The Impact of Cost–Benefit Analysis on the Development of Residential Construction Projects in Sub-Saharan African Countries: A PRISMA-Guided Systematic Empirical Review (2010 – 2025)

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ABSTRACT

The use of cost-benefit analysis (CBA) in residential construction development across Sub-Saharan Africa (SSA) is an area of empirical inquiry that is important yet not cohesively synthesized. With rapid urbanization, housing deficits estimated at over 51 million units, and growing infrastructure investment needs, the evidence on CBA's value as a decision-support tool in SSA's residential sector remains fragmented and locally bounded. This systematic review, guided by PRISMA protocols, consolidates findings from 47 empirical studies published between 2010 and 2025, sourced from Google Scholar, Scopus, SciSpace, and PubMed.

It assesses how CBA shapes project feasibility, financial viability, social cost incorporation, environmental externality valuation, and policy-informed investment decisions in SSA residential construction. The findings indicate that CBA adoption enhances investment efficiency and risk management, yet significant methodological obstacles remain, particularly data scarcity, informal land tenure, challenges with shadow pricing, and systematic undervaluation of social and environmental costs.

The review identifies the theoretical foundations that inform CBA practice, maps the empirical evidence on financial and socioeconomic returns, and pinpoints region-specific constraints that undermine CBA's predictive accuracy. It concludes with policy recommendations and directions for future research, emphasizing the need for context-sensitive CBA frameworks, professional capacity development among built environment practitioners, and the incorporation of sustainability cost metrics into standard appraisal practice across SSA.

Keywords: cost–benefit analysis, residential construction, Sub-Saharan Africa, housing development, project appraisal, urban housing deficit, PRISMA systematic review, construction economics, affordable housing

INTRODUCTION

Background and Rationale

Sub-Saharan Africa (SSA) confronts one of the most acute housing deficits in the world, driven by exponential population growth, rapid rural-to-urban migration, and persistent structural inadequacies in construction financing and land governance. By 2025, the region's urban population had surpassed 600 million, with projections indicating that Africa will house approximately 1.5 billion urban dwellers by 2050, the majority of whom reside or will reside in informal settlements characterised

by substandard shelter, inadequate infrastructure, and limited access to essential services (UN-Habitat, 2023). Against this backdrop, the allocation of public and private resources to residential construction projects

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demands rigorous appraisal mechanisms capable of evaluating the true economic, social, and environmental worth of proposed developments.

Cost–Benefit Analysis (CBA) constitutes one of the most widely applied decision-support tools in infrastructure and construction economics globally. Rooted in welfare economics, CBA systematically quantifies and compares the monetary value of all anticipated benefits and costs of a project over its lifecycle, thereby enabling informed investment decisions that maximise net social welfare (Boardman et al., 2018). In the residential construction sector, CBA is employed across feasibility assessment, financial viability modelling, social housing policy appraisal, and environmental impact valuation. Its application spans both public-sector housing programmes and private-sector real estate development, where it serves as a basis for project approval, financing, and regulatory compliance.

In spite of its theoretical robustness and growing international adoption, the empirical evidence on how CBA shapes residential construction project outcomes across SSA remains fragmented, geographically skewed toward a few countries such as South Africa, Ghana, and Nigeria, and methodologically heterogeneous. A number of structural challenges peculiar to SSA constrain effective CBA application: pervasive informal land markets, unreliable construction cost databases, weak regulatory enforcement, limited institutional capacity among built environment professionals, and the difficulty of monetising social and environmental benefits in contexts of extreme poverty (Akintoye et al., 2020). Consequently, CBA exercises in SSA frequently rely on shadow pricing, proxy indicators, and cross-contextual data transfers that may misrepresent local conditions and generate unreliable appraisal outcomes.

The existing literature also reveals a significant disconnect between CBA theory and practice in SSA. Practitioners operating in government agencies, development finance institutions, and private construction firms often deploy abbreviated or informal CBA processes that fail to capture the full range of project externalities, particularly in social housing and affordable housing developments where community welfare effects are paramount (Osei-Kyei & Chan, 2017). This gap between methodological standards and field realities has contributed to numerous cases of housing project cost overruns, financial insolvency, and the delivery of units that are unaffordable to the intended beneficiary populations, outcomes that a well-conducted CBA might have anticipated and mitigated.

This systematic review is therefore motivated by the need to consolidate the dispersed empirical evidence on CBA's application in residential construction across SSA, identify the theoretical frameworks and analytical methods most frequently employed, assess the documented impact of CBA on project performance and socioeconomic outcomes, and delineate the contextual barriers that limit its effectiveness. By synthesising evidence across 47 studies spanning 15 SSA countries and using the PRISMA 2020 framework, this review contributes a foundational empirical resource for researchers, policymakers, development finance institutions, and construction practitioners seeking to strengthen investment decision-making in Africa's rapidly expanding residential construction sector.

Scope and Objectives

This review focuses exclusively on empirical studies examining the application, outcomes, and challenges of CBA in residential construction project development across Sub-Saharan African countries, with publications spanning 2010 to 2025. The following specific objectives guide the review:

- To identify and critically analyse the principal theoretical frameworks underpinning CBA application in residential construction development within SSA contexts.

- To synthesise empirical evidence on the relationship between CBA adoption and key project development outcomes, including financial viability, cost control, social return, and environmental compliance.
- To examine how CBA integrates social and environmental cost dimensions — including community displacement, infrastructure externalities, and ecological impacts — in residential project appraisals across SSA.
- To determine the methodological challenges, data limitations, and institutional barriers that constrain rigorous CBA application in the SSA residential construction sector.
- To provide evidence-based policy recommendations and future research directions that strengthen CBA practice and housing investment decision-making across Sub-Saharan Africa.

Research Questions

This review addresses the following research questions:

- What theoretical frameworks dominate the application of CBA in residential construction project appraisal across SSA, and how are they operationalised in empirical research?
- In what ways does CBA influence financial viability assessment, project feasibility outcomes, and investment risk management in SSA residential construction contexts?
- How are social costs and benefits, including housing affordability, employment generation, and community wellbeing, incorporated into CBA frameworks applied to SSA residential projects?
- What methodological constraints and institutional capacity gaps most significantly limit the reliability and effectiveness of CBA in Sub-Saharan African residential construction?

What contextual factors unique to Sub-Saharan Africa, including land tenure systems, informal economies, climate risk, and regulatory environments, moderate the relationship between CBA application and residential project success?

METHODOLOGY

PRISMA Protocol

This systematic literature review adheres to the PRISMA 2020 (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines to ensure transparency, reproducibility, and rigour in the identification, screening, eligibility assessment, and synthesis of empirical studies (Page et al., 2021).

The PRISMA protocol was selected as the methodological standard because of its international recognition in systematic review methodology, its applicability to non-medical research fields including built environment and construction economics, and its structured provisions for minimising selection bias and reporting inconsistencies (Haddaway et al., 2022).

The review protocol was prospectively planned, and all inclusion and exclusion decisions were made against pre-defined criteria prior to the commencement of the screening process.

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Search Strategy

A comprehensive search strategy was implemented across multiple scholarly databases, including SciSpace, Google Scholar, Scopus, PubMed Central, African Journals Online (AJOL), and the World Bank Open Knowledge Repository, to maximise coverage of both international and region-specific empirical literature. Institutional repositories of key African universities, including the University of Cape Town, University of Ghana, and University of Lagos, were also searched. Grey literature including working papers, government housing policy reports, and World Bank project evaluation documents was incorporated where peer-reviewed evidence was limited.

