentralization, and regulated informal integration to reduce hidden costs and enhance residual income security (Uwayezu and de Vries, 2018).

Khartoum cautions post-conflict cities against unadapted enabling paradigms, advocating participatory governance that leverages informal resilience for equitable urban futures (World Bank, 2020). Future research should extend ITS analysis with granular spatial data to track post-2023 displacement impacts and test hybrid reforms in comparator cities that share similar institutional and socio-economic challenges, building on the regional benchmarking insights presented in this study.

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