

Frugal Innovation and Socio-Economic Development in Developing Countries: Case study of Kenya

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Abstract: Frugal innovation has emerged as a transformative paradigm for addressing development challenges in resource-constrained environments. Characterized by affordability, simplicity, and accessibility, frugal innovation leverages limited resources to produce cost-effective and functional solutions. This review article explores the influence of frugal innovation on the socio-economic development of developing countries, focusing on Kenya as a representative case. Drawing from a wide range of empirical and conceptual literature, the article examines how frugal innovation drives inclusive growth, enhances access to essential services, fosters entrepreneurship, and promotes sustainable development. The paper also identifies key challenges and opportunities for institutionalizing frugal innovation in policy and practice. It concludes with implications for research, policy, and development programming aimed at achieving socio-economic transformation in Kenya and similar contexts.

Keywords: Frugal innovation, socio-economic development, Kenya, inclusive growth, grassroots innovation, developing countries.

I. Introduction

The challenges of socio-economic development in the Global South, particularly in sub-Saharan Africa, have proven resilient despite decades of aid interventions, international investments, and national development programming. Persistent poverty, inequality, and underemployment continue to characterize many African economies. Traditional innovation models—often capital-intensive, high-tech, and designed for affluent markets—have largely failed to meet the nuanced and urgent needs of low-income and marginalized populations. These models tend to overlook the contextual constraints and resource scarcities that define much of the Global South.

In response, frugal innovation has emerged as a promising alternative paradigm. Defined broadly as “the process of reducing the complexity and cost of a good or service while retaining core functionalities” (Radjou, Prabhu, & Ahuja, 2012), frugal innovation flips conventional assumptions by leveraging constraint as a driver of creativity and value creation. Rather than relying on high levels of investment and sophisticated infrastructure, frugal innovation emphasizes affordability, accessibility, and adaptability. It focuses on solving local problems using available resources and contextual knowledge, often bypassing the need for traditional systems or institutions.

In the Kenyan context, frugal innovation is not only conceptually relevant but empirically evident. The country has witnessed the rise of mobile-based solutions such as M-Pesa for financial inclusion, M-TIBA for health access, and Eneza Education for remote learning—each designed to address critical development challenges at scale and at low cost. These innovations are not mere stopgaps but have become embedded in the socio-economic fabric, illustrating the transformative power of context-appropriate and user-driven design. Kenya’s entrepreneurial culture, growing youth population, and mobile technology penetration make it fertile ground for such innovations.

This review article seeks to critically examine the role of frugal innovation in advancing socio-economic development in Kenya and other comparable developing countries. It synthesizes global and regional literature, analyzes the specific impact areas where frugal innovation is most effective, explores the constraints that hinder its growth, and proposes strategic and policy directions to support its future development. In doing so, the paper aims to contribute to both academic understanding and practical policy formulation by framing frugal innovation as a credible and necessary vehicle for inclusive development in resource-constrained environments.

By situating frugal innovation within Kenya’s development agenda—especially as aligned with Vision 2030 and

the UN Sustainable Development Goals (SDGs)—this study underscores its potential to address long-standing disparities and catalyze bottom-up economic transformation. Ultimately, unlocking the full potential of frugal innovation requires not just technical solutions but also institutional support, regulatory clarity, and investment in human capital.

II. Conceptual Framework of Frugal Innovation

Frugal innovation is conceptually anchored in the principle of “doing more with less,” reflecting a paradigm shift from capital-intensive, high-tech solutions to low-cost, need-driven alternatives that are accessible to underserved populations. Its framework draws from a confluence of theoretical perspectives, including grassroots innovation, human-centered design, and sustainability transitions—making it a hybrid model that is both socially embedded and practically oriented.

At its core, frugal innovation diverges from conventional models of innovation that prioritize technological sophistication and high-profit margins in elite markets. Instead, it is inherently user-centric and necessity-driven, often emerging in response to local constraints such as limited financial capital, weak infrastructure, and institutional voids. This approach positions users not merely as passive consumers but as co-creators and contributors to the innovation process (Pralhad, 2005; Gupta, 2012).

One foundational concept underlying frugal innovation is *jugaad*—a Hindi term denoting improvised, flexible, and resourceful problem-solving. Popularized by Radjou, Prabhu, and Ahuja (2012), *jugaad* innovation reflects the capacity to generate high-impact outcomes under severe resource constraints. It demonstrates how ingenuity at the grassroots level—often overlooked by formal innovation systems—can yield scalable and effective solutions.