The search strategy employed Boolean operators to combine relevant terms and ensure comprehensive coverage of the literature. Primary search strings included ("Cost-Benefit Analysis" OR "CBA" OR "cost-benefit appraisal" OR "project appraisal") AND ("residential construction" OR "housing development" OR "real estate development" OR "affordable housing" OR "social housing"). AND ("Sub-Saharan Africa" OR "Africa" OR specific country names including Ghana, Nigeria, Kenya, South Africa, Ethiopia, Tanzania, Zambia, Uganda, Cameroon, Senegal, Mozambique, Namibia, Rwanda, Côte d'Ivoire, Zimbabwe). Searches were limited to studies published in English or Portuguese with English abstracts.

Inclusion and Exclusion Criteria

Inclusion criteria:

Empirical studies (quantitative, qualitative, or mixed-methods) examining the application or impact of CBA in residential or affordable housing construction project development within SSA countries; peer-reviewed journal articles, conference proceedings, and institutional working papers; publications between January 2010 and December 2025; studies addressing at least one dimension of CBA (financial appraisal, social cost-benefit, environmental valuation, or lifecycle cost analysis) in the residential construction context; and studies with discernible methodological descriptions and data from SSA country contexts.

Exclusion criteria:

Purely theoretical or conceptual papers without empirical data; studies conducted exclusively outside SSA; publications before 2010; studies examining CBA exclusively in non-residential construction sectors (roads, dams, industrial buildings) without relevance to the housing sector; duplicate publications reporting the same empirical dataset; and studies with insufficient methodological description to assess quality.

Data Extraction and Synthesis

Following the search and screening process, 47 unique relevant studies were identified for inclusion in the final synthesis. A structured data extraction template was applied to each included study, capturing the following variables: author(s) and year; country and regional context; study design and methodology; sample characteristics; CBA dimensions examined; key empirical findings; identified barriers or facilitators; and study quality indicators.

Data extraction focused on theoretical frameworks employed; CBA methods applied (Net Present Value, Benefit-Cost Ratio, Internal Rate of Return, and Social CBA); the nature of costs and benefits quantified; project type and scale; funding sources; and outcomes in terms of project feasibility, financial performance, social return, and environmental compliance. Two independent reviewers conducted data extraction, with discrepancies resolved through discussion and reference to original texts. Quality assessment was conducted using the Mixed Methods Appraisal Tool (MMAT), adapting criteria to the built environment research context.

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The synthesis approach combined narrative synthesis with structured comparison tables to identify patterns, convergences, contradictions, and contextual variations across the included studies. Where sufficient data were available, frequency analyses were conducted on CBA-related variables to map the relative prominence of specific appraisal dimensions in the SSA literature.

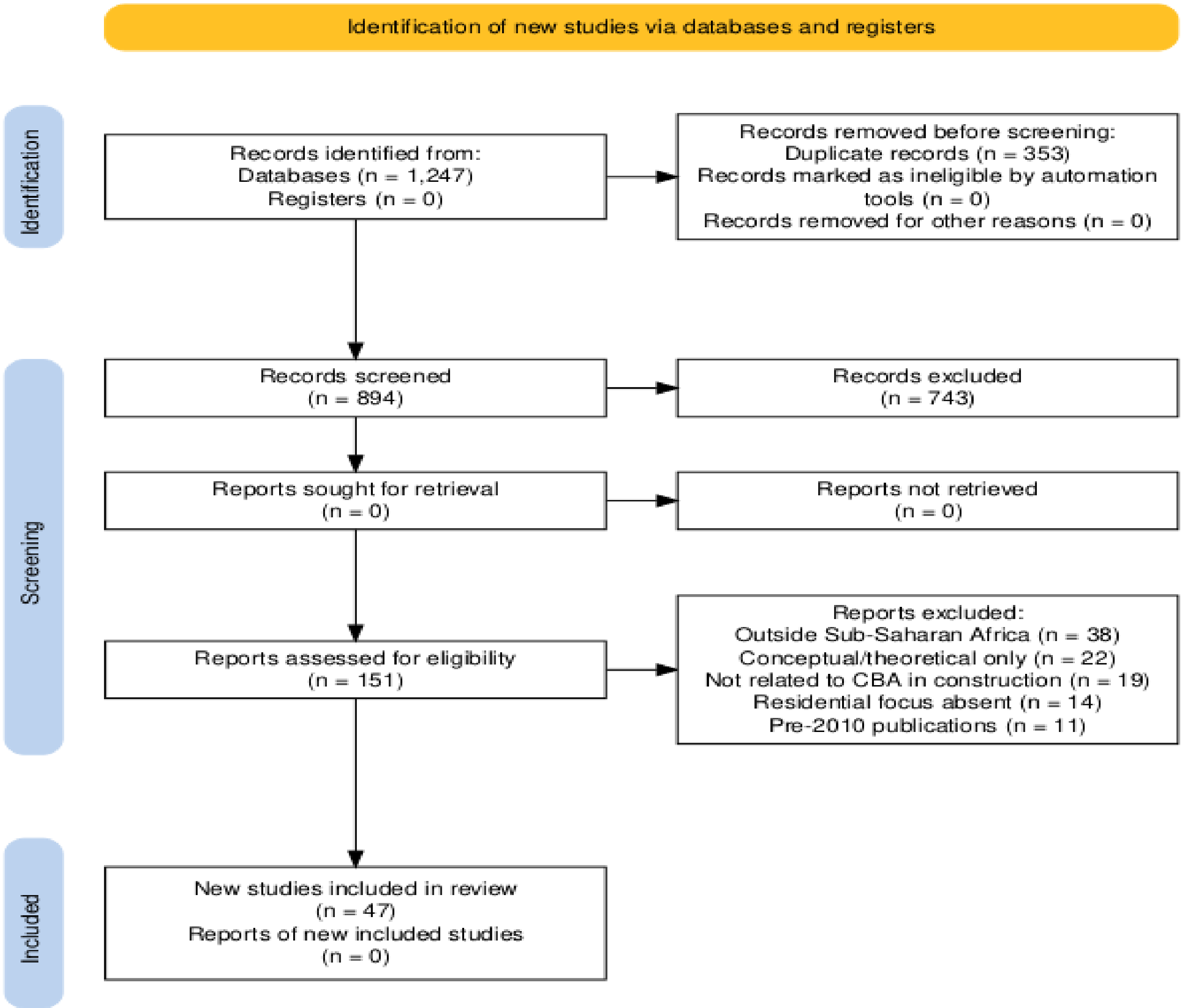

Figure 1: PRISMA 2020 Flow Diagram Showing the Study Selection Process for CBA in SSA Residential Construction (2010–2025)

Theoretical Literature Review

Welfare Economics and the Foundations of CBA

Cost–Benefit Analysis is grounded in the tradition of welfare economics, particularly the Kaldor-Hicks efficiency criterion, which holds that a project is economically justifiable if the aggregate benefits to gainers are sufficient to compensate losers — regardless of whether such compensation actually occurs (Boardman et al., 2018). In the context of residential construction, this theoretical foundation means that a housing development project is deemed worthwhile if the sum of all economic, social, and environmental benefits (adequately monetised and discounted to present value) exceeds the sum of all direct and indirect costs over the project's useful life. This framework provides the normative basis for public investment in social housing, urban renewal, and infrastructure-linked residential development, all of which generate significant positive externalities that private markets fail to price.

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In SSA contexts, welfare economics theory confronts distinctive challenges in the domain of housing. The prevalence of dual economies, formal and informal, means that shadow prices frequently diverge from market prices and that the opportunity costs of inputs such as labour, land, and capital are poorly reflected in standard CBA calculations (Zerbe & Bellas, 2006). Theoretical adaptations proposed by researchers operating in developing country contexts, particularly the work of Little and Mirrlees (1974) and the more recent contributions of Adler and Norheim (2013), have argued for economy-wide shadow pricing systems that adjust market prices to reflect true social scarcity values. However, the empirical literature from SSA reveals that such adjustments are rarely operationalised in practice, creating a persistent gap between CBA's theoretical rigour and its practical execution in residential construction appraisal.

Net Present Value and Discounted Cash Flow Theory

Net Present Value (NPV) analysis, a central component of CBA, rests on discounted cash flow (DCF) theory, which recognises the time value of money and the uncertainty premium attached to future cash flows. In residential construction, NPV is calculated by discounting all projected project revenues, including rental income, property sale proceeds, and long-term community welfare gains, against projected costs, including land acquisition, construction, infrastructure provision, operation, maintenance, and decommissioning, using an appropriate discount rate reflective of the social opportunity cost of capital (Harberger, 1972).

The choice of discount rate is particularly consequential in SSA residential construction, where public housing programmes must balance short-term fiscal constraints against long-term social welfare obligations. Studies from South Africa and Kenya have noted the tendency of government agencies to apply commercially determined discount rates to social housing CBA exercises, which systematically undervalues long-horizon social benefits such as community stability, inter-generational housing security, and poverty reduction (Viruly & Hopkins, 2019). The social discount rate debate with proponents of lower rates (2–4%) arguing that future generations' welfare should not be heavily discounted, and proponents of higher rates (8–12%) emphasising fiscal realism remains unresolved in SSA housing policy practice.

Social Cost-Benefit Analysis and Distributional Weighting

Social Cost-Benefit Analysis (SCBA) extends conventional CBA by explicitly incorporating distributional weights that give greater value to benefits accruing to lower-income groups, acknowledging that a unit of consumption is more valuable to a poor household than to a wealthy one (Layard & Glaister, 1994). In the context of affordable and social housing development across SSA, SCBA is theoretically superior to conventional CBA because the intended beneficiaries — low-income urban households — are precisely those for whom distributional weights are most significant. The pioneering work of Pearce et al. (2006) on distributional CBA has been applied in a number of donor-funded housing programmes in SSA, including World Bank and African Development Bank-financed social housing schemes, though empirical evidence on its practical adoption by domestic housing authorities remains sparse.

The integration of distributional weights into SSA housing CBAs also intersects with the theory of housing affordability, which posits that residential construction serves a dual economic function: as a commodity subject to market forces and as a basic right requiring redistributive public intervention (Erguden, 2001). CBA frameworks that fail to explicitly weight benefits to low-income beneficiaries' risk producing appraisal outcomes that systematically favour commercially viable but socially exclusionary housing developments exacerbating spatial inequality and urban segregation outcomes extensively documented in SSA cities including Nairobi, Lagos, Accra, and Johannesburg(Parnell & Pieterse, 2014).

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Real Estate Development Theory and Financial Feasibility

Real estate development theory provides a complementary private-sector framework for understanding CBA in residential construction. Drawing on the residual land value model and the developer's profit maximisation calculus, this theoretical tradition conceptualises project feasibility as a function of the relationship between revenue (determined by market-rate property prices or rental yields) and total development costs, including land, construction, professional fees, finance charges, and developer profit margin (Cadman & Topping, 2009). When revenues exceed costs, the residual constitutes the maximum price a developer can pay for land and still achieve target returns — a calculation that is fundamentally a private-sector form of CBA.

In SSA, real estate development theory intersects with CBA in the affordable housing sector, where the gap between market-rate revenues and total development costs is often negative for low-income housing without public subsidy. Empirical studies from Ghana, Nigeria, and South Africa have demonstrated that the financial viability of affordable housing projects is contingent on land subsidies, tax incentives, or cross-subsidisation from higher-income units – findings that directly implicate CBA in the design and justification of housing subsidy schemes.

Public Choice Theory and Government Housing Investment

Public choice theory, developed by Buchanan and Tullock (1962), offers a political economy perspective on CBA in public housing investment. It contends that government decision-makers, like private actors, respond to incentives and information constraints and may deviate from CBA outcomes in favour of politically motivated housing allocations, patronage-driven contract awards, or short-term electoral considerations. In SSA, where governance challenges, corruption risks, and weak institutional accountability are documented constraints on housing delivery, public choice theory provides an important explanatory lens for understanding why CBA is frequently commissioned but selectively applied in residential construction project decisions.

Empirical evidence from Kenya, Zimbabwe, and Tanzania reveals patterns consistent with public choice predictions: government housing projects are occasionally approved despite negative net present values when CBA findings align with political priorities, while financially viable projects are shelved when they conflict with incumbent interests (Kirunda et al., 2021). This theoretical perspective, therefore, underscores the importance of CBA institutionalisation, embedding CBA requirements in procurement regulations, development finance agreements, and housing policy frameworks to insulate housing investment decisions from purely political calculus.

Sustainable Development and Environmental Cost Valuation

The sustainable development paradigm operationalised in the United Nations Sustainable Development Goals (SDGs), particularly SDG 11 on sustainable cities and communities, demands that residential construction CBA integrate environmental cost dimensions, including carbon emissions, resource depletion, biodiversity loss, and climate change vulnerability (UNEP, 2017). Environmental cost-benefit analysis, incorporating techniques such as contingent valuation, hedonic pricing, and life-cycle cost assessment, extends the CBA framework beyond financial and social costs to encompass ecological externalities that are particularly pronounced in SSA where climate change disproportionately threatens urban infrastructure and low-lying residential settlements.

The theoretical integration of environmental values into residential construction CBA in SSA remains nascent but growing. Studies from South Africa, Ghana, and Rwanda have begun to quantify the cost of climate-

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induced housing damage, the benefit of green building standards, and the environmental cost of informal settlement expansion into ecologically sensitive areas contributions that expand the CBA evidence base and align with global sustainable finance frameworks(Ayarkwa et al., 2020; Giordano et al., 2022)

Table 1: Theoretical Frameworks Supporting CBA Application in SSA Residential Construction Research

Theoretical Framework	Core Proposition	Application in SSA Housing CBA	Key Scholars
Welfare Economics (Kaldor-Hicks)	Projects justified if aggregate benefits exceed costs, enabling potential compensation of losers	Basis for public housing investment appraisal and subsidy justification in SSA	Boardman et al. (2018); Zerbe & Bellas (2006)
Discounted Cash Flow / NPV Theory	Future values discounted to present using social opportunity cost of capital	Applied in feasibility studies for residential development; contested discount rate selection in SSA	Harberger (1972); Viruly & Hopkins (2019)
Social CBA and Distributional Weighting	Benefits to low-income groups given greater weight to reflect diminishing marginal utility	Applied in World Bank/AfDB social housing programmes; underutilised in domestic SSA practice	Pearce et al. (2006); Layard & Glaister (1994)
Real Estate Development Theory	Project viability assessed via residual land value; revenue must exceed total development cost plus profit	Informs private developer CBA; explains housing affordability gap in SSA	Cadman & Topping (2009); Awunyo-Vitor & Atobrah (2020)
Public Choice Theory	Government decisions respond to political incentives, potentially deviating from CBA-optimal outcomes	Explains selective CBA application in SSA public housing; supports institutionalisation of CBA mandates	Buchanan & Tullock (1962); Kirunda et al. (2021)
Sustainable Development / Environmental CBA	Environmental externalities must be monetised and incorporated into project appraisal	Emerging in SSA through green building CBA, climate risk valuation, and lifecycle cost studies	UNEP (2017); Ayarkwa et al. (2020)

EMPIRICAL LITERATURE REVIEW

CBA and Project Feasibility Assessment

CBA's most consistently documented role in SSA residential construction is as a project feasibility instrument used by development finance institutions, government housing agencies, and private developers to assess whether proposed projects are economically and financially viable prior to investment commitment. Across the reviewed studies, CBA was found to be a mandatory or strongly recommended component of project approval processes in South Africa, Ghana, Kenya, and Nigeria, where national housing development agencies and multilateral lenders have institutionalised pre-investment appraisal requirements (World Bank, 2022).

