

ORIGINAL ARTICLE OPEN ACCESS

Coupling Responsible Innovation and Sustainable Business Model Innovation to Address Grand Challenges

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Received: 31 May 2024 | **Revised:** 27 May 2026 | **Accepted:** 8 June 2026

Associate Editor: Minu Kumar

Keywords: grand challenges | responsible innovation | social enterprise | sub-Saharan Africa | sustainable business model innovation

ABSTRACT

Academic Abstract: Innovations designed to address grand challenges within the social innovation sector can have unintended consequences, particularly where organizations pursue triple-bottom-line objectives under resource constraints. Yet research on coupling responsible innovation (RI) and sustainable business model innovation (SBMI) largely frames this as aspirational rather than theoretical, leaving it conceptually underdeveloped and empirically underexplored. Accordingly, this study asks: How can organizations operating within institutionally weak environments embed RI to make their SBMI processes more responsible? Utilizing a 10-year longitudinal study of a social enterprise delivering off-grid solar in Africa, we identify three SBMI cycles and develop a process framework for RI-SBMI coupling. We outline four RI-shaped organizational capacities that support business model evolution as a dynamic, principle-driven process in which RI functions as a sensitizing framework rather than a fixed ethical template. We further demonstrate that paradox management, through the mechanisms of experimentation, relinquishing control, and value prioritization, is central to responsible SBMI. We also show that RI principles are not applied equally; instead, their importance changes depending on organizational capacity and the part of the business model. Finally, by grounding these dynamics in an institutionally weak context, the study advances theory on responsible business model evolution.

Practitioner Abstract: Low-income households in resource-constrained settings characterized by rural poverty, limited infrastructure, and constrained market access are some of the most vulnerable to the impacts of grand challenges. Therefore, to avoid unintentional reinforcement of structural inequalities, it is essential to conduct regular, inclusive consultation with stakeholders. Ideally, this is undertaken during SBM development but can and should be applied to existing SBMs. Within institutionally weak contexts, systematically identifying and assessing opportunities, both internal and external to the organization, and innovating to accommodate them can improve geographic reach and market competitiveness. When working with environmentally friendly technologies and practices, a critical, reflexive review should be continuously undertaken, ideally incorporating in-house expertise and neutral, external input (e.g., from research organizations). The creation of greater social and environmental values will require a willingness to sacrifice some economic value capture. Therefore, coupling the principles between RI and SBMI can help achieve this while maintaining economic viability. For profit-making companies, inclusive stakeholder engagement may enhance organizational legitimacy and build a low-income customer base, while systematic identification of opportunities supports competitiveness and innovation. Coupling RI and SBMI helps balance social, environmental, and economic objectives, potentially improving credibility.

[Correction added on 27 July 2026, after first online publication: The second author name has been corrected to “Omar Al-Tabbaa” and the third author name to “Morven G. McEachern” in this version.]

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1 | Introduction

Climate change, poverty, and inequality are grand challenges that affect millions of people worldwide and while various innovations have emerged that aim to tackle such challenges (Voegtlin et al. 2022), numerous high-profile cases have demonstrated that scientific and technological advancements have intensified social deprivation and contributed to environmental disasters rather than alleviating them (Scherer and Voegtlin 2020); thus, resulting in crises and a loss of public trust (Long and van Waes 2021; Owen et al. 2021).

Aiming to align scientific research paradigms more closely with societal needs and values (Owen et al. 2021), the responsible innovation (RI) concept gained traction at the beginning of the 2010s, emerging from crises such as pesticide overuse (Carson 1962), the Three Mile Island accident in 1979, explosions at Bhopal and Chernobyl (in 1984 and 1986, respectively), and mad cow disease in the 1980s and 1990s (Macnaghten 2020). Foundational works characterize RI as “both old and new” (Stilgoe et al. 2013, 1568), building on a “rich history” (Owen et al. 2013, 22) of ethical reflection, public engagement, anticipatory governance, and co-production between science and society (Jasanoff et al. 2001; Macnaghten 2020) rather than introducing entirely new principles. RI emphasizes the importance of anticipating potential impacts, reflecting on ethical and social implications, inclusively engaging stakeholders, and acting transparently to ensure that innovation processes are accountable to societal concerns (Brand and Blok 2019; Owen and Pansera 2019). However, RI has been criticized for lacking a focus on power imbalances and the broader political-economic structures that shape innovation trajectories (Genus and Iskandarova 2018).

Concurrently, growing pressure on businesses to respond to sustainability imperatives has led to the emergence of sustainable business model innovation (SBMI) (Evans et al. 2017; Bocken et al. 2014). SBMI refers to redesigning a firm's business model to create social, economic, and environmental value, thereby addressing sustainability challenges while maintaining competitiveness (Shakeel et al. 2020). However, SBMI has been criticized for insufficient focus on socio-ethical considerations during innovation, retaining emphasis on economic and environmental sustainability while neglecting deeper ethical considerations, such as justice, equity, and the moral implications of technological advancements (Bocken and Short 2016; Stubbs and Cocklin 2008).

Given their shared normative grounding and concern for societal outcomes (Owen et al. 2021; Ambos and Tatarinov 2022), as well as their limitations, recent scholarship has called for greater integration of RI and SBMI (Long and van Waes 2021; Magni et al. 2024), which we term RI-SBMI coupling. We refer to this coupling as the substantive alignment between RI principles and the decision-making rules that organizational actors employ when they (re)design elements of their sustainable business models. This alignment can emerge from deeply held organizational socio-ethical values and mission commitments that are substantively consistent with RI principles, rather than requiring conscious recognition of the RI framework as a named schema. Coupling is, therefore, visible when RI principles are *operationally embedded* in choices regarding value creation,

delivery, and capture, informing how value propositions are framed, which customer segments are prioritized, which delivery channels and partners are selected, and how trade-offs are handled. They act as a set of guardrails rather than functioning as external checklists applied after decisions have already been made. Where this is the case, decisions are not driven by economic or environmental logics alone but carry an ethical orientation that constrains and redirects purely commercial options.

The risks of neglecting such coupling are evident. For example, in sectors like off-grid energy, sustainable business models originally aimed at serving rural, energy-poor homes have drifted toward more commercially viable urban markets, marginalizing vulnerable communities in the process (Barry and Creti 2020; Clowes et al. 2019). This drift highlights the danger of SBMI that is not anchored in robust socio-ethical commitments: without strong normative guidance, even well-intentioned innovations may reproduce exclusion and undermine fair transition (Brand and Blok 2019).

Building on this foundation, we identify several gaps in the literature. First, despite increasing interest in coupling the RI and SBMI concepts (Long and van Waes 2021; Magni et al. 2024), existing research largely frames their coupling as an aspiration rather than a theoretically specified mechanism. Consequently, the connection between these frameworks remains conceptually underdeveloped and empirically underexplored. Addressing this gap requires unpacking the process through which RI principles are embedded by managers and key stakeholders into the different components of SBMI design and operationalized across organizational and field-level dynamics (Degbey et al. 2024; Liu et al. 2024). This focus is particularly necessary to advance the overlapping literature on SBMI processes and RI by providing nuanced insights into the guarding role of RI principles in developing responsible sustainable business models (Ranabahu 2020).

Second, organizations that pursue SBMI face inherent *trade-offs* when attempting to achieve triple bottom line objectives while maintaining ethical integrity (Bacq and Aguilera 2022). Hybrid organizations, such as social enterprises, are particularly exposed to these tensions as they must balance their social mission and financial viability (Jay 2013). Embedding RI principles into their sustainable business models can serve to maintain this balance; however, current research provides limited insights into how organizations can recalibrate value propositions, negotiate ethical dilemmas, and maintain the viability of their sustainable business models, particularly under resource constraints (Smith and Besharov 2019). Because these tensions evolve and re-emerge over time, they cannot be fully understood through cross-sectional snapshots. Also, longitudinal evidence on how they unfold, particularly in response to grand challenges, such as energy poverty in excluded regions, remains scarce (Halme and Korpela 2014).

Third, while prior research has highlighted the enabling role of regulatory bodies in fostering RI adoption (Owen et al. 2021; Voegtlin and Scherer 2017), it remains unclear how organizations can effectively couple RI with SBMI in the absence of strong institutional drivers. This gap is critical because RI-SBMI coupling is more complex in settings

of institutional weakness, where regulatory enforcement is limited and societal expectations surrounding ethics and sustainability are fragmented and weakly supported (Anand et al. 2023; George et al. 2012). This challenge is salient in sub-Saharan Africa, where institutional voids can constrain both formal governance mechanisms and the informal norms that typically support responsible business conduct (Umoru et al. 2026). In such contexts, societies and organizations cannot rely on external pressures to steer innovation in socially and environmentally responsible directions, thus raising important questions regarding how organizations internally generate, sustain, and operationalize ethical commitments as part of their SBMI processes.

We respond to the above gaps by posing the following research question: *How can organizations operating within institutionally weak environments embed RI to make their SBMI processes more responsible?* To investigate this question, we conducted a longitudinal case study on Sunny Money, a social enterprise that delivers off-grid solar energy in rural sub-Saharan Africa. Drawing on 10 years of primary and secondary data, we employed an inductive research design to trace the evolution of Sunny Money's business models across three distinct cycles. Therefore, while our *unit of analysis* is the organization (i.e., Sunny Money's business model), our *level of analysis* is the intraorganizational processes of embedding RI principles into SBMI across sequential business-model innovation cycles (Yin 2018). Critically, we consider (1) interactions between Sunny Money and external network actors (e.g., business agents, schools, and suppliers), and (2) macro institutional features in sub-Saharan Africa, as contextual factors that shape these processes, not as independent units of analysis (Johns 2006; Uzzi 1997).¹

Overall, our study advances understanding of the synergistic relationship between RI and SBMI in several ways. *First*, we bring together two largely parallel streams of literature (RI and SBMI) by moving beyond normative claims and developing a process framework that explains how organizational leaders and boundary-spanning staff can embed RI principles within the iterative development of sustainable business models. Responding to concerns that RI is often detached from operational realities and is difficult to implement (Genus and Iskandarova 2018; de Hoop et al. 2016), our framework shows how managers and key stakeholders translate RI principles into continuous adjustments of key SBMI components (value proposition redesign, reconfiguration of value creation and delivery, and value capture transformation). We theorize four sequential RI-shaped organizational capacities (equity-centered value orientation, regenerative sustainability logic, contextual innovation capability, and paradox navigation logic) that explain how the RI-SBMI coupling drives the socio-ethical evolution of sustainable business models. *Second*, we highlight paradox management as being central to responsible SBMI, thereby revealing that tensions are not episodic problems but persistent features of simultaneously pursuing social, economic, and environmental value (Smith and Lewis 2011; Jay 2013). Here, we identify three mechanisms (experimentation, relinquishing control, and value prioritization) through which organizations can keep the process moving while making responsibility governable in practice. *Third*, we contribute to the RI literature by demonstrating that RI has a temporal structure: its principles do not carry the same weight

throughout the SBMI process but become more or less central at different points, thereby highlighting the changing role of RI principles over time. *Finally*, by situating our analysis in institutionally fragile contexts (i.e., sub-Saharan Africa) we show how embedding RI principles can partially compensate for weak regulation and fragmented institutional systems. In doing so, we highlight RI-SBMI coupling as an organization-level response to institutional voids, that enables sustainable innovation to be pursued responsibly despite volatile and under-regulated market conditions.