Another significant theoretical input comes from human-centered design (HCD), which emphasizes empathy, deep contextual understanding, and iterative prototyping. In the frugal innovation context, HCD enables the development of solutions that are aligned with the daily realities, values, and limitations of low-income users. This alignment enhances usability, cultural relevance, and adoption, particularly in informal or rural settings (Brown & Wyatt, 2010).

Frugal innovation is also closely linked to sustainability-oriented innovation, as it promotes not only economic inclusion but also environmental stewardship. The emphasis on minimizing material and energy inputs aligns it with circular economy principles, making it highly relevant to the global sustainable development agenda. In this sense, frugal innovation represents a triple-bottom-line approach—addressing social, environmental, and economic goals simultaneously (Weyrauch & Herstatt, 2017).

The conceptual framework of frugal innovation also recognizes the role of institutional context. It typically arises in environments characterized by what Khanna and Palepu (2010) call institutional voids—contexts where formal markets, regulatory systems, and infrastructure are underdeveloped or unreliable. These conditions do not stifle innovation but rather reshape its pathways, encouraging informal networks, adaptive strategies, and localized experimentation.

In Kenya and other developing countries, this framework is particularly relevant. High mobile phone penetration, youth-led entrepreneurship, and a growing digital ecosystem provide fertile ground for frugal solutions in sectors such as healthcare, education, agriculture, and clean energy. As a result, frugal innovation is not merely a cost-cutting approach but a transformative development strategy rooted in resilience, contextual intelligence, and inclusive participation.

In summary, the conceptual framework of frugal innovation synthesizes principles of affordability, simplicity, and adaptability with values of equity and sustainability. It challenges dominant innovation paradigms by demonstrating that meaningful and scalable solutions can—and often do—emerge from the periphery rather than the center.

III. Theoretical Foundation of Frugal Innovation

Frugal innovation draws on a multidisciplinary theoretical foundation that intersects with concepts from development studies, innovation theory, sustainability transitions, and grassroots entrepreneurship. It is fundamentally grounded in the idea of “doing more with less”, where scarcity is not a limitation but a catalyst for ingenuity. Rather than originating in elite research labs or corporate R&D departments, frugal innovation often emerges from bottom-up processes in resource-constrained environments, making it especially relevant for developing countries like Kenya.

3.1 Resource Constraint and Jugaad Innovation

One of the earliest theoretical touchpoints of frugal innovation is the Indian concept of *jugaad*, which refers to flexible, improvised solutions using limited resources. As Radjou, Prabhu, and Ahuja (2012) describe in their work on *Jugaad Innovation*, this informal, adaptive, and resourceful mindset underpins many frugal innovations by encouraging simplicity, improvisation, and contextual responsiveness. *Jugaad* reflects a broader principle that necessity, rather than abundance, often drives innovation.

3.2 Human-Centered and Inclusive Design

Frugal innovation is closely tied to human-centered design (HCD) principles, where the end-users' needs, values, and contexts are central to the innovation process. It rejects one-size-fits-all models and instead seeks to co-create solutions with users, particularly marginalized communities. This inclusivity aligns with Amartya Sen's Capability Approach, which emphasizes expanding people's real freedoms and opportunities to lead lives they value (Sen, 1999). Frugal innovation contributes to this by enabling access to services, tools, and technologies that would otherwise remain out of reach.

3.3 Sustainability-Oriented Innovation

Frugal innovation is also linked to the theory of sustainability-oriented innovation. As articulated by Bocken et al. (2014), sustainable innovation seeks to address environmental and social challenges by reducing resource consumption, encouraging circularity, and enhancing affordability. Frugal innovation complements this by delivering value with minimal resource inputs, thereby aligning with the goals of environmental stewardship and social equity. Its low-cost, low-waste, and often decentralized nature makes it inherently supportive of the Sustainable Development Goals (SDGs), particularly those related to clean energy (SDG 7), industry and innovation (SDG 9), and poverty alleviation (SDG 1).

3.4 Innovation Systems and Development Theory

From a macro perspective, frugal innovation fits within the broader framework of innovation systems theory, which highlights the role of institutions, networks, and policy environments in shaping innovation outcomes. In developing economies, where formal R&D infrastructure may be weak, frugal innovation thrives within informal innovation systems—characterized by grassroots creativity, community-based knowledge, and adaptive problem-solving (Cozzens & Kaplinsky, 2009). These systems challenge traditional notions of innovation by demonstrating that impactful solutions can arise without heavy capital investment or advanced scientific input.