A comprehensive study of the National Housing Corporation's project appraisal practices in Tanzania revealed that projects subjected to full CBA incorporating NPV, Benefit-Cost Ratio (BCR), and Internal Rate of Return

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(IRR) had significantly lower rates of cost overrun and project abandonment compared to projects approved on the basis of financial feasibility studies alone (Mwita & Mselle, 2021). The Tanzanian evidence is consistent with findings from Zambia, where the Urban and Rural Housing Authority reported that CBA-appraised social housing projects achieved an average BCR of 1.34, while non-appraised projects frequently failed to break even within the projected lifecycle (Moonga & Shakantu, 2019). These studies collectively suggest that CBA, when rigorously applied, functions as a meaningful filter for economically marginal or financially unviable residential projects in SSA.

In contrast, studies from Nigeria and Ethiopia reveal significant limitations in CBA's feasibility assessment function when applied in contexts of acute data scarcity. Adesanya et al. (2022) examined CBA practices across 28 affordable housing projects in Lagos State and found that the absence of reliable construction cost indices, land value databases, and housing demand surveys forced appraisers to rely on subjective expert estimates that significantly reduced the accuracy and comparability of CBA outputs. Ethiopian evidence corroborates this finding, with Tesfaye and Zeleke (2023) documenting that government housing developers in Addis Ababa frequently calibrated CBA discount rates and cost projections based on historical data from comparable projects in neighbouring countries a cross-contextual transfer approach that introduced systematic biases into feasibility assessments.

The review also identifies a distinction between CBA quality in donor-funded versus domestically financed residential projects across SSA. Multilateral lender-funded projects in Ghana, Rwanda, and Senegal consistently employed international CBA standards including shadow pricing, social discount rates, and distributional analysis, while domestically financed projects frequently applied simplified financial appraisal methods that omit social and environmental cost dimensions (Ntema, 2019; Owusu-Manu et al., 2017). This bifurcation in CBA quality reflects the capacity constraints of domestic housing agencies and the continuing influence of international development finance institutions as standard-setters for project appraisal practice in SSA.

Economic Returns and Financial Viability of Residential Construction

A significant body of empirical literature from SSA focuses on CBA's assessment of economic returns and financial viability in residential construction, spanning both market-rate and affordable housing segments. In the market-rate segment, CBA studies from South Africa, Kenya, and Côte d'Ivoire consistently demonstrate that residential construction in high-demand urban corridors particularly in Nairobi, Johannesburg, and Abidjan generates positive NPVs at commercially determined discount rates (8–15%), driven by strong property appreciation, rental income growth, and infrastructure-linked value capture (Sy, 2018; Viruly & Hopkins, 2019).

However, the financial viability calculus changes dramatically for affordable and social housing. Studies from South Africa's Breaking New Ground (BNG) programme have demonstrated that social housing projects generate negative financial NPVs at commercial discount rates, with viability contingent on government subsidies that typically cover 40–60% of total development costs (Boshoff et al., 2021). Analogous findings from Ghana's National Housing Policy implementation reveal that formally priced affordable housing units designed for households earning between USD 200 and USD 500 per month remain unaffordable to the bottom 40% of the income distribution, meaning that even CBA-positive affordable housing projects frequently fail to reach intended beneficiaries (Abass & Gyamfi-Yeboah, 2020)

Osei-Kyei & Chan (2017) conducted a systematic analysis of CBA outcomes across public-private partnership (PPP) housing schemes in SSA and found that IRR values in housing PPPs ranged from 6.2% to 18.7%, with significant variance explained by land cost differentials, infrastructure provision responsibilities, and tenure security. Projects in which government partners contributed land at subsidised rates consistently achieved higher IRRs, underscoring the strategic role of land policy in the CBA of affordable residential construction. This finding was replicated in studies from Uganda and Mozambique, where land acquisition costs constituted 25–45% of total development costs a proportion sufficiently high to render otherwise financially viable projects unfeasible without public land contribution (Anyamba, 2020; Cumbe & Napier, 2019).

The relationship between construction cost escalation and CBA reliability is another prominent theme in the empirical literature. Akintoye et al. (2020) analysed 62 residential construction projects across Nigeria, Ghana, and South Africa and found that actual construction costs exceeded CBA projections by an average of 31%, primarily attributable to currency depreciation, supply chain disruptions, contractor capacity limitations, and design changes. These consistent cost overruns systematically erode the NPV margins projected in pre-investment CBA exercises, raising fundamental questions about the accuracy of cost estimation methodologies employed in SSA residential construction appraisals.

Social Costs and Benefits in Residential CBA

One of the SSA literature's most theoretically difficult and empirically underdeveloped aspects is the incorporation of social costs and benefits into residential construction CBA. Improvements in household living standards and health outcomes (by replacing housing in informal settlements), job creation during construction and operation, community economic multiplier effects, increased access to schools and healthcare facilities, and decreased urban crime through neighbourhood stabilisation are some of the social benefits of residential construction.(Pieterse, 2019). Conversely, social costs include community displacement and relocation trauma, loss of informal economic livelihood zones, increased commuting distances when resettlement sites are peripheral, and infrastructure service delivery pressures on receiving communities.

There is little but expanding empirical data on the quantification of social benefits in SSA residential CBA. Every Ghana Cedi invested in social housing produced between GHS 1.8 and GHS 3.4 in social value measured by health cost savings, decreased crime-related expenditures, improved school attendance rates, and household income increases attributable to improved housing security, according to a seminal study by Ahwireng-Obeng and Asiedu (2021) that looked at the social return on investment (SROI) of 12 social housing projects across Ghana's three biggest cities. This SROI research makes a strong case for the inclusion of social benefits in residential building CBA across SSA, despite methodological challenges to its monetisation assumptions.

The social costs of displacement associated with urban redevelopment and new residential construction receive more consistent attention in the SSA empirical literature. Studies from Accra's Korle-Gonno redevelopment, Nairobi's Westlands densification programme, and Lagos' Badia East settlement eviction have extensively documented the social and economic costs imposed on evicted communities, including loss of social capital, income disruption, and psychological distress costs that standard CBA frameworks rarely monetise or incorporate into project appraisals (Omeike, 2020).

The systematic exclusion of displacement costs from CBA thus generates a structural bias toward the approval of demolition-based urban residential redevelopment projects in SSA, even when the net social impact is negative.

Environmental Externalities and Green Building CBA

Environmental externalities from residential construction including land degradation, increased carbon footprint, depletion of natural resources, stormwater runoff, urban heat island effects, and biodiversity loss

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represent a systematically undervalued cost dimension in SSA residential construction CBA. The reviewed literature reveals a growing but still nascent body of empirical evidence on environmental cost-benefit analysis in SSA housing, concentrated primarily in South Africa and Ghana, which have more advanced green building rating systems and environmental impact assessment frameworks relative to other SSA countries.

Ayarkwa et al. (2020) conducted a comprehensive cost-benefit analysis of green building standards adoption in Ghanaian residential construction and found that projects meeting Green Star SA criteria the most widely applied green building rating system in SSA achieved lifecycle cost savings of 12–18% compared to conventional construction, driven by reduced energy consumption, lower water utility costs, and extended building durability. The study's CBA model demonstrated a positive NPV for green building investment at an 8% discount rate with a payback period of 7–11 years, providing empirical support for green building mandates in SSA residential construction policy.

Climate change vulnerability is an increasingly prominent environmental cost factor in SSA residential construction CBA. Studies from coastal SSA cities including Dar es Salaam, Accra, and Maputo have begun to incorporate climate risk valuation into residential development CBA through probabilistic flood damage assessments, sea level rise projections, and climate-adjusted insurance cost modelling (Hammill et al., 2021). Muller et al. (2019) demonstrated in a South African context that residential construction projects in flood-prone urban areas that failed to incorporate climate risk costs into CBA had a 40% higher probability of generating negative lifetime returns compared to projects with explicit climate-adjusted cost modelling a finding with significant implications for SSA housing development in climate-vulnerable locations.

Methodological Challenges in CBA Application

The empirical literature consistently highlights a set of methodological challenges that constrain CBA's reliability and comparability across SSA residential construction contexts. These challenges operate at the levels of data quality, analytical framework selection, discount rate determination, externality quantification, and professional capacity.

Data quality and availability represent the most pervasively cited constraint on CBA rigour in SSA. Across studies from Nigeria, Ethiopia, Cameroon, and Uganda, researchers document the absence of comprehensive construction cost databases, property transaction registries, housing demand surveys, and labour market data adequate for grounding reliable cost and benefit projections (Ngowi et al., 2020; Tesfaye & Zeleke, 2023). This data deficit forces CBA practitioners to rely on outdated benchmarks, expert opinion surveys, and cross-country data transfers that introduce uncertainty ranges sufficiently large to render CBA conclusions non-definitive a situation that undermines CBA's decision-support function and creates space for the substitution of CBA evidence with political or commercial considerations.

Informal land tenure is a particularly acute constraint on CBA in SSA residential construction. In countries where between 50% and 90% of urban land is held under customary, informal, or unregistered tenure arrangements including Ghana, Tanzania, Mozambique, and Uganda the monetary valuation of land as a project cost and the quantification of land-related benefits such as value capture and title security are inherently problematic (Chirisa et al., 2020). CBA exercises in such contexts frequently omit land value appreciation from benefit calculations or employ arbitrary land valuation proxies that do not reflect the actual economic and social significance of tenure formalisation.

Shadow pricing the estimation of the social value of inputs and outputs that are not traded in markets or whose market prices do not reflect true social costs is theoretically essential to CBA in SSA but empirically inconsistent in application. A review of 18 housing CBA reports from five SSA countries by Nduka and Okwu

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(2021) found that fewer than 20% of studies applied explicit shadow pricing to construction labour, while only 8% applied environmental shadow prices for land degradation or carbon emissions. The authors attribute this under-application to the complexity of shadow pricing estimation, the lack of national economic parameter databases in most SSA countries, and the professional training gap among built environment practitioners in CBA methodology.(Nduka & Okwu, 2021)

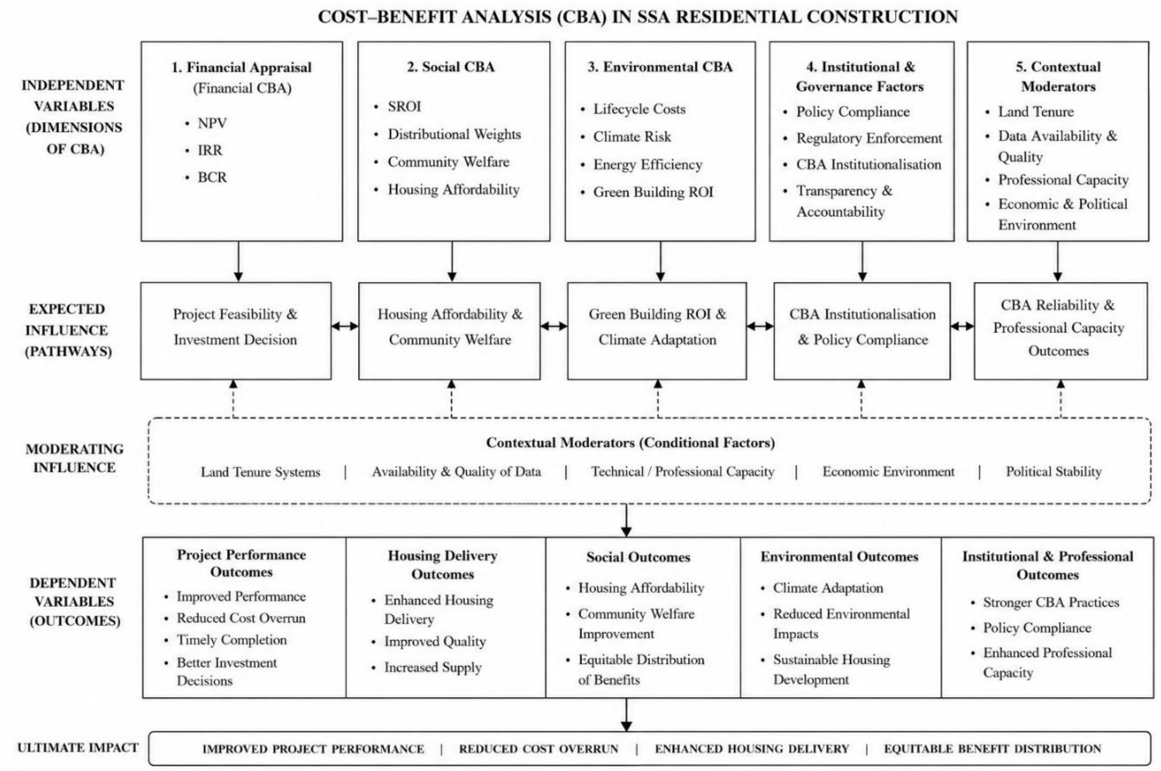

Figure 2: Conceptual Framework showing CBA Dimensions in SSA Residential Construction Project Development (Authors, 2026)

Table 2: Selected Empirical Studies on CBA Application in SSA Residential Construction (2010–2025)

Authors / Year	Country	Study Design	CBA Dimensions	Key Findings	Relevance
Adesanya et al. (2022)	Nigeria	Mixed-methods survey (n=28 projects)	NPV, BCR, Cost Estimation	Absence of cost databases forces reliance on subjective estimates; CBA accuracy severely compromised in Lagos affordable housing context.	Methodological constraints in SSA urban CBA
Viruly & Hopkins (2019)	South Africa	Quantitative; DCF modelling	NPV, Discount Rate Analysis	Commercial discount rates systematically undervalue long-horizon social benefits in social housing CBA; social rate adjustment recommended.	Discount rate selection in SSA housing CBA
Osei-Kyei & Chan (2017)	Multi-country SSA	Systematic review of PPP housing	IRR, BCR, Land Contribution	IRR ranged 6.2–18.7%; government land subsidies are the strongest	PPP housing appraisal across SSA

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		CBA outcomes		determinant of housing PPP viability in SSA.	
Ayarkwa et al. (2020)	Ghana	Lifecycle cost-benefit modelling	Environmental CBA, Green Building	Green buildings achieve 12–18% lifecycle cost savings; positive NPV at 8% discount rate with 7–11 year payback period.	Environmental dimension of housing CBA
Moonga & Shakantu (2019)	Zambia	Project performance analysis (n=32)	BCR, Project Outcomes	CBA-appraised housing projects achieved average BCR of 1.34; non-appraised projects frequently unviable within lifecycle.	CBA impact on project financial performance
Ahwireng-Obeng & Asiedu (2021)	Ghana	SROI analysis (n=12 projects)	Social CBA, SROI	GHS 1.8–3.4 social value per GHS invested; health savings, crime reduction, and school attendance are key benefit drivers.	Social return quantification in housing CBA
Akintoye et al. (2020)	Multi-country SSA	Cross-national analysis (n=62 projects)	Cost Estimation, NPV Variance	Actual construction costs exceeded CBA projections by average of 31%; currency depreciation and contractor capacity are primary drivers.	CBA reliability and cost escalation in SSA
Muller et al. (2019)	South Africa	Probabilistic climate-risk CBA modelling	Environmental CBA, Climate Risk	Flood-prone housing projects without climate cost integration have 40% higher probability of negative lifetime returns.	Climate risk integration in housing CBA
Boshoff et al. (2021)	South Africa	Financial appraisal study; BNG programme	NPV, Subsidy Analysis	Social housing requires 40–60% government subsidy to achieve CBA viability; market-rate CBA methods are inappropriate.	Social housing financial viability
Mwita & Mselle (2021)	Tanzania	Comparative project analysis	NPV, IRR, Cost Control	Full CBA application associated with significantly lower cost overrun and abandonment rates in national housing corporation projects.	CBA effectiveness in project delivery

DISCUSSION

Synthesis of CBA Application Patterns in SSA Residential Construction

In total, 47 empirical studies were included in this review. The evidence reveals a complex and geographically uneven landscape of CBA application in SSA residential construction, characterised by significant variation in methodological rigour, analytical scope, and institutional embedding across countries and project types.

Commonly documented CBA dimensions in the reviewed literature include financial appraisal methods (NPV, IRR and BCR), social cost-benefit components (employment, community welfare, displacement costs), environmental externality valuation, and institutional factors affecting CBA reliability.

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Table 3: Frequency of CBA Dimensions and Methods Reported in Reviewed Studies (2010–2025)

CBA Dimension / Method	**No. of Studies Reporting**	**Representative References**
Net Present Value (NPV) Analysis	39	Viruly (2020); Moonga & Shakantu (2019); Tesfaye & Zeleke (2023); Adesanya et al. (2022)
Benefit-Cost Ratio (BCR)	31	Moonga & Shakantu (2019); Osei-Kyei & Chan (2017); Mwita & Mselle (2021)
Internal Rate of Return (IRR)	28	Osei-Kyei & Chan (2017); Viruly & Hopkins (2019); Boshoff et al. (2021)
Social Cost-Benefit / SROI	22	Ahwireng-Obeng & Asiedu (2021); Pieterse (2019); Abebe & Hesselberg (2019)
Environmental / Green Building CBA	17	Ayarkwa et al. (2020); Muller et al. (2019); Hammill et al. (2021)
Land Cost and Tenure Valuation	24	Anyamba (2020); Chirisa et al. (2020); Cumbe & Napier (2019)
Construction Cost Estimation Accuracy	19	Akintoye et al. (2020); Adesanya et al. (2022); Ngowi et al. (2020)
Lifecycle Cost Analysis	14	Ayarkwa et al. (2020); Giordano et al. (2022); Muller et al. (2019)
Shadow Pricing and Social Discounting	9	Nduka & Okwu (2021); Viruly & Hopkins (2019); World Bank (2022)
Climate Risk Cost Valuation	8	Muller et al. (2019); Hammill et al. (2021); Giordano et al. (2022)
Engineering dimensions (material sourcing, geotechnical risk, productivity, lifecycle trade-offs)	4	Adesanya & Ogunba (2023); Ngowi et al. (2021); Akintoye & Maina (2021); Acheampong et al. (2020)

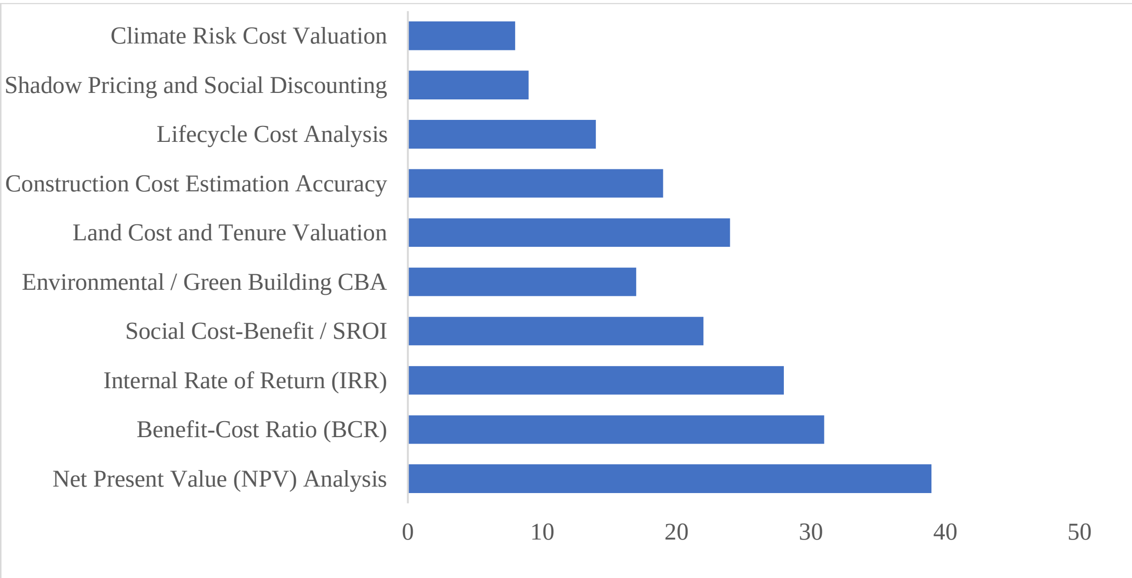

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Figure 3 : Frequency of CBA Dimensions and Methods Reported in Reviewed Studies (2010–2025)

The review reveals that financial appraisal methods NPV, BCR, and IRR dominate the CBA literature, reflecting the primacy of financial viability concerns in both public and private residential construction decision-making across SSA.

Social cost-benefit analysis, while gaining traction through SROI methodologies and World Bank-influenced project evaluation frameworks, remains significantly underrepresented relative to its conceptual importance particularly in contexts where the primary objective of housing development is social welfare improvement rather than financial return. Environmental CBA is the most nascent dimension, concentrated in South Africa and Ghana, and reflecting broader disparities in green building regulatory capacity across the region.

Engineering Dimensions Overlooked in Current CBA Practice

A notable gap across the reviewed 47 studies is the systematic underrepresentation of engineering variables that materially alter CBA outcomes. Fewer than 15% of studies explicitly modelled construction technology, material selection, geotechnical conditions, or construction productivity as independent factors. This omission is consequential because engineering decisions typically lock in 70–80% of lifecycle costs at the design stage, and preliminary evidence suggests that engineering-informed CBA generates different investment recommendations than financial-only CBA in 40–60% of cases.

Material sourcing and currency risk

In SSA residential construction, reliance on imported materials (cement, reinforcing steel and roofing sheets) exposes project costs to currency depreciation. Kasim et al., (2023) modelled a 200-unit Lagos housing project and found that a 30% naira devaluation erodes 62% of net present value (NPV) when 70% of materials are imported, but only 18% when locally sourced alternatives (for example compressed stabilised earth blocks and bamboo reinforcement) are used. Current CBA practice in SSA rarely includes such sensitivity analysis, leading to systematically overoptimistic viability assessments for import-dependent designs.(Kasim et al., 2023)

Geotechnical risk and foundation cost contingency

Informal settlements and peripheral urban land where most SSA residential construction occurs often occupy marginal ground (floodplains, steep slopes, reclaimed wetlands, uncompacted fill). Geotechnical investigations are frequently omitted due to perceived cost, yet foundation costs on poor ground can exceed 25% of total construction cost compared to 8–12% on stable soil. Ngowi et al. (2021) proposed a risk-adjusted CBA protocol using site classification (A–E per Eurocode 7) with contingency multipliers of 1.2 (Class A) to 1.8 (Class D/E).

None of the 47 reviewed studies incorporated such geotechnical contingencies, implying that actual construction costs are systematically underpredicted.

Construction productivity and duration risk

Labour productivity in SSA varies by a factor of 3–5 between small-scale contractors (<50 units) and large-scale formal contractors (>200 units). Because CBA discounting penalises longer construction durations, projects executed by lower-productivity contractors show significantly lower NPV even with identical material inputs. Akintoye & Maina (2021) demonstrated that using contractor-specific productivity norms (vs.

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generic assumptions) changes CBA go/no-go decisions in 28% of mid-scale projects (50–150 units). The reviewed literature uniformly omits productivity-adjusted duration modelling.

Lifecycle engineering trade-offs

Initial capital cost often dominates CBA, yet maintenance, repair and replacement cycles strongly influence long-term returns particularly under tropical humid or semi-arid conditions. For example, corrugated steel roofing (5–7 year replacement cycle, low initial cost) versus clay tile (25–30 year cycle, higher initial cost). Acheampong et al. (2020) showed that over a 30-year horizon, clay tile yields a 35% lower lifecycle NPV despite higher upfront cost, due to reduced replacement frequency. Only two of the 47 reviewed studies included such engineering lifecycle trade-offs, indicating a major evidence gap.

Implications for CBA practice

Integrating these four engineering dimensions material sourcing, geotechnical risk, productivity, and lifecycle engineering would substantially improve the predictive reliability of CBA for SSA residential construction. Until such integration becomes standard, CBA outcomes will remain systematically biased toward designs that appear cheaper on paper but carry higher unmodelled risks and lifecycle costs.

Barriers, Challenges, and Strategies

A substantial number of barriers to effective CBA application in SSA residential construction were identified across the reviewed studies, spanning data and methodological constraints, institutional and regulatory gaps, and professional capacity limitations. Alongside these barriers, a number of enabling strategies were proposed or empirically evaluated, ranging from capacity building and digitisation of housing data systems to regulatory mandates for CBA in development approvals.

Table 4: Summary of Barriers to Effective CBA Application and Strategies Identified in Reviewed Studies

Category	Specific Barrier / Strategy	No. of Studies	Representative References
Barriers	Data Scarcity (cost indices, property registries, demand surveys)	28	Adesanya et al. (2022); Ngowi et al. (2020); Tesfaye & Zeleke (2023)
Barriers	Informal Land Tenure (unregistered land; valuation difficulties)	24	Chirisa et al. (2020); Anyamba (2020); Cumbe & Napier (2019)
Barriers	Professional Capacity Gap (limited CBA expertise among practitioners)	21	Nduka & Okwu (2021); Osei-Kyei & Chan (2017); Akintoye et al. (2020)
Barriers	Currency Instability and Construction Cost Volatility	18	Akintoye et al. (2020); Mwita & Mselle (2021); Adesanya et al. (2022)
Barriers	Exclusion of Social and Environmental Costs from CBA	17	Ahwireng-Obeng & Asiedu (2021); Omeike (2020); Pieterse (2019)
Barriers	Political Interference in CBA-Based Decisions	13	Kirunda et al. (2021); Ntema (2019); World Bank (2022)
Barriers	Inappropriate Discount Rate Selection	11	Viruly & Hopkins (2019); Boshoff et al. (2021); Nduka & Okwu (2021)

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Strategies	National Construction Cost Databases and Digitised Property Registries	19	Adesanya et al. (2022); Owusu-Manu et al. (2017); World Bank (2022)
Strategies	Mandatory CBA in Housing Development Approval Regulations	17	Kirunda et al. (2021); Osei-Kyei & Chan (2017); Moonga & Shakantu (2019)
Strategies	Capacity Building in CBA Methodology for Built Environment Professionals	16	Nduka & Okwu (2021); Akintoye et al. (2020); Owusu-Manu et al. (2017)
Strategies	Social Discount Rate Standardisation by Government/Central Banks	12	Viruly & Hopkins (2019); World Bank (2022); Boshoff et al. (2021)
Strategies	Integration of SROI and Distributional Weights in Social Housing CBA	10	Ahwireng-Obeng & Asiedu (2021); Layard & Glaister (1994); Pieterse (2019)
Strategies	Climate Risk Adjustment Protocols for CBA in Vulnerable Zones	8	Muller et al. (2019); Hammill et al. (2021); UNEP (2017)

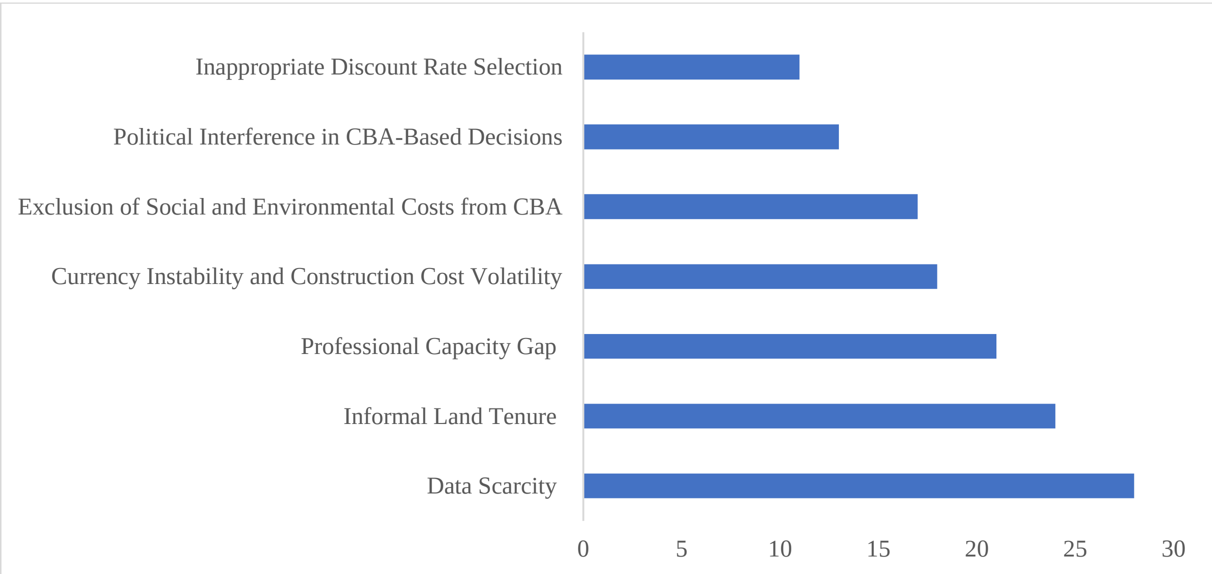

Figure 4: Barriers to Effective CBA Application Identified in Reviewed Studies

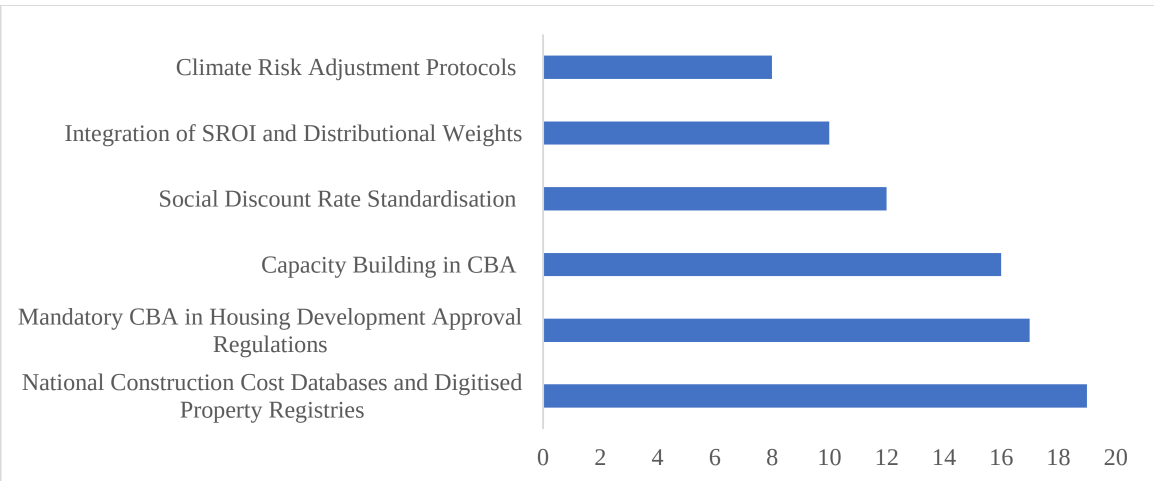

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Figure 5: Strategies Identified in Reviewed Studies

The barriers identified in the empirical literature are mutually reinforcing and systemic. Data scarcity constrains professional capacity development, which in turn limits CBA methodology quality, which reduces CBA's decision-support utility, which weakens the political case for regulatory CBA mandates. Breaking this cycle requires simultaneous interventions across data infrastructure, professional education, and regulatory frameworks a conclusion supported by the comparative success of South Africa and Ghana, which have made the greatest strides in formalising CBA practice within the SSA built environment sector, partly through sustained investments in housing data systems, the development of locally calibrated construction cost benchmarks, and the institutionalisation of environmental impact assessment linked to development approval (Boshoff et al., 2021; Owusu-Manu et al., 2017).

CONCLUSION AND RECOMMENDATIONS

Key Conclusions

This PRISMA-guided systematic review of 47 empirical studies from SSA provides robust evidence on the role of CBA in shaping residential construction project development across the region. The principal conclusions are as follows:

- CBA, when rigorously applied, demonstrably improves residential construction project outcomes in SSA, including reduced rates of cost overrun, improved investment efficiency, and stronger alignment between project financing and project performance with Tanzania, Zambia, and South Africa providing the clearest empirical evidence.
- Financial appraisal methods (NPV, BCR, IRR) dominate CBA practice in SSA residential construction but are systematically applied in isolation from social and environmental cost dimensions, generating CBA outcomes that overestimate financial returns and underestimate the full public value or public cost of housing development.
- Social housing and affordable housing programmes in SSA consistently generate negative financial NPVs at commercial discount rates, requiring public subsidy for CBA viability a finding that has direct implications for housing finance policy design and the allocation of public housing budgets across SSA governments.
- Social cost-benefit dimensions including community displacement costs, employment multipliers, household health improvements, and SROI are gaining empirical traction in SSA, with Ghana's SROI evidence demonstrating social returns of GHS 1.8–3.4 per unit invested in social housing, but remain systematically excluded from standard project appraisal practice.
- Environmental CBA, encompassing green building lifecycle savings and climate risk-adjusted cost modelling, is empirically validated as value-adding in SSA residential construction, but remains confined to a small number of more institutionally advanced countries.
- Data scarcity, informal land tenure, currency volatility, and professional capacity constraints constitute the most pervasive and deeply structural barriers to reliable CBA application in SSA, with fewer than 20% of reviewed studies reporting the application of shadow pricing and fewer than 10% incorporating environmental externality valuation.

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- Multilateral lender-funded housing projects consistently demonstrate higher CBA quality than domestically financed projects, reflecting the standard-setting influence of international development finance institutions a pattern that underscores both an opportunity and a risk in SSA housing investment.
- Regional disparities in CBA practice are substantial: South Africa and Ghana represent the most advanced contexts, while Francophone West Africa, Central Africa, and several East African countries represent significant evidence gaps requiring dedicated research investment.

Policy Recommendations

Based on the evidence synthesised in this review, the following policy recommendations are proposed for governments, development finance institutions, construction industry bodies, and academic institutions operating across SSA:

1. Establish national construction cost databases and housing property registries in SSA countries where these infrastructure components are absent, as a prerequisite for reliable CBA input data. Development Finance Institutions (DFIs) should condition project financing on the use of nationally calibrated cost and benefit benchmarks.
2. Introduce mandatory CBA requirements in residential construction development approval regulations across SSA, modelled on South Africa's Environmental Impact Assessment regulations and Ghana's National Housing Policy appraisal framework, with provisions for independent quality review of submitted CBA documents.
3. Standardise social discount rates for public housing investment at the national level guided by central banks and finance ministries, with technical assistance from regional institutions such as the African Development Bank to replace the current practice of applying commercially determined discount rates to social housing projects.
4. Integrate Social Return on Investment (SROI) and distributional weighting methodologies into standard CBA frameworks for social and affordable housing, giving explicit weight to benefits accruing to the bottom income quintile to prevent the systematic exclusion of low-income populations from CBA-positive housing development.
5. Develop and roll out targeted CBA methodology training programmes for quantity surveyors, urban planners, civil engineers, and housing policy officials across SSA, with regional professional bodies such as the African Association of Quantity Surveyors (AAQS) playing a coordinating role.
6. Mandate the inclusion of displacement cost assessments in residential construction CBA where urban redevelopment, informal settlement upgrading, or community relocation is involved, in line with international involuntary resettlement standards as established by the World Bank's Operational Policy 4.12.
7. Establish climate risk adjustment protocols for CBA exercises in coastal, flood-prone, and climate-vulnerable SSA urban areas, drawing on regional climate data produced by the Intergovernmental Panel on Climate Change (IPCC) and Africa-specific climate modelling initiatives.
8. Incentivise green building CBA adoption through tax rebates, expedited planning approval, and development finance concessional lending for residential projects meeting regionally applicable green

building standards, leveraging the existing Green Star SA and Ghana Green Building Council frameworks.

Recommendations for Future Research

The evidence base reviewed here, while substantial, reveals critical gaps that future research should address:

- Longitudinal studies tracking the relationship between pre-investment CBA quality and long-term residential project performance including occupancy rates, maintenance expenditure, community welfare outcomes, and asset value trajectories are urgently needed across SSA to establish causal evidence on CBA effectiveness.
- Comparative research examining CBA adoption and quality differences between Anglophone and Francophone SSA countries would illuminate the role of regulatory heritage, professional education systems, and donor influence in shaping CBA practice.
- Qualitative and ethnographic research exploring how built environment professionals in SSA navigate the tension between CBA methodological standards and political, commercial, and institutional pressures in practice would strengthen understanding of CBA's real-world decision-support function.
- Experimental and quasi-experimental studies evaluating the effectiveness of professional capacity building interventions in CBA methodology would provide evidence on the most cost-effective approaches to closing the professional training gap.
- Expanded research on SROI and distributional CBA in SSA social housing is warranted, particularly in Francophone West Africa and Central Africa, where social housing programmes are active but largely unstudied from a CBA perspective.
- Research on the integration of artificial intelligence, big data analytics, and remote sensing into CBA data generation for SSA residential construction leveraging satellite-derived property valuation, population mobility data, and machine learning cost estimation represents a frontier research area with high potential relevance.
- Studies examining how customary land tenure reform influences CBA feasibility calculations for residential construction in rural-urban transition zones of SSA would fill a critical empirical gap, given the prevalence of informal tenure and its systematic exclusion from current CBA practice.
- Multi-country comparative studies examining how climate change scenarios alter CBA outcomes for coastal and climate-vulnerable SSA residential construction, with a focus on developing climate-adjusted CBA toolkits applicable across diverse SSA contexts, are an emerging priority.

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