2 | Theoretical Background

2.1 | Responsible Innovation

Responsible Innovation (RI) seeks to guide scientific and technological development toward socially desirable, ethically grounded, and environmentally sustainable outcomes through shared responsibility and stewardship (von Schomberg 2019; Yaghmaei and van de Poel 2020). It is commonly structured around four dimensions, these being anticipation, reflexivity, inclusion, and responsiveness (Stilgoe et al. 2013), as covered in the editorial of this Special Issue which provides an overview of the emergence of RI and its definition. Taken together, the dimensions provide a framework for addressing societal grand challenges by ensuring innovation is forward-looking, reflective, participatory, and adaptable (Scherer and Voegtlin 2020; Owen et al. 2021). *Anticipation* refers to the capacity to consider the potential long-term societal and environmental impacts of innovations, urging innovators to proactively consider risks and unintended consequences (Stilgoe et al. 2013). *Reflexivity* requires innovators to critically examine their values, assumptions, and motivations, pushing for innovation processes to be guided by ethical self-awareness (von Schomberg 2019). *Inclusion* mandates the meaningful engagement of diverse stakeholders, thus incorporating multiple perspectives to ensure equitable innovation outcomes (Kanter 1999; Stilgoe et al. 2013). *Responsiveness* necessitates adaptive governance mechanisms that enable innovation trajectories to evolve in response to societal concerns and environmental challenges (Owen et al. 2021; Stilgoe et al. 2013). Management scholars (e.g., Bacq and Aguilera 2022; Scherer and Voegtlin 2020; Owen et al. 2021; Voegtlin and Scherer 2017) recently directly linked RI with addressing societal grand challenges. Thus, RI's four-dimensional framework can be perceived as a conceptual scaffold for guiding scientific and technological efforts toward innovative, ethically grounded, solutions (Long and van Waes 2021; Stilgoe et al. 2013). Yet, and despite its ethical aspirations, the RI framework can be criticized as still lacking the pragmatism necessary for widespread adoption (Owen et al. 2021; van de Poel and Sand 2021). Its strong emphasis on precautionary governance and stakeholder deliberation often results in procedural rigidity, thereby hindering the agility required for firms operating in dynamic and competitive markets (Owen et al. 2013; Stilgoe et al. 2013). Its reliance on broad, normative principles can fail to provide strategies to balance social responsibility with financial sustainability (Scherer and Voegtlin 2020). This limitation is particularly problematic for firms that must balance ethical responsibilities with profitability and resource constraints (Ambos and Tatarinov 2022; Rip 2014). Furthermore, RI's emphasis on processes limits the

ability to measure its impact on sustainability and societal well-being (van Lente et al. 2017). Without clear economic incentives or mechanisms for integrating sustainability with value creation, RI risks being perceived as an aspirational yet impractical framework (Gurzawska 2021). Overall, these limitations (summarized in Online Appendix Table A) have led to slow adoption of the RI approach (Owen et al. 2021).

Consequently, theoretical (Magni et al. 2024; Pan et al. 2023) and empirical (Long and van Waes 2021; Lehoux et al. 2021) calls have been made to incorporate alternative management or business-centric approaches, such as SBMI, which can provide a structured and market-driven mechanism to embed sustainability into an organization's innovation process.

2.2 | SBMI Dynamics

Companies operating with profit-centric business models have been challenged to move beyond narrow profit logics (Evans et al. 2017; Geissdoerfer et al. 2018) giving rise to sustainable business models (SBMs). Building on the traditional business model construct (Amit and Zott 2001; Chesbrough and Rosenbloom 2002; Osterwalder and Pigneur 2013; Boons and Lüdeke-Freund 2013), SBMs integrate social, economic, and environmental value creation for multiple stakeholders, while seeking to reduce negative impacts (Bocken et al. 2019; Ringvold et al. 2023; Schaltegger, Hansen, and Lüdeke-Freund 2016). Yet, while earlier work clarifies *what* SBMs look like, it says less about *how* they emerge (Geissdoerfer et al. 2018), thus shifting attention to SBMI. SBMI is a dynamic, iterative process of redesign involving exploration, piloting, and scaling (Inigo et al. 2017; Bocken and Geradts 2020; Shakeel et al. 2020). In practice, SBMI behaves less like a linear pipeline (i.e., explore-pilot-scale) (Coffay et al. 2024; Ritala et al. 2018) and more like a turbulent search process influenced by organizational inertia, stakeholder resistance and recombination across value propositions, partner incentives, and revenue logic (Foss and Saebi 2017; Shakeel et al. 2020; Bhatnagar et al. 2022; Rathobei et al. 2024).

Dynamic capabilities (DCs) theory (Teece et al. 1997; Teece 2007; Eisenhardt and Martin 2000) has been explicitly connected with SBMI, researchers demonstrating that DCs can enable incremental and radical sustainability transitions (Inigo et al. 2017), and mediate between sustainability intentions and implementation (Coffay et al. 2024). Drawing on the sensing-seizing-transforming framework (Teece 2007), Coffay et al. (2024) highlight that SBMI requires organizational design changes, where DCs function as mediators between strategic intent and execution. Inigo et al. (2017) reveal that sensing opportunities, seizing them through stakeholder integration and clean technologies, and reconfiguring resources for systemic change support both incremental and radical transformations in SBMs. Recent reviews also argue that DCs for SBMI must extend beyond internal reconfiguration to encompass stakeholder integration and legitimacy-building efforts (Ortiz-Avram et al. 2024). However, despite its process ambition, DCs scholarship often operationalizes these capabilities as discrete and relatively stable categories (e.g., sensing versus seizing), underplaying how they overlap, co-evolve, and become reworked in context. This has prompted calls for greater attention to underlying practices, activities,

and contextual contingencies in explaining the SBMI process (Faccin et al. 2025; Ringvold et al. 2023).

Recognizing the promise and limitations of the DCs concept, complementary SBMI frameworks focus upon three interconnected elements, these being, value proposition redesign (calling for a departure from product-centric logics toward service-oriented approaches) (Geissdoerfer et al. 2018), value creation and delivery reconfiguration (to restructure upstream and downstream activities, partner networks, and technologies) (Evans et al. 2017; Lüdeke-Freund et al. 2018), and value capture transformation (such as shared value creation and multistakeholder financial models (Mignon and Bankel 2023)). However, these reconfigurations can mask exploitative dynamics (Hossain et al. 2025), for example, greenwashing (Boons and Bocken 2018), externalizing polluting components of a value chain to regions with institutional voids (Al-Tabbaa et al. 2024), financializing impact rather than lived realities (Casasnovas and Jones 2022), or reinforcing elitism and excluding marginalized voices (Reece et al. 2022).

Therefore, despite its sustainability-oriented aspirations, SBMI remains embedded in market logics that often prioritize economic imperatives and incremental innovations, with a reliance on voluntary corporate action (Stubbs and Cocklin 2008; Bocken and Short 2016; Schaltegger, Hansen, and Lüdeke-Freund 2016) with the risk of reproducing inequality and environmental degradation.

Together, these limitations indicate that without stronger ethical guidance, the SBMI process can merely perpetuate business-as-usual practices under the guise of sustainability; thus, underscoring the complementary and important role of RI in providing guardrails.

2.3 | Coupling RI and SBMI

This section examines the relationship between RI (rooted in science and technology studies) and SBMI (grounded in business and management). Rather than treating the two frameworks as interchangeable, we clarify how they converge, where they differ, and why their integration remains theoretically and practically difficult.

Although both RI and SBMI literature call for more responsible and sustainable innovation, they articulate this demand in different ways. RI is framed as “science for society [and] with society” (Owen et al. 2013, 36), whereas SBMI emphasizes innovations that create positive, or reduce negative, impacts for the planet (Bocken et al. 2014). Both emphasize deeper societal engagement (Bacq and Aguilera 2022) and the need to act on stakeholder input, although they label this differently (Owen et al. 2013; Berends et al. 2016). Thus, we treat RI and SBMI as interconnected, rather than parallel concepts and examine how they can be *coupled* in practice. In essence, SBMI focuses on creating and implementing business models pursuing triple bottom line objectives, which necessitates rethinking value creation, delivery, and capture mechanisms to minimize ecological footprints and enhance societal well-being (Ringvold et al. 2023). Conversely, RI emphasizes the

ethical dimensions of innovation, ensuring that new products/services and their underpinning processes align with societal values, are socially acceptable, and ethically sound (Genus and Iskandarova 2018). Therefore, we argue that coupling RI principles to SBMI processes is necessary for developing a theoretical framework capable of addressing the multifaceted complexity of grand challenges (e.g., poverty or lack of energy) in both innovative and responsible ways.

More specifically, SBMI is unlikely to achieve its full potential unless it is grounded in principles of responsibility, since the long-term success of sustainable initiatives depends on securing and maintaining a social license to operate (Prno and Scott Slocombe 2012), which is closely linked to ethical considerations and societal acceptance (Guo et al. 2022). However, important conceptual ambiguities and practical tensions remain in prior efforts to integrate RI and SBMI frameworks. For example, Long and van Waes (2021) connect RI and SBMI in the context of bike-sharing business models. They position RI as a mechanism for ensuring that innovation addresses societal and environmental challenges ethically, while SBMI integrates sustainability into business strategies. However, we argue that their perspective is somewhat normative and optimistic, as it overlooks tensions highlighted in innovation systems theory, particularly power dynamics and market pressures that can undermine ethical objectives. It also underestimates trade-offs, including how RI's deliberative processes may reduce the agility of SBMI. Empirically, Lehoux et al. (2021) examine responsible health innovations, thus demonstrating how business models aimed at creating long-term societal value struggle within financially driven systems. Similarly, Ambos and Tatarinov (2022) highlight the role of intrapreneurship in fostering RI within international organizations, thereby revealing how institutional politics shape the feasibility of responsible innovation. Critically, Blok and Lemmens (2015) raise questions regarding the moral legitimacy of RI itself and caution against its rhetorical appropriation. Their critique resonates with similar concerns in SBMI, where sustainability language is occasionally co-opted without genuine transformation (Mendes et al. 2025; Tuckerman et al. 2023). Ivanova et al. (2023) have deepened this critique by showing that RI adoption varies with discursive frames, incentives, and stakeholder interests, where certain firms engage with RI to align with societal values, but others symbolically adopt it to boost legitimacy.