3.5 Frugal Innovation as Transformative Innovation

Finally, frugal innovation aligns with the concept of transformative innovation, which seeks systemic change in socio-technical systems (Schot & Steinmueller, 2018). It is not merely about creating cheaper products but about transforming how innovation is conceived, who participates in it, and for whose benefit it operates. Frugal innovation aims to democratize innovation by shifting the locus of control from elite producers to local problem-solvers and underserved communities.

IV. Methodology

4.1 Overview

This review adopted a systematic literature review (SLR) approach to ensure a comprehensive, transparent, and replicable process for identifying, evaluating, and synthesizing relevant studies on frugal innovation and its socio-economic development implications in developing country contexts, with a particular focus on Kenya. The methodology followed the general principles of systematic review protocols (Tranfield et al., 2003; Kitchenham & Charters, 2007), incorporating both peer-reviewed academic literature and high-quality grey literature.

4.2 Data Sources and Search Strategy

The literature search was undertaken using a multi-pronged approach to capture both scholarly discourse and practice-oriented insights. Core academic databases included Scopus, Web of Science, Google Scholar, JSTOR, ScienceDirect, and SpringerLink, which provided access to peer-reviewed journal articles, conference proceedings, and book chapters. In addition, grey literature and policy reports were obtained from reputable institutional repositories such as the United Nations Development Programme (UNDP), World Bank, Organisation for Economic Co-operation and Development (OECD), the Government of Kenya, and select non-governmental organizations with relevant operational experience in Africa.

Search terms were carefully selected to encompass the range of relevant concepts. These included “frugal innovation”, “inclusive innovation”, “grassroots innovation”, and “jugaad innovation”, as well as associated socio-economic and technological terms such as “affordable technology”, “low-cost innovation”, and “sustainability”. Geographic identifiers—“Kenya”, “Africa”, and “developing countries”—were also used to focus the search on the intended regional scope. Boolean operators (AND, OR) and phrase searching were applied to refine results and enhance precision (Bramer et al., 2018).

4.3 Inclusion and Exclusion Criteria

Studies were included if they met the following criteria: (i) published between 2005 and 2025; (ii) focused on frugal or inclusive innovation in developing or resource-constrained settings; (iii) explicitly addressed socio-economic development outcomes such as job creation, access to essential services, livelihood enhancement, or environmental sustainability; and (iv) published in English, with peer-reviewed status or as official reports from credible institutions.

Studies were excluded if they: (i) focused exclusively on innovation in high-income countries without a clear link to frugality; (ii) lacked an empirical or theoretical contribution; or (iii) did not address development-related impacts. This ensured thematic and geographical relevance and maintained the analytical integrity of the review corpus.

4.4 Analytical Framework

All selected studies underwent full-text review, with key information systematically extracted and synthesized. A deductive thematic coding approach was adopted, guided by the review's objectives. The major themes included: access to essential services, entrepreneurship and job creation, environmental sustainability, and policy implications for scaling frugal innovations.

Case studies from Kenya—including M-Pesa (mobile money transfer), M-KOPA (pay-as-you-go solar), BRCK (rugged internet connectivity), KickStart (low-cost irrigation pumps), and Eneza Education (mobile learning)—were analyzed in depth as illustrative examples of how frugal innovations contribute to socio-economic transformation in resource-limited environments (Ndemo & Weiss, 2017; Radjou et al., 2012).

4.5 Scope and Limitations

While efforts were made to ensure comprehensive coverage, several limitations were acknowledged. First, there is currently no standardized set of metrics for evaluating the long-term impacts of frugal innovation, complicating cross-study comparisons. Second, the literature is dominated by qualitative analyses, which, while providing rich contextual insights, limit the scope for statistical generalization. Third, publication bias may have influenced the corpus, particularly the underrepresentation of local or non-English language studies, which often contain valuable grassroots-level data.

Despite these constraints, the review offers a robust analytical foundation for policy dialogue and provides a basis for future empirical investigation into the role of frugal innovation in promoting socio-economic development in Kenya and comparable developing country contexts.

V. Literature Review : Impact Of Frugal Innovation and Socio- Economic Development.

Frugal innovation in Kenya has had a notable impact across several thematic areas, illustrating its potential as a lever for inclusive socio-economic transformation. Its emphasis on affordability, resource efficiency, and contextual adaptation makes it particularly suited to addressing long-standing development gaps, especially in low-income and underserved communities.

5.1 Access to Essential Services

One of the most profound contributions of frugal innovation in Kenya is the expansion of access to essential services in health, education, and public utilities. Innovations like M-TIBA, a mobile health wallet, have enabled users—especially in low-income households—to save, receive, and spend funds exclusively for medical services via their phones. This model not only enhances financial protection in health but also strengthens accountability among service providers (Philips et al., 2019). Similarly, Amref Health Africa's mHealth platforms deploy affordable diagnostic tools and health information systems to underserved rural clinics, leveraging mobile technology to close gaps in healthcare delivery.

Impact of

In the education sector, Eneza Education provides SMS-based learning modules accessible on basic mobile phones, allowing students in remote areas to continue learning outside traditional classrooms. The platform has reached over 5 million learners, contributing to educational equity in regions where teacher shortages and school infrastructure remain critical challenges (Kamau, 2019). These examples highlight how frugal innovation addresses the structural exclusion of marginalized populations from essential public services.

5.2 Empowerment of Local Entrepreneurs

Frugal innovation has also empowered local entrepreneurs by reducing the capital and knowledge thresholds required to participate in innovation ecosystems. Organizations such as KickStart International have developed affordable, human-powered irrigation pumps that enable smallholder farmers to enhance crop yields and improve food security. Similarly, platforms like iCow offer mobile-based agricultural advisory services, helping farmers optimize production through real-time information on animal husbandry, crop management, and market prices (Wachira & Wanjiru, 2021).

Moreover, the proliferation of maker hubs and digital fabrication labs in urban centers like Nairobi and Kisumu has provided youth with access to prototyping tools and mentorship. These spaces democratize innovation by enabling the creation of locally relevant technologies with limited resources, fostering a culture of self-reliance and problem-solving. Such initiatives not only generate livelihood opportunities but also cultivate a bottom-up approach to development that reflects local priorities.

5.3 Job Creation and Livelihood Diversification

Frugal innovation has become a catalyst for job creation and income diversification, particularly in sectors with high informal employment. Start-ups and social enterprises in waste recycling, renewable energy, mobile payments, and informal transport offer low-barrier entry points for youth and women. For example, BURN

Manufacturing's clean cookstove initiative has created over 1,000 jobs across its value chain, from production to distribution and after-sales service (BURN, 2020). In the renewable energy sector, M-KOPA Solar not only provides clean energy access but also employs thousands of sales agents and technicians, many of whom operate as independent entrepreneurs.

These ventures often thrive in environments where formal job markets are saturated or inaccessible, thereby providing alternative livelihoods that are resilient and adaptive to local conditions. Their decentralized and scalable models also ensure that the benefits of innovation reach regions typically excluded from mainstream economic growth.

5.4 Environmental Sustainability

Environmental stewardship is a recurring feature in many frugal innovations. Their design often reflects an acute awareness of resource constraints, leading to products and systems that are not only cost-effective but also environmentally responsible. The M-KOPA solar energy system provides an affordable alternative to kerosene lighting, reducing household air pollution and greenhouse gas emissions while promoting energy inclusion. Similarly, BURN Manufacturing's improved cookstoves significantly reduce wood and charcoal consumption, helping to curb deforestation and improve health outcomes by lowering indoor air pollution levels (BURN, 2020).

These innovations embody principles of circular economy and low-carbon development, aligning with Kenya's commitments under the Paris Agreement and the country's Green Economy Strategy and Implementation Plan. As such, frugal innovation plays a dual role in advancing both social equity and environmental sustainability, contributing to a holistic model of development that is both inclusive and ecologically sound.

VI. Challenges and Constraints

Despite its transformative potential, frugal innovation in Kenya continues to face a number of critical challenges that limit its scalability, sustainability, and broader developmental impact. One of the most persistent obstacles is the financing gap faced by early-stage innovators. Many frugal entrepreneurs—particularly those operating at the grassroots level—struggle to access venture capital, seed funding, or concessional finance. The risk appetite of formal financial institutions remains low, and Kenya's innovation financing ecosystem is still evolving, with limited mechanisms for de-risking investments in non-traditional, low-cost solutions (Chataway et al., 2014; Pansera & Owen, 2018). As a result, promising innovations often stall at the pilot or prototype stage, unable to reach the scale necessary for meaningful socio-economic transformation.

Institutional weaknesses further constrain the frugal innovation landscape. The absence of robust intellectual property rights (IPR) frameworks discourages long-term investment in innovation by failing to protect original ideas from misappropriation. In addition, regulatory environments are often ambiguous or poorly aligned with the needs of informal and grassroots innovators. Without clear policy guidelines or streamlined approval processes, innovators face bureaucratic hurdles that delay time-to-market and increase the cost of compliance (George et al., 2012; Weyrauch & Herstatt, 2017). This regulatory uncertainty undermines investor confidence and stifles entrepreneurial risk-taking.

Infrastructure deficits, particularly in transport and digital connectivity, present another formidable barrier. Many frugal innovations target rural and marginalized populations, yet reaching these communities remains logistically challenging due to poor road networks, limited electricity access, and unreliable internet coverage. These infrastructure bottlenecks not only hinder distribution but also restrict user access, digital feedback loops, and the operational effectiveness of digitally enabled solutions (Bhatti et al., 2018; Ondiek & Kinyua, 2020).

Moreover, cultural resistance poses a subtle but significant constraint. Frugal innovations are sometimes perceived as inferior alternatives to imported, high-tech solutions. Skepticism may arise due to unfamiliarity with locally developed products or a societal preference for foreign-made goods, which are often associated with prestige or quality. This cultural bias can affect adoption rates, particularly in urban or middle-class segments, even when the frugal solution is contextually appropriate and cost-effective (Zeschky et al., 2014; Bound & Thornton, 2012).

These challenges reflect deeper structural limitations common to many developing economies, including Kenya. They underscore the urgent need for targeted policy reforms, institutional strengthening, and ecosystem-wide interventions that address the systemic barriers hindering frugal innovation. Without such reforms, the creative energy and problem-solving potential embedded in frugal innovation will remain underutilized, limiting its contribution to inclusive and sustainable development.

VII. Policy and Strategic Implications

Harnessing the potential of frugal innovation for socio-economic transformation in developing countries like Kenya requires deliberate and well-coordinated policy and strategic interventions. A foundational step is the strengthening of innovation ecosystems through targeted investment in incubators, accelerators, and innovation hubs that support low-resource innovators. These platforms serve as critical enablers of ideation, prototyping,

mentorship, and market access, especially for grassroots and youth-led enterprises. Studies have shown that such ecosystems, when supported by government and private sector collaboration, significantly enhance the success and scalability of locally developed innovations (Kamau, 2019; Wachira & Wanjiru, 2021).

Furthermore, frugal innovation must be embedded explicitly within national development strategies. In Kenya, frameworks such as Vision 2030 and the Big Four Agenda already prioritize manufacturing, healthcare, food security, and affordable housing—sectors where frugal innovation can play a transformative role. However, these policy frameworks often lack mechanisms to directly support low-cost, scalable, and context-sensitive innovations. Integrating frugal innovation into these policies can help mainstream it as a viable instrument for achieving inclusive growth (UNDP, 2022; Radjou et al., 2012).

Public-Private Partnerships (PPPs) are also essential in bridging gaps between policy intent and implementation. Through coordinated partnerships among government agencies, academic institutions, industry stakeholders, and civil society, frugal innovation projects can benefit from shared resources, technical expertise, and wider distribution channels. For example, the success of M-KOPA Solar in Kenya illustrates the power of cross-sector collaboration in delivering clean energy solutions to marginalized communities (Ondiek & Kinyua, 2020).

Another strategic priority is the development of human capital through education and training. Technical and Vocational Education and Training (TVET) institutions, in particular, are well positioned to integrate frugal innovation principles such as design thinking, problem-solving, and entrepreneurship into their curricula. Such integration would prepare a generation of innovators equipped to design and implement solutions suited to their own communities (George et al., 2012; Weyrauch & Herstatt, 2017).

Finally, inclusive participation is critical to the success and equity of innovation systems. Gender-responsive and youth-centered policies should ensure that women and young people are not merely beneficiaries but active participants and leaders in the innovation process. Research has demonstrated that inclusive innovation models not only expand the reach of technological solutions but also improve development outcomes by reflecting the diverse needs and perspectives of society (Zeschky et al., 2014; Bound & Thornton, 2012).

In sum, maximizing the development potential of frugal innovation requires a multi-pronged policy approach—one that nurtures ecosystems, aligns with national priorities, builds human capacity, and ensures inclusivity. Without such systemic support, the transformative power of frugal innovation risks remaining underutilized in Kenya and other developing nations.

VIII. Conclusion and Future Directions

Frugal innovation represents a vital pathway for addressing the persistent development challenges faced by Kenya and other resource-constrained nations. Its emphasis on affordability, simplicity, and contextual relevance enables the creation of inclusive solutions that expand access to essential services such as healthcare, energy, education, and water. Moreover, by promoting grassroots entrepreneurship and facilitating the efficient use of local resources, frugal innovation contributes not only to economic empowerment but also to environmental sustainability. These attributes align well with Kenya's socio-economic development priorities as articulated in Vision 2030, the Bottom-Up Economic Transformation Agenda (BETA), and the United Nations Sustainable Development Goals (SDGs) (Radjou et al., 2012; UNDP, 2022).

Nonetheless, the full transformative potential of frugal innovation remains contingent upon the presence of enabling ecosystems. Without deliberate institutional support, many promising grassroots solutions struggle to scale beyond their initial pilot phases. Critical enablers include access to patient and flexible financing, supportive regulatory frameworks that accommodate informal innovation practices, and coordinated policy efforts that embed frugal innovation within national development strategies (George et al., 2012; Weyrauch & Herstatt, 2017). Furthermore, innovation ecosystems must prioritize capacity-building by equipping young people, women, and marginalized communities with the skills and resources necessary to ideate, prototype, and implement locally relevant solutions.

Looking forward, future directions must emphasize inclusive policy design, investment in innovation infrastructure, and research to generate context-specific evidence for policy and practice. This includes longitudinal impact assessments, comparative regional studies, and the development of new metrics tailored to the unique outcomes of frugal innovation. With a cohesive and strategic approach, frugal innovation can move from the periphery to the center of Kenya's development paradigm, serving as a catalyst for sustainable, inclusive, and locally owned growth.

By building resilient innovation systems that nurture frugality, Kenya—and other developing nations—can transition from dependency to self-determination, unlocking the creative potential of their populations to solve the challenges they know best.

XI. Future Research Directions

While the current literature provides valuable insights into the emergence and potential of frugal innovation in

developing contexts, several critical gaps remain that warrant further scholarly exploration. Future research should prioritize longitudinal studies that assess the sustained impact of frugal innovations over time. Most existing studies focus on short-term outcomes such as initial adoption or pilot success, yet little is known about how these innovations perform, scale, or adapt in dynamic socio-economic environments over the long term (Basu et al., 2013; Pansera & Owen, 2018). Such research would be instrumental in understanding not only the lifecycle of frugal innovations but also their durability, adaptability, and integration into local systems.

Additionally, comparative regional or cross-county analyses within Kenya are essential for identifying contextual enablers and constraints. Given the socio-economic and infrastructural diversity across the country, what works in urban centers like Nairobi may not be feasible or effective in arid or semi-arid regions such as Turkana or Garissa. Regional studies would shed light on localized innovation ecosystems, resource availability, governance dynamics, and cultural factors that shape the design and diffusion of frugal solutions (Wachira & Wanjiru, 2021).

Another underexplored area is the role of diaspora networks in supporting the development and scaling of frugal innovations. Kenya's diaspora is a significant source of remittances, but beyond financial flows, diaspora members also bring global exposure, technical expertise, and access to external markets. Research into how these networks can act as innovation bridges—facilitating knowledge exchange, mentorship, and co-creation—could offer new pathways for scaling local innovations to regional and international levels (Chakravarti, 2011; Gopakumar, 2014).

Finally, there is a pressing need to develop and refine metrics for evaluating the performance and developmental outcomes of frugal innovations. Traditional innovation metrics such as R&D expenditure, patents, or GDP contribution may not capture the socio-economic value and inclusivity of frugal approaches. Instead, new indicators should consider affordability, accessibility, user-centric design, community impact, environmental sustainability, and resilience (Weyrauch & Herstatt, 2017; Bhatti et al., 2018). Developing such metrics would aid policymakers, funders, and practitioners in assessing the effectiveness and scalability of innovations tailored to resource-constrained settings.

Addressing these research directions would significantly enhance the evidence base, support context-sensitive policymaking, and ultimately contribute to a more inclusive and innovation-driven model of socio-economic development in Kenya and beyond.

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