Taken together, these studies emphasize that, while both RI and SBMI share the goal of promoting societal value and hold potential for creating synergies, their coupling to help navigate complex organizational dynamics remains underdeveloped. This reinforces the call for a more critical, context-sensitive approach and, thus, acknowledges the inherent contradictions and trade-offs that influence *embedding* responsibility into sustainable innovation.

2.3.1 | Embedding RI in SBMI

To clarify this point, we distinguish between coupling and embedding. In theorizing RI-SBMI coupling, we treat RI principles as a distinct set of guiding values that can be

institutionalized in organizational practice. Principles-based approaches argue that values become consequential only when woven into governance structures, decision criteria, and everyday routines, rather than remaining mission statements. Similarly, values-based innovation research reveals how shared values shape innovation portfolios, stakeholder participation, and design choices (Breuer and Lüdeke-Freund 2017). Together, these views suggest that RI matters not as an external ethical overlay but as a set of moral resources that can shape organizational action.

Within this framing, coupling depicts the relationship, where RI and SBMI become linked when RI principles systematically inform business model innovation. In contrast, embedding depicts the mechanism through which this linkage is enacted. Thus, embedding refers to how anticipation, inclusion, reflexivity, and responsiveness are enacted by managers and key stakeholders within the design and evolution of SBMs, for example, as explicit design criteria, rules structuring participation, or routines that trigger reflection and adjustment. This enactment does not necessarily involve explicit recognition of the RI framework by name. Where organizations operate from socio-ethical values *substantively consistent* with RI principles, embedding can occur as a *de facto* process driven by mission rather than formal framework adoption. Therefore, SBMI provides a structural and procedural platform where RI principles are made actionable through repeated reconfiguration of value creation, delivery, and capture, while RI provides the normative orientation that disciplines and redirects SBMI when addressing grand challenges.

3 | Methods

We adopted a longitudinal single-case study approach, which began in 2012, to capture organizational change processes and the factors affecting them (Bansal and Corley 2011).

3.1 | Research Setting

Our empirical setting focuses on inclusive energy access as a grand challenge (Mahto et al. 2020; Voegtlin et al. 2022), with particular attention to off-grid electrification in sub-Saharan Africa. Access to energy is a driver of socioeconomic development (Bhatia and Angelou 2015), with potential to alleviate poverty-related challenges, including poor health, limited education, and constrained economic opportunity. While grid extension remains cost-effective in densely populated areas, off-grid systems, particularly solar technologies, are considered the most viable solution for rural communities in sub-Saharan Africa, where 80% of the world's energy-deprived population resides (International Energy Agency (IEA) 2021). However, the recent collapse of high-profile off-grid companies (Cross and Neumark 2021) alongside a shift in market focus from rural energy-poor communities to more affluent urban consumers (Barry and Creti 2020) has dampened the early optimism surrounding off-grid electrification (Clowes et al. 2019). Further, financial overvaluation (Clowes et al. 2019) and the liquidation of firms (Cross and Neumark 2021) have led investors to redirect resources

TABLE 1 | Summary of interviewees and secondary sources consulted.

Position in organization and location	No. and duration of interviews ^a
Chief Executive Officer, Italy	Five interviews. 60; 60; 75; 20; 55; 55 min (91 pages)
Operations Director, Zambia	Four interviews. 60; 80; 20; 30 min (42 pages)
Business Coordinator, Zambia	Two interviews. 20; 20 min (12 pages)
Administrator and Agent Coordinator, Zambia	One interview. 40 min (12 pages)
Agents ×6, Lusaka, Zambia	Six in Focus Group and individual interviews. 100; 40 min (21 pages)
Agent, Livingstone, Zambia	One interview. 70 min (19 pages)
Documentation available only internally	
Financial statements from 2009/2010 onwards; Zambia country budgets	
Agent spreadsheet and Agent Training Manual, 2021; end of year reports (2014 onwards)	
Emails from 2016 onwards; notes and sketches from the field by the first author	
Documentation made available to public	
Legal Reports and Accounts 2015–2016 to date (documents range from 25 to 59 pp. each)	
Impact reports (2015) (GOGLA, ODI, Practical Action, Solar Aid) (47 pp), metrics (2015) (50 pp); Country briefing: Zambia, 2016 (ODI, GOGLA, Practical Action, SolarAid) (10 pp)	
SolarAid Impact Reports 2013; 2014; 2015 (12+ pp. each); SolarAid, Sunny Money websites	
Sunny Money Zambia Agent Research Findings, 2016 (14 pp); Light Libraries Report 2021 (9 pp)	
Repair App, website link; Pico-Solar Diagnosis and Repair Manual, n.d. (45 pp)	
Tackling Solar E-Waste, 2021 (11 pp); White Paper on e-waste, 2023 (23 pp); State of Repair in the off-grid solar sector, 2024 (27 pp)	

^aAll interviews conducted face to face. Duration rounded to 5 min.

toward urban and peri-urban markets, where creditworthiness is higher and profitability more assured (Barry and Creti 2020; Cross and Neumark 2021). Given these shifts risk systematically excluding the populations most in need, thereby reproducing structural injustices (Groenewoudt and Romijn 2022), this narrowing of focus toward commercially attractive segments comes amid growing calls for more innovative and flexible business models to deliver renewable energy in more inclusive ways (Chirambo 2018; International Renewable Energy Agency (IRENA) 2017).

3.2 | Selection and Context of the Case Study

To address our research question, we identified an organization that provides energy access to rural communities in Zambia as our research context because we consider it representative of the disparities in electricity access that appear across large parts of sub-Saharan Africa.

The organization studied, *Sunny Money*, is an international social enterprise providing renewable off-grid energy in sub-Saharan Africa, its mission revolving around provision of electricity for energy-poor rural households. It operates in Malawi and Zambia and supports solar partners in Senegal and Uganda. Beginning in 2006, it was one of the first organizations to introduce and distribute individual pico-solar lights (a few with

mobile phone charging capability) and solar home systems. As of 2025, it has sold and distributed over 2 million solar products and is considered a leader in the sector (Munro et al. 2022).

3.3 | Timeline of the Case Study

Access to Sunny Money was granted in 2012, while the lead author was living in Zambia. During this time, the researcher worked part time as a consultant and mentor to the organization for 2 years, maintaining email contact after leaving Zambia and undertaking two further visits to conduct field research, thus providing sustained periods of engagement (Yin 2018). While the lead author's prior involvement could potentially introduce personal bias, the research process was safeguarded through independent and objective peer review. The second and third co-authors, who had no prior knowledge of the organization, ensured integrity and impartiality in the analysis. Furthermore, our research explores strategic high-level concepts rather than cultural or organizational theories.

3.4 | Data Collection

Following Yin (2018), data was collected and triangulated from multiple sources, thus ensuring at least three forms of corroborating primary and secondary evidence, including extensive

semi-structured interviews with key informants; review of internal and publicly available documentation; and notes and observations made during field studies (see Table 1).

Primary data was collected via in-depth semi-structured interviews held across multiple sites with five key members of staff and seven agents.² Senior staff were selected because, as key actors, they understand the organization's identity, history, and business strategy and can provide access to key resources and documents (Daft and Weick 1984; Corley and Gioia 2004). "Agents" were selected because of the role they play in the organization's business model.

Interviews were held over several days, with some individuals interviewed on multiple occasions. Interviews were designed to collect and triangulate the views of the chief executive officer, the Zambian senior management team, and key personnel. All interviews were conducted in English and recorded, with participants providing informed consent, following research approval by the first author's university ethics committee. Interview questions were grouped into themes that explored the creation of the social enterprise (consideration of other models, potential afforded by the selected model); alignment between model and fulfillment of dual or triple bottom-line objectives; organizational performance (achievements and links back to objectives); operating environment and adaptations (innovation pilots, successful and unsuccessful); financial sustainability (relations with board, funders, stakeholders, competing objectives, trade-offs); customer prioritization (means of verification, mission (re)orientation, social, environmental, economic resource allocation); static or dynamic model (innovation evolution, influencing factors).

As interviews progressed, greater attention was paid to the social, ethical, and environmental dimensions of operations and the innovations the organization piloted, particularly how these initiatives shaped decision-making and subsequent business model adjustments. In line with interpretive research guidelines (Gioia et al. 2013), interview questions evolved, enabling informants to lead the inquiry, revisiting earlier topics, and probing emerging patterns around how responsibility-oriented considerations influenced innovation choices.

Table 1 lists secondary data sources and evidence utilized for corroboration and triangulation. Sunny Money provided access to over 10 years of financial data, sales records, end-of-year reports, evaluations, internal and external presentations, which were supplemented by information in the public domain, including audited accounts going back to 2006, annual reports, and websites. A review of evidence was conducted during and between field visits, thus enabling simultaneous and recursive consultation of primary and supplementary sources (Braun and Clarke 2021; Siggelkow 2007).

Finally, and as our third source of data, during multiple site visits, field notes were gathered through informal discussion and observation of participants during coffee breaks, lunches, in staff meetings and during briefing sessions (Corley and Gioia 2004; Yin 2018). Direct observation of the transaction and distribution processes of the energy supply items was undertaken between 2012 and 2014 and again between 2016 and 2018. This included

observation of product management, storage and maintenance, testing and repair of products (demonstrating the research required to understand the products, their weaknesses, and, thus, develop a repair app and booklet), staff in the office (operationalizing the business model), engaging with organizations (dealing with suppliers and direct customers), speaking to clients and agents (managing partnerships, targeting different customer segments to create social value, negotiating prices to ensure economic and social value capture), and preparing for extended periods of sales in rural areas (evidence of the trade-offs associated with certain social value creation), all of which contributes to creating "rich rigor" in qualitative research (Tracy 2010).

3.5 | Data Analysis

In the context of sub-Saharan Africa, our analysis focused on how Sunny Money embedded RI principles into its SBMI to enable inclusive energy transitions. We recognize that Sunny Money was not explicitly aware of the RI framework. However, foundational RI scholarship notes that RI builds on a longer history of *de facto* responsible practices, including ethical reflection, public engagement, anticipatory governance, and co-production between science and society (Owen et al. 2013; Stilgoe et al. 2013; Macnaghten 2020). We, therefore, employed the RI framework as a sensitizing analytical lens within the data analysis. More specifically, we treated the RI four dimensions as *ex-post* interpretive constructs, not as a managerial template that Sunny Money formally adopted or consciously used. This distinction shaped our analytical procedure. That is, our task was not to test whether Sunny Money implemented RI as a named framework, but to examine how its decisions, routines, and business model adjustments were informed by its socio-ethical commitments and values substantively consistent with anticipation, reflexivity, inclusion, and responsiveness. In practice, this meant moving from first-order evidence of organizational choices to second-order themes, and then to aggregate capacities (as explained in phase 4 next). We conceptualize these capacities as RI-shaped because their content and operation reflect different combinations of RI principles. They were not produced by matching one principle to one aggregate dimension; they emerged from the data and were subsequently theorized as RI-shaped because they explain how responsibility became embedded in SBMI across successive business model cycles. Reading organizational practice through RI categories in this way makes visible the socio-ethical commitments and logics embedded in choices that might otherwise appear purely operational and is necessary for advancing RI-SBMI coupling as a theoretically specified rather than merely normative argument.

Adopting an empirically grounded approach, we analyzed sources of evidence by moving back and forth between them iteratively, developing our findings from the data. Later, we combined this with a review of the RI principles and SBM frameworks. Through this process, we sought evidence from which we could deduce or contradict the influence of RI principles with decisions made and actions taken by the organization. Given the sizeable volume of primary and supplementary data, and to facilitate understanding, we present the process in phase form.

3.5.1 | Phase 1. Assembly of Evidence

We organized all sources of evidence, including transcriptions, internal and external reports, and field notes.

3.5.2 | Phase 2. Developing a Timeline

Following guidelines for inductive, reflexive thematic analysis (Braun and Clarke 2024) and to ensure rigor in the approach (Corley and Gioia 2004; Gioia et al. 2013), we listened to audio recordings of the interviews and re-read transcripts. A consistent message emerged: one of different business models adopted and piloted over time, with staff regularly referring to “macro-years” and “macro-installations,” which they contrasted with “pico-years” and “pico-solar.” In developing the timeline, we found macro systems were introduced in 2007/2008 and installed “on over 400 rural schools, health clinics, and community centers” (website: Our History). The CEO explained how this first SBM grew from “let’s put a solar system on [that] community center...in Malawi” to “OK let’s do more...and Solar Aid did 416...between 2007/8 up until around 2011...and it was a lot of work.”

A story of evolving organizational structure emerged, going from a small charity-led model (“with a tiny bit of money, £35,000”) to a larger charity model with “support from USAID” and other trusts and foundations (identified in audited accounts from 2006 and the Memoranda and Articles). This model evolved into the current “trade-not-aid” model delivered through the social enterprise Sunny Money, which first appears in the 2011 audited accounts, being wholly owned by SolarAid. Observations by the first author corroborated a phasing out of macro installations as the organization shifted away from “the old solar technology... and lead [acid] batteries” (CEO). This shift ushered in SBM 2. A third SBM was identified from a new focus on repair, first appearing in the 2019 audited accounts, followed by the launch of a repair app in 2020 as well as a discussion of the app and repair in subsequent reports up to 2024. The BBC Digital Planet podcast in 2020 and two white papers co-authored with the University of New South Wales in 2023 and 2024 attested to the focus of the third SBM. From this, we developed a timeline of key moments in the organization’s history. We realise there is overlap between SBMs, with pico-solar being piloted while macro-solar was still the focus, and repair research being undertaken while pico-solar continued to be sold. However, we contend that overlap between SBMs does not preclude the ushering in of a new SBM. Indeed, it would be foolhardy to introduce an entirely new SBM without first piloting it.

In keeping with the overarching concepts associated with each SBM and to facilitate differentiation between them, we refer to them in the following manner: We refer to SBM 1 as “communal,” SBM 2 as “household,” and SBM 3 as “longevity.”

3.5.3 | Phase 3. In-Depth Exploration

As we were seeking to explore the extent to which the four RI principles informed SBMI decision-making, we revisited the definitions of each. For example, the RI principle of *inclusion*

mandates meaningful engagement with diverse stakeholders and the incorporation of multiple perspectives to ensure innovations have equitable outcomes (Kanter 1999; Stilgoe et al. 2013). We had evidence from diverse sources that supported ways in which SBMI decision-making had been *inclusive*.

In structuring the analysis, we identified central ideas and activities as first-order concepts. For example, the organization’s inclusive vision is a core concept: “SolarAid has a vision of a world where everyone has access to affordable, clean, renewable energy.” (Consolidated Audited Accounts 2017). Another central idea is the selection of technologies: “the products themselves from Sunny Money, they are quality and they are durable and actually dependable. And people love them.” (Agent); “we...realized that, basically, it’s all very well having a panel on the school but then what happens when the kids go home. They’re still using candles, kerosene and paraffin, etc. So, were we actually having much of an impact?” (Operations Director in Zambia). While ensuring access to quality technologies for all users was central, product reliability was equally critical, as failures risk a return to energy poverty. Thus, the following were coded as related first-order concepts: “we honor our warranty. We have good customer service. We have good replacements. You know, unless they put it in water or they burn it or something, we’ll do our best to replace it for them” (Operations Manager, Zambia). From such first-order concepts, we derived second-order themes that we consider organizational practices. For example, *inclusive customer service* reflects a commitment to universal, clean, affordable energy underpinned by provision of reliable, high-quality products under warranty. The breadth, diversity and consistency of evidence gave us confidence that RI principles informed SBMI decision-making within the organization.

The same technique was used for all codes and themes, with Figure 1 providing evidence of first-order concepts (activities, ideas, concepts) from which second-order themes (practices) were derived.

As shown in Figure 1, certain themes were consistent across business models (SBM 1, 2, and 3), namely *keeping pace with product transformations* and *opportunity mapping*. Others reflected tensions associated with devolved distribution models, for example, *relinquishing control*. Finally, we sought to capture the organization’s consistent but assumed focus on renewable energy. Here, internal critique, external policy influencing, social and environmental value creation were readily linked. From this, *combined value creation* and *critical review* emerged. Two of the three researchers, the first and third authors, coalesced around 32 codes, later checked for reliability by the second author. To ensure we accurately captured second-order themes, we triangulated multiple sources of evidence (Yin 2018), moving iteratively between transcripts and other documentation (Gioia et al. 2013). As a result, nine second-order themes were created.

3.5.4 | Phase 4. Longitudinal Conceptualization

The organization had undertaken three radical innovations to its business model, each seeking to become more inclusive and/or more sustainable. We wanted our data structure to explore and reflect dimensions consistent across each SBM.

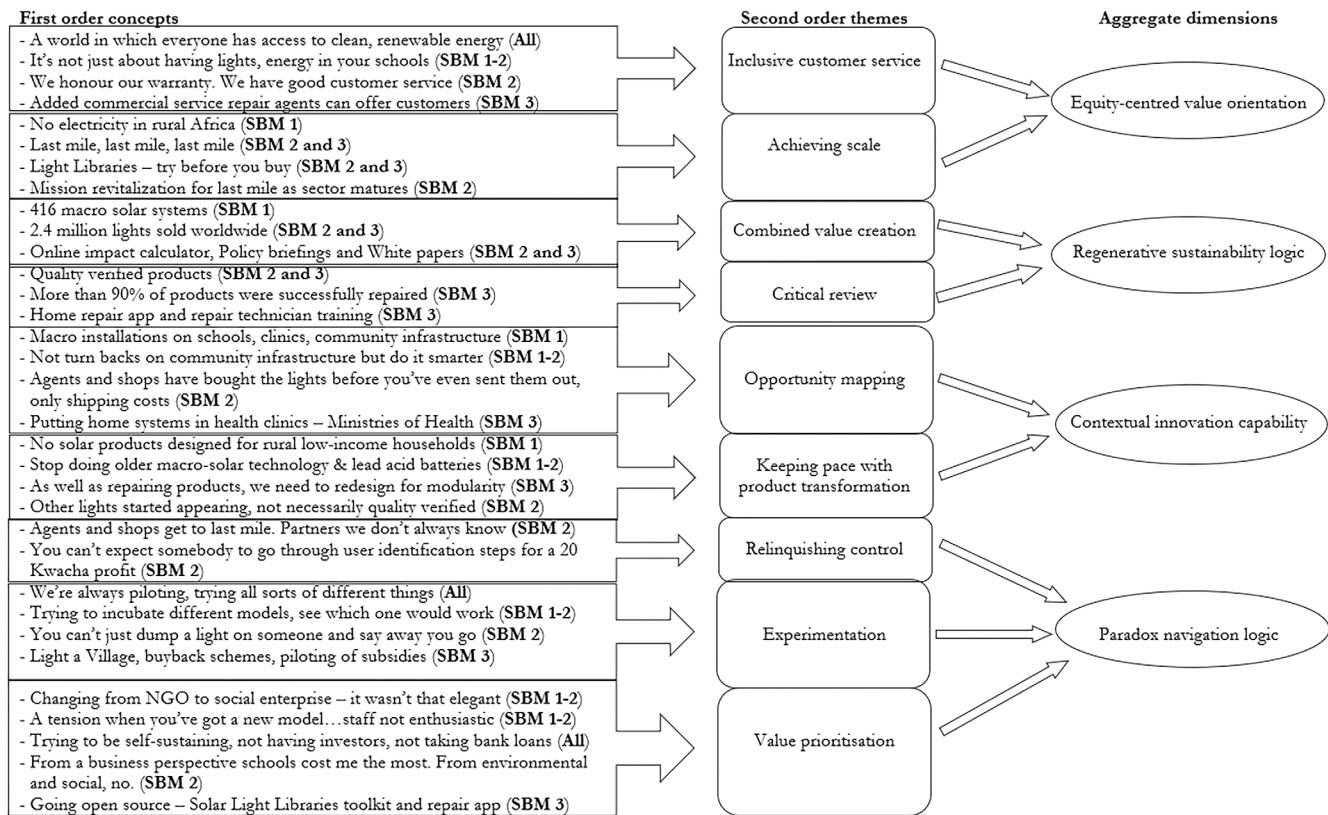


FIGURE 1 | Data structure.

Equity-centered value orientation and *regenerative sustainability logic* emerged rather easily because social and environmental value creation featured consistently in the evidence. Difficult decisions and trade-offs were constant, thus leading to *paradox navigation logic*. Finally, the expertise to navigate difficult operating environments with pervasive institutional voids was conceived as *contextual innovation capability*.

As noted in Phase 3, our aim was to analyze the four principles of RI to determine whether and how anticipation, inclusion, reflexivity, and responsiveness had been enacted in any of the three SBMs. We continuously returned to the definitions of each principle prior to seeking supportive or contradictory evidence in each SBM. Having illustrated this with *inclusion* (in Phase 3), we now illustrate *responsiveness* in each SBM. *Responsiveness* requires adaptations that enable innovations to evolve from societal concerns and emerging challenges (Owen et al. 2021; Stilgoe et al. 2013). We found that each SBM sought to improve on the previous one, and several included sub-categories. Examples of responsiveness include moving from communal macro-solar installations to smaller household systems, training agents in response to weak financial and business literacy, and development of light libraries for the poorest households.

The CEO and senior managers exhibited much *reflexivity* and self-criticality, questioning their assumptions: “were we actually having much of an impact? Yes ok, we were helping kids do their homework but then they were still walking home in the dark, doing their chores in the dark and not able to do any extra studies at home.” This led to the phase out of macro-solar systems

(SBM1) in favor of household products (SBM2), reflecting improvements to the social value of the core business model. They also questioned the organization's motivations: “Why do we exist...if it [pico-solar] is happening already with private capital coming into the market?” These high-level organizational reflections led to reframing of the original mission to “...it's gonna be the hardest-to-reach people...we exist for...as opposed to before, it was everyone.” There was also reflexive evidence of challenging internal values, e.g., in relation to the paradox of combining trade income with donor funding: “...we're basically a poor man's solar company competing with private capital” and “I will happily tick that [donor] box for that money”. *Anticipation* was the most difficult to analyze. While the repair apps and technicians in SBM 3, longevity, demonstrated anticipation of the e-waste associated with these products, we also found evidence in other more obscure areas. For example, in SBM 1, the organization anticipated that grid-based electrification would not reach millions of Zambian households, thus providing a rationale for the social value that cuts through all its SBMs.

To conclude phase 4, we linked each aggregate dimension with relevant RI principles. It is worth noting that the existence of four SBMI aggregate dimensions is not a result of direct correlation with the four RI principles, as our analysis reveals that each SBMI is linked to more than one RI principle.

4 | Findings

We identified four aggregate dimensions: *equity-centered value orientation*, *regenerative sustainability logic*, *contextual*

innovation capability, and *paradox navigation logic* (Figure 1), which we conceptualize as RI-shaped capacities running through the organization's enactment of increasingly responsible practices. When applied to the coupling of RI and SBMI, these capacities enable value proposition redesign, value creation and delivery reconfiguration, and value capture transformation to be embedded. In this manner, Sunny Money was able to continuously adapt its SBMs, maintaining sustainability and economic effectiveness while sustaining a consistent orientation toward socio-ethical objectives. Critically, our analysis across three consecutive SBMs demonstrates that the iterative development of more responsible SBMs for equitable electricity provision hinges on the cultivation and processual enactment of these four capacities. Figure 2a–c (see also Online Appendix Table B for rich context) provide a longitudinal synthesis of our findings by mapping the four capacities across Sunny Money's three SBMs. This mapping reveals how each capacity was enacted in each SBM, which RI principles were most salient, and where the capacity operated within the SBMI elements (value proposition, value creation/delivery, and value capture), thereby revealing how RI became embedded in SBMI over time. Although Sunny Money was neither aware of nor explicitly guided by the RI framework, in this section, we deliberately link the four capacities (in italics) with the four RI principles (in bold) to enhance clarity for the reader.

4.1 | SBM 1: Communal

Established in 2006, Sunny Money began as a non-governmental organization, SolarAid, supported with £35,000 from a UK renewable energy company called Solar Century. From the outset, SolarAid demonstrated an *equity-centered value orientation*, realizing “600 million people in Africa have no access to electricity” (SolarAid Impact Report 2013). It was **anticipated** that the Zambian government (like others) would not extend grid-based access to rural areas because of very high investment costs, insufficient revenue potential, and network deterioration (Haanyika 2008), which have resulted in many utility companies reporting financial losses in sub-Saharan Africa (IEG 2016). This informed Sunny Money's development of its **inclusive** vision “to create a world where everyone has access to clean, renewable energy” (SolarAid, History). To achieve this, its first SBM created value by “installing solar systems on over 400 schools and clinics” “across Zambia and Tanzania” (SolarAid Impact Report 2013, 10; SolarAid, History). This is consistent with the **reflexivity dimension**, as the organization's leaders understood their own organization's renewable energy expertise and the gaps in government provision of rural energy access that this could help address. Assessed against SBM features, social value was created with each system designed for communal use; environmental value creation came courtesy of renewable (solar) energy utilization; economic value was captured with government agencies and sponsorship funding 90% of system costs. **Inclusive** consultation with rural communities led to a 10% community contribution accompanied by the requirement “to present and demonstrate...a sustainability plan...[which] meant they could actually generate some income from that system and use that income to maintain that system over its lifetime” (CEO).

The operationalization of SBM 1 also required the application of *contextual innovation capability*, with the core capability being to map and understand opportunities by which to create and deliver value. The macro systems were built courtesy of a memorandum of understanding with ministries of education and health, with these key partnerships and strategic alliances helping to address institutional voids in rural access to electricity (see Figure 2a and Online Appendix Table B).

In addition to large solar installations, the organization “began assembling solar lamps and solar phone chargers in Tanzania and Malawi” (SolarAid Impact Report Summer 2013, 10), realizing that “no solar products designed for rural low-income households” (CEO) existed. Driven by its *equity-centered value orientation* to innovate around **inclusive** lighting at the household level, this component of SBM 1 required a different kind of *contextual innovation capability* (one that focused on keeping pace with product transformation). In the absence of products designed for rural households, SolarAid established Sunny Money and “worked with local entrepreneurs to manufacture and sell [small] solar products” (CEO), “establishing the first large scale pico-solar assembly lines in Africa” (SolarAid Impact Report Summer 2013, 10).

Despite the relative success of SBM 1, an **inclusivity**-driven and **reflexive** review of the value proposition led to a radical repositioning away from it:

We realized that, basically, it's all very well having a panel on the school but then what happens when the kids go home. They're still using candles, kerosene and paraffin, etc. So, were we actually having much of an impact? Yes ok, we were helping kids do their homework but then they were still walking home in the dark, doing their chores in the dark and not able to do any extra studies at home.

(Country Director, Zambia)

To achieve better *equity-centered value orientation*, Sunny Money decided “to stop doing these old [large school] systems” and instead “realized the need for pico-solar” (Country Director, Zambia) that were “taking off apace” (SolarAid Market Update 2016) and from which they anticipated they could “achieve very similar results with much cheaper kit and maybe even create a business model out of it” (CEO).

A willingness to adjust SBM 1's value proposition to become more *equity-centered* demonstrates an additional RI effect, *responsiveness*, which required *contextual innovation capability*. Two delivery mechanisms were enacted to achieve this. First, keeping pace with product transformations, it embraced that “technology was evolving, we were in a fast-moving sector” (CEO). Second, it built on opportunities already mapped and created with ministries of education deciding to “change the way that we do schools” (Country Director, Zambia) distributing “through head teachers of schools...as trusted members of their communities” (SolarAid Market Update 2016).

However, a move toward more **inclusive** and equity-centered value propositions requires that organizations prioritize between value creation and capture opportunities. In SBM 1,

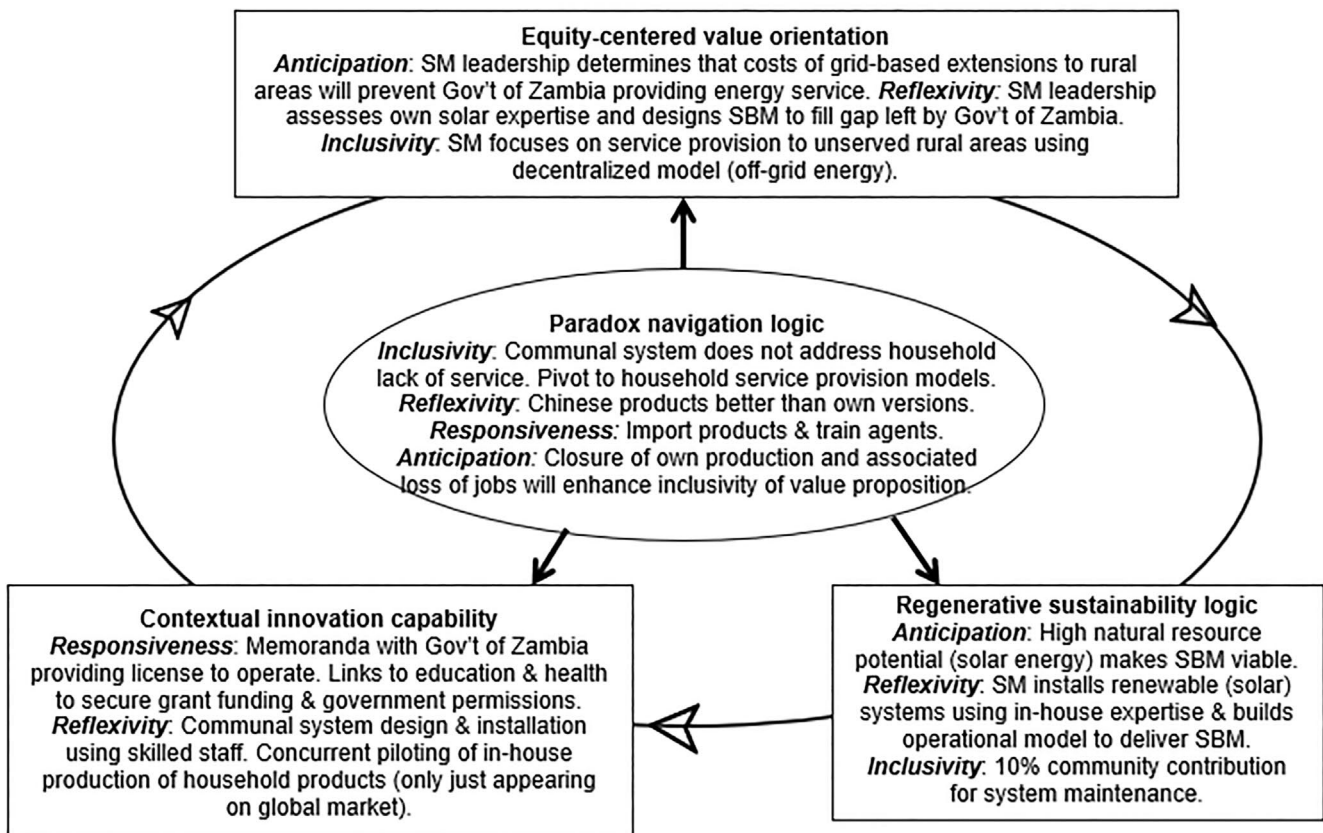
capturing economic value was “easier if we were doing installations on clinics ‘cos that was directly impacting health, so we did get support from USAID” (CEO), whereas sales of pico-solar systems do not fit with this traditional economic model. Enacting a change of organizational status and structure can also introduce challenges as “social enterprises are new, it’s sometimes difficult for authorities to understand or have something that actually matches what you’re trying to do” (CEO). The enactment of value prioritization mechanisms such as these demonstrates that the third aggregate dimension, *paradox navigation logic*, is a constant feature in the operationalization of any SBM and associated innovations that are *equity-centered* in their *value orientation*. We identify such paradox navigation as central to

social enterprises seeking to avoid mission drift toward economic value capture. Following these dynamics, Sunny Money moved to SBM 2.

4.2 | SBM 2: Household

The primary driver for innovating to SBM 2 was a more *equity-centered value orientation* (see Figure 2b and Online Appendix Table B). The gap in the market was the same (i.e., rural communities without electricity), but the end-user became clearly identifiable as the individual customer rather than the entire community. **Inclusivity** remains at the heart of this SBM, supported

a. SBM1 – “communal supply”



SBM 1 Description: Unserved rural populations (*equity-centered*) get communal access to electricity via solar installations on schools and clinics (**value proposition**). There are also trials of locally made household products. **Value is created** as installations are on public buildings and **value is delivered** using skilled staff, renewable technology and a community contribution to maintain and operate the system. With funding from donors this model readily **captures economic value**. *Context-innovation* secures license to operate & skills where none existed. Renewable energy fulfils *regenerative logic*. However, in paradox 1) communal solar installations leave homes in energy poverty, and in paradox 2) locally manufactured pico products are less viable than emerging Chinese products, so imports are prioritized and local production ceased. For rich context & further details see Online Appendix Table B.

FIGURE 2 | (a) SBM 1—“communal supply,” (b) SBM 2—“household supply,” and (c) SBM 3—“longevity.”

b. SBM2 – “household supply”

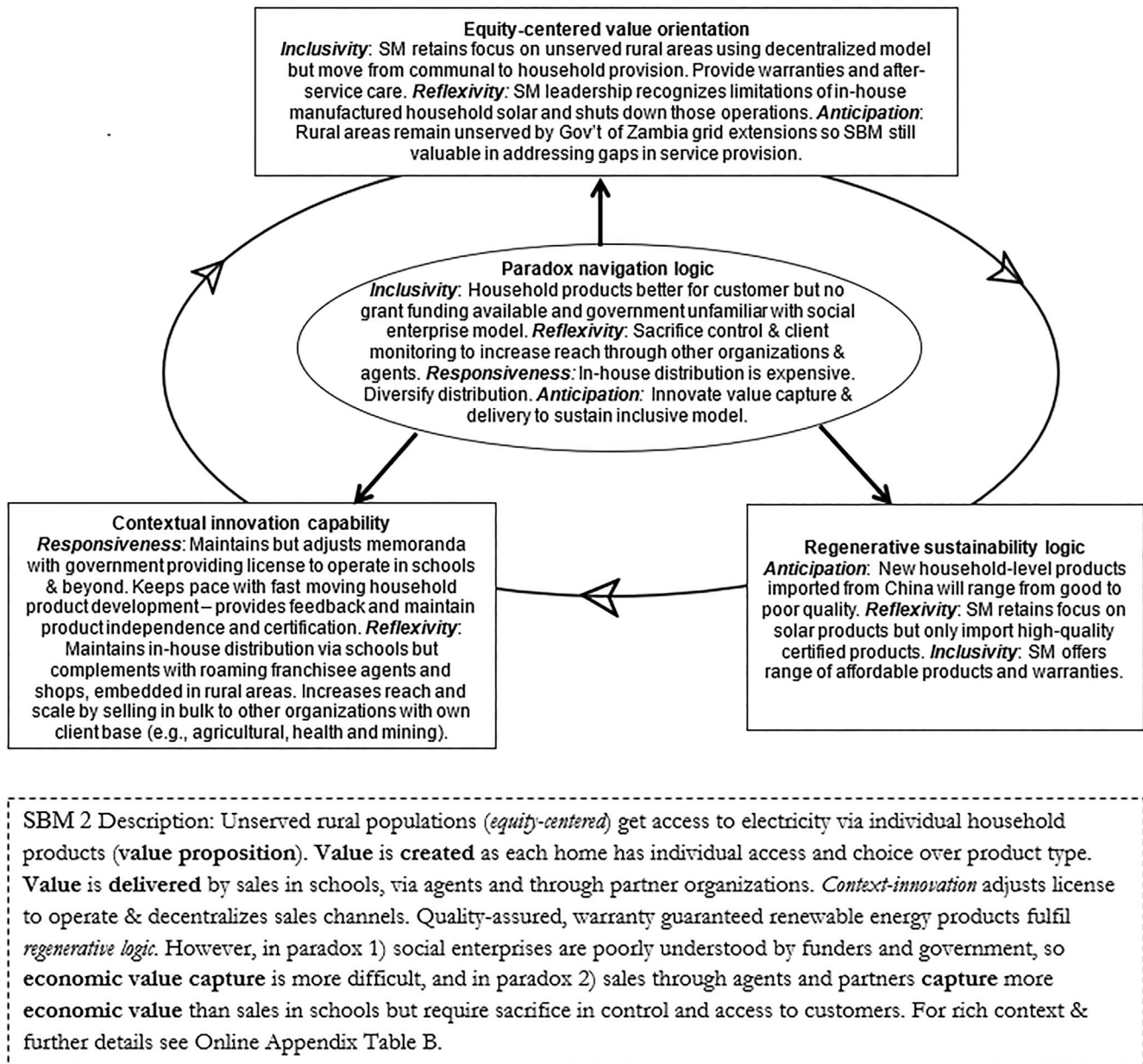


FIGURE 2 | (Continued)

by opportunity mapping and socio-cultural understanding that were critical elements of the *contextual innovation capability* enacted in SBM 2 to enable rural customers to be reached at the household level rather than via a central communal resource.

People, also, they trust teachers still in Zambia. And also working with the Ministry of Education. We did get a memorandum of understanding..which is still valid to this day, to be able to work in any school across Zambia.

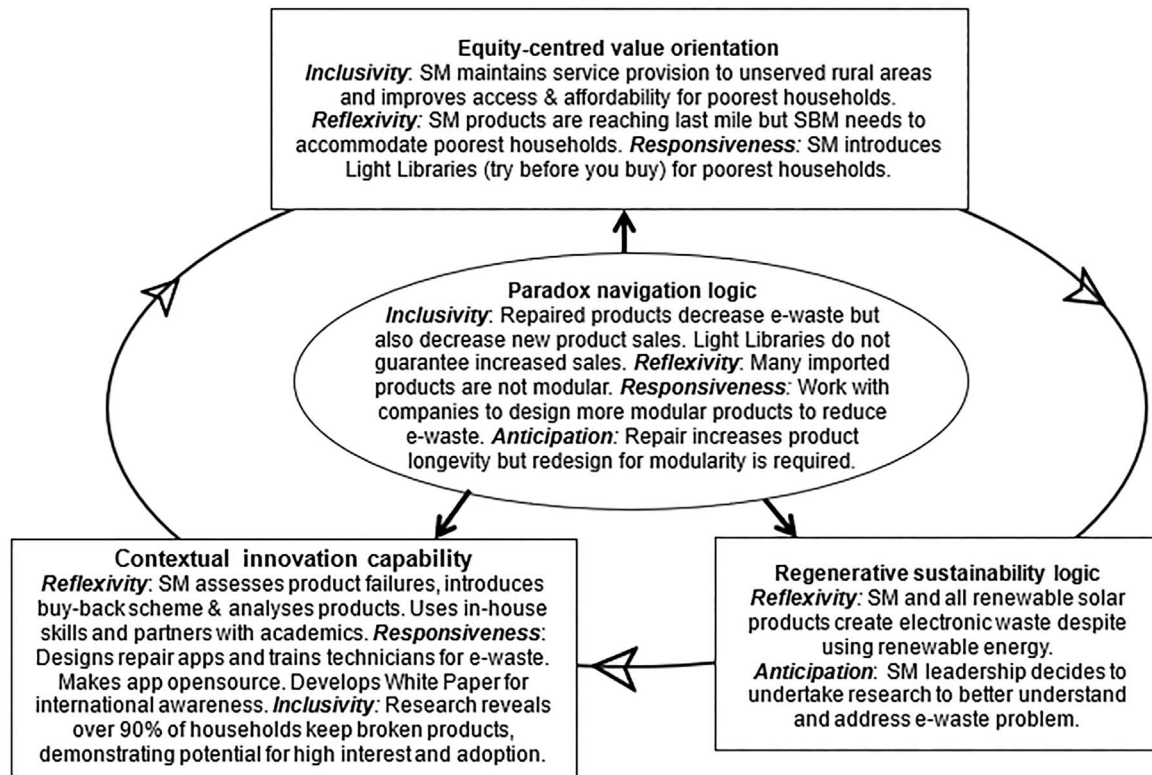
(Country Director, Zambia)

In seeking to reach rural customers and provide the best quality products, Sunny Money kept pace with product transformation

and embraced a **reflexivity** linked paradox in SBM 2: “We like the fact that we’re manufacturing locally, but these other products being made in China have the potential to be much cheaper, mass produced, high quality” (CEO).

The decision was taken to “clos[e] down manufacturing operations” (CEO) and import suitable quality-certified products. These were entry-level pico-solar lights, capable of lighting one or more rooms and charging radios, phones, and torches. Thus, throughout SBM 2, the organization complied with its *regenerative sustainability logic*. Anticipating and recognizing the existence of “many poor-quality solar household systems”, Sunny Money only sold products that had been “quality tested by Lighting Global” (*Solar household systems: evidence of impact*, 2015). In addition, by 2015, it “became the first solar light

c. SBM3 – “longevity”



SBM 3 Description. Continued value proposition, creation, delivery, capture & paradoxes as per SBM 2 through schools, agents & partners. Additionally, *regenerative logic* reveals e-waste from broken products. *Context innovation* reveals high customer retention of broken products and uses in-house expertise to develop repair potential – simple for product owners and specialist for technicians. Light Libraries extend **value creation & delivery** to extremely poor households. However, in paradox 1) repaired products reduce e-waste & provide better **value creation** but reduce **economic value capture**, and in paradox 2) households ‘renting’ lights through libraries are not guaranteed to eventually purchase products so there is an **economic value capture** risk. For rich context & further details see Online Appendix Table B.

FIGURE 2 | (Continued)

distributor to recycle products [and began] supporting research on the disposal of e-waste using pre-existing structures to avoid infrastructure costs” (ibid.). By building on its *contextual innovation capability* and *navigating* the *paradoxes* associated with a competitive manufacturing environment, Sunny Money was able to maintain its *equity-centered value orientation*. These pragmatic decisions demonstrate the prominence of **inclusivity**, **reflexivity**, and **responsiveness** in undertaking a radical shift to SBM 2.

A detailed analysis of SBM 2 reveals a mixture of innovations which are discussed here. In SBM 2, social value is created via sales of products to families of school children, often requiring multiple visits to the same schools.

The first delivery would always be a bit slack. People would [ask] why should we use this and what’s the point of the solar light, I’ve used candles, my parents

used candles, my grandparents, why? But once you’ve done that first delivery and you’ve got a couple of people using them, the floodgates usually open.

(Country Director, Zambia)

This fulfills the value proposition of SBM 2 and *equity-centered value orientation*. However, economic value capture is challenging because staff “are costing fuel before they’ve even sold the lights” (Operations Manager, Zambia) and “there’s a daily allowance for the team, [as well as] vehicle costs” (Country Director, Zambia), poor road conditions, long distances, low population density, and limited purchasing power among customers. Despite the high economic costs of sales through schools, Sunny Money enacts social value prioritization over economic value capture to maintain its *equity-centered value orientation*: “From a business perspective [i.e., economic], schools cost me the most. From environmental and social [perspectives]—no” (Country Director, Zambia).

Without discontinuing sales through schools, Sunny Money chose to map other opportunities to more readily capture economic value to avoid relinquishing the drive to create social and environmental value. In doing so, the organization recruited and created networks of micro-franchisees, or agents, for which it would “segment a geographical area and say like ok this is your group of villages” (CEO). These agents live and work in rural areas, occasionally in schools, often speaking local dialects and having social networks. They buy products in bulk, benefiting from subsidies; moreover, they sell at whatever price customers are willing to pay. Once the organization has received the agent’s upfront payment, the orders are dispatched via national bus services, thus reducing transport costs: “Agents and shops have bought the lights before you’ve even sent them out. So, we don’t have to spend money other than the shipping” (Operations Manager, Zambia).

This demonstrates *contextual innovation capability* to more readily capture economic value while delivering products to “last mile” customers (Country Director, Zambia). Although these innovations better captured economic value, *paradoxes* had to be *navigated*, thus requiring experimentation and a willingness to relinquish control:

An agent program takes a while to get up and working. You can’t just dump a solar light on somebody and go, oh away you go (Country Director, Zambia). “You can’t expect somebody [an agent] who’s selling a light for a profit of 20 Kwacha to go through all these steps to get to [register] that end user.”

(Operations Manager, Zambia)

A cost benefit analysis of the agent model demonstrated this more effectively captured economic value than the school’s model. Despite this, a subsequent analysis of over 1000 agents revealed that certain “agents are becoming one-offs...buying once a year then never to be seen again” (Country Director, Zambia). As Sunny Money calls agents “once or twice a month, to see how sales are going,” it was able to apply its *contextual innovation capability*, which revealed that many lack basic business skills and “don’t really know how to put a budget together or a small cash flow” (Country Director, Zambia). Therefore, a training program was developed with an experienced partner organization. This innovation reveals elements of **inclusion** (agent consultation), **reflexivity** (analysis of devolved sales), as well as **responsiveness** through a willingness to support weaker agents.

In addition to upskilling weaker agents, analysis revealed that “agents in shops are actually our big money makers” (Operations Manager, Zambia), selling lots of lights and requiring no training: “We would call them super agents – that is, people that have three, four shops. I’ll give you an example: Mr. X up in Northern Province has twelve shops. He is able to buy from us on a set level of credit, \$2,000 worth of lights rather than \$70 worth of lights” (Country Director, Zambia). Thus, the organization created networks of “super agents” able to order larger volumes and supply “standard” agents with fewer lights. However, “the [super] agent with seven little shops is not going to be able to keep track of what agent he’s selling to and what end user that agent’s gone to. So, one of the things we are having problems with is seeing who that end user is” (Operations Manager, Zambia).

Multiple variations of an apparently simple micro-franchisee model—devolved product delivery networks, subsidized pricing offers, bespoke training, super-agent networks—demonstrate that *contextual innovation capability* is essential to effectively deliver value in complex environments. Value prioritization decisions and experimentation permeate the agent model, with Sunny Money incurring the expenses for training programs or relinquishing control over sales to customers. Such *paradoxes* require careful *navigation* and application of context-specific expertise (see Figure 2b and Online Appendix Table B).

Further, to improve economic value capture and reach in remote rural areas unserved by teams or agents, Sunny Money used *contextual innovation capability* to innovate further. It mapped organizations with large employee or customer bases (agricultural, and mining companies, social enterprises, NGOs, churches). Next, it offered them solar products as complements to existing product or service offerings (i.e., akin to social enterprises distributing health kits through community outreach, or agricultural companies selling seeds). Sunny Money refers to these organizations as partners: “You look at the...partners when you get that order ...like 3500 lights, a huge order with huge rewards...And they were able to get those lights to the farmers and sell them like that (clicks fingers) because they’ve infiltrated the market...” (Operations Manager, Zambia).

Such opportunity mapping reduces primary delivery costs, “open[s] doors because they’re on the ground a lot more than Sunny Money” (Country Director, Zambia) and extends geographic reach. However, like super-agents, sales to partner organizations are business-to-business transactions and require a relinquishing of control in Sunny Money’s interaction with customers, thus demonstrating *paradox navigation* in such SBMs. “Some of the corporates may be getting to the last mile, but ... I don’t think it is...” (Operations Manager, Zambia).

Finally, *equity-centered value orientation* is evident in Sunny Money’s leadership. Through its participation in global solar fora, Sunny Money rejected the draw of more profitable customer segments and instead sought to influence businesses to adopt more equity-centered orientations:

Private companies in our space are showcasing new [solar] televisions...but how many were saying...we’ve cracked the solution to the lower segment of the population? I moderated a session on ‘too poor, too remote, too insecure’. And so that’s what we needed to innovate around.

(CEO)

With solar enterprise now taking off in major African markets, our mission has shifted to center around those with least access to energy... Although the idea is simple enough, implementing it will be hard. We choose to do the difficult thing.

(SolarAid Annual Report and Financial Statements, 2020/21, p. 3, message from the Chair)

As the quotes show, other corporations focused on wealthier, urban customers, reinforcing social injustices of lack of access to products and services in rural areas. Sunny Money rejected this economically lucrative shift to continue creating *equity-centered* value for “last mile” customers:

This last year, 2017, farming didn't really bring in much of an income for them [the farmers]...because the government reduced the price at which they going to buy maize.

(Agent Coordinator, Zambia)

But again, seasonality and when people have money is so up and down... lack of rainfall and everything else cos you're dealing with subsistence farmers, really.

(Country Director, Zambia)

SBM 2 demonstrates a constant application of *contextual innovation capability* in the drive for *equity-centered value orientation*. There are multiple strands and innovations within this SBM, all intended “to reach the last mile” (Operations Manager, Zambia). Certain innovations (e.g., the schools program) incur greater cost structures but enable Sunny Money to maintain direct linkages with customers. Funds raised through sponsorship, philanthropy, or from government donors have helped accommodate such costs. Where other innovations increase geographic reach and facilitate economic value capture, they do so at the expense of customer interaction. This illustrates the *paradoxes* running through every decision.

4.3 | SBM 3: Longevity

The shift from SBM 1 to SBM 2 enabled the creation of more individual *equity-centered value* while developing mutually supportive economic value capture innovations. SBM 3 indicates a new *equity-centered* innovation but primarily focuses on developing a more *regenerative sustainability logic*, which can be applied to the adaptations of SBM 2 for future innovations and by other businesses in the sector (see SBM 3 in Figure 2c and Online Appendix Table B).

Inclusive consultation with school-based customers revealed that even entry-level products were too expensive for some. To better reach the “last mile,” it introduced light libraries (SolarAid 2022), providing a “try before you buy” approach, whereby schools get 20–50 lights that students can rent for one penny per day. This allows economically impoverished households to buy solar once savings accrue from reductions in the purchase of kerosene or torch batteries. This is clearly an *equity-centered value orientation*. The creation of light libraries prioritizes social value creation over economic value capture and demonstrates the *navigating of paradoxes* required when *orienting to equity-centered value*.

The use of renewable energy sources, including solar energy, is usually considered environmentally responsible. However, adopting a critical review of its operations and products, Sunny Money found that over 90% of households had kept broken solar products, and of these products, over 90% could be repaired

(Munro et al. 2023; BBC radio). By integrating a *regenerative sustainability logic*, Sunny Money innovated to remedy the e-waste problem. With external economic support, a fault diagnosis and repair manual was developed and made open source (Repair Manual 2023), as was a repair app, enabling customers to undertake basic repairs. Repair technicians were also trained to repair complex issues, extending product longevity and creating social, economic, and environmental value. Further, Sunny Money produced a policy briefing (Munro et al. 2023) and is working with a manufacturer to create modular lights that can be disassembled without discarding the entire unit. While there may initially have been a sector-wide lack of **anticipation** regarding e-waste, the organization is demonstrating environmental **responsiveness**, thus attempting to reduce negative impacts and enacting a *regenerative sustainability logic* (see Figure 2c and Online Appendix Table B).

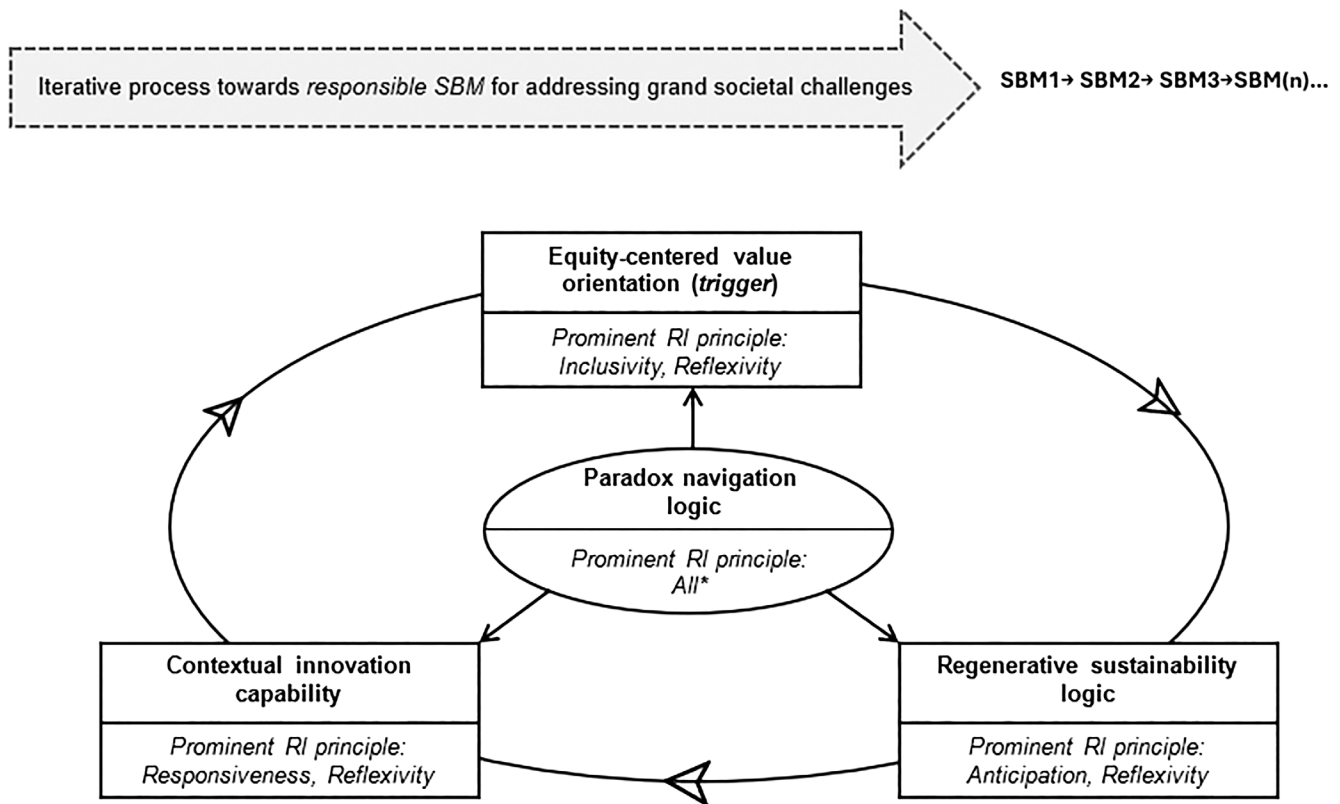
Detailed product knowledge has been developed over years of working in the sector and by disassembling faulty, broken products. The knowledge gained also contributes to the development of modular lights, thus demonstrating *contextual innovation capability* at the fore of SBM 3. This reveals that *contextual innovation capabilities* loop back to *regenerative sustainability logic*. Moreover, the interplay between social research and value creation with *contextual innovation capability* is also revealing—the finding that over 90% of households had kept faulty products reveals a rather different approach to the relationship between customers and products, as compared to that in more economically developed countries.

Both innovations within SBM 3 require that paradoxes be navigated, particularly for economic value capture. Customer-based product repair and devolved networks of repair technicians could reduce economic value capture for the organization but demonstrate the prioritization of *regenerative sustainability logic* as well as *equity-centered value orientation* created through extending product longevity and better customer value for money. Light libraries also require careful *paradox navigation*; while such libraries might eventually lead to economic value capture if a family moves from rental to purchase, this is not guaranteed.

4.4 | A Process Framework for Responsible SBMI

Integrating the above findings, we theorize responsible SBMI as a process in which RI principles are embedded as organizing standards within business model innovation, rather than treated as external ethical add-ons. Within Sunny Money, these principles are repeatedly integrated across value proposition redesign, reconfiguration of value creation and delivery, and value capture transformation, ensuring that each shift remains oriented to addressing energy poverty under institutional weakness.

Across three consecutive SBMs, we identify four recurrent, cross-cutting aggregate dimensions (equity-centered value orientation, regenerative sustainability logic, contextual innovation capability, and paradox navigation logic) which we conceptualize as RI-shaped organizational capacities—Figure 3 and Table 2. These capacities are not additional “elements”



*The four principles of Responsible Innovation: *anticipation, reflexivity, inclusion and responsiveness*

For rich context and further details see Online Appendix Table B.

FIGURE 3 | A process framework for responsible SBMI.

bolted onto the business model but patterned abilities through which managers adapt value proposition, reconfigure value creation and delivery, and transform value capture in ways that remain guided by RI principles. While the SBMI framework specifies where change occurs, these capacities explain how responsible change is sustained under persistent social-ecological-economic trade-offs. Importantly, they also clarify why RI principles vary in salience over time as each capacity foregrounds different principles depending on the tensions faced.

Equity-centered value orientation initiates responsible SBMI by anchoring business model transformation in inclusion, legitimacy, social need, and justice. As depicted in Figure 3 and Table 2, inclusion is the key RI principle that underpins *equity-centered value orientation* requiring that problems are co-defined with communities, value propositions co-produced, and accountability built into the model rather than treated as peripheral. This capacity unsettles the initial value proposition by forcing recognition of who remains excluded and why, as seen when SBM 1's school-based access failed to address household energy poverty, triggering a shift to household-level solutions in SBM 2. This deliberate, socially committed shift introduced new operational constraints, including longer sales cycles, higher distribution costs, and lower short-term revenue. Rather than retreating from its inclusivity commitments, Sunny Money iteratively refined its approach, demonstrating that

paradox navigation is intrinsic to equity-oriented redesign from the outset, shaping it at every turn.

Regenerative sustainability logic emerges once equity-driven redesign exposes downstream environmental consequences, forcing a rethink. Environmental responsibility shifts from harm mitigation toward restoration, prompting the organization to ask whether its business model is trading short-term access for long-term ecological damage. While environmental responsibility in SBM 1 and SBM 2 focused on carbon reduction via solar access and quality-certified products, increasing solar e-waste led to SBM 3's emphasis on durability and circularity: modular products, repairable components, open-source repair tools, and repair-oriented offerings help extend product life. These changes were not reactive responses to regulation but internally driven by ethical commitment to prevent new forms of environmental harm. However, this surfaced a new paradox: longer product lifetimes reduce product turnover and can weaken revenue streams. Sunny Money responded by decentralizing maintenance through local technicians and repair apps, shifting value creation from centralized production to community-based service models; this adaptation demonstrates that paradox navigation is a generative feature of responsible SBMI.

Contextual innovation capability enables the organization to operationalize equity and regeneration in institutionally weak contexts.

TABLE 2 | RI-shaped organizational capacities enabling SBMI: the conceptualization^a.

RI-shaped capacity	How the capacity works	Embedding prominent RI principles	Where capacity acts in SBMI (link to SBMI components)
Equity-centered value orientation	Uses inclusive problem framing and reflexive evaluation to set targeting/eligibility and define what counts as “impact.”	Converts inclusion into <i>design rules</i> (targeting/eligibility, legitimacy criteria, stakeholder-defined “need”) and utilizes reflexive checks to prevent mission drift.	Converts inclusion into <i>design rules</i> (targeting/eligibility, legitimacy criteria, stakeholder-defined “need”) and utilizes reflexive checks to prevent mission drift.
Regenerative sustainability logic	Reorients environmental value from “less harm” (mitigation) toward “repair and regeneration” (extending product life, reducing e-waste, designing for disassembly and repair).	Builds anticipation/reflexivity into SBM choices via lifecycle criteria (durability/repairability), take-back/repair routines, and long-horizon impact evaluation.	Builds anticipation/reflexivity into SBM choices via lifecycle criteria (durability/repairability), take-back/repair routines, and long-horizon impact evaluation.
Contextual innovation capability	Builds the practical capacity to redesign delivery under institutional voids: mapping local constraints, adapting routes to market (agents, partners, school channels), and continuously reconfiguring operations to fit real infrastructure, income cycles, and literacy realities.	Embeds responsiveness via ongoing adaptation (experimentation, learning loops, partner reconfiguration), with reflexive scrutiny of who is (not) reached and why.	Embeds responsiveness via ongoing adaptation (experimentation, learning loops, partner reconfiguration), with reflexive scrutiny of who is (not) reached and why.
Paradox navigation logic	Meta-capacity that treats persistent tensions (equity vs. efficiency; regeneration vs. revenue; responsiveness vs. control) as structural features of responsible SBMI, not one-off problems; keeps the organization moving by repeatedly realigning decisions across the three SBMI components over multiple cycles.	Institutionalizes “trade-off work” through routines for prioritization, experimentation, and revisiting assumptions; mobilizes all RI principles as guardrails for tough choices.	Institutionalizes “trade-off work” through routines for prioritization, experimentation, and revisiting assumptions; mobilizes all RI principles as guardrails for tough choices.

^aSee [Supporting Information](#) table which provides a chain of evidence (Yin 2018) on the dynamics that happen at each cycle. This also clarifies the effect of capacities on the three elements of SBMI and shows the role of RIs across the three SBM cycles.

Conceptually, it is the organization's ability to evolve, converting locally grounded insights into new arrangements for value creation and delivery. The shift from SBM 1's centralized installations and direct school engagement to SBM 2 and SBM 3's decentralized delivery through rural agents and strategic partnerships illustrates this evolution, thus enabling broader reach and reducing operating costs while maintaining a focus on access. However, decentralization introduced new tensions, including diffused control, variable agent capability and customer experience, and reduced organizational visibility. Sunny Money addressed these tensions through mechanisms such as super-agents, tiered training, segmentation, and use of local transport services, illustrating that contextual innovation capability is a continuous process of adjustment rather than a fixed competence.

Paradox navigation logic operates across all stages as the central structuring capacity. It allows the organization to work through persistent tensions generated by the other three capacities, that is, equity versus efficiency, regeneration versus revenue, responsiveness versus control, without resolving them. It underpins the

entire responsible SBMI process, shaping how managers continuously engage with tensions. Across SBM 1—SBM 3, these tensions repeatedly surfaced in different forms: balancing scale with depth in SBM 2's shift to agent networks, reconciling environmental responsibility with business sustainability in SBM 3's repair-focused model, and managing mission commitment alongside operational efficiency during SBM 1's move from macro systems to more distributed solutions. Paradox navigation sustains SBMI across cycles by linking the other capacities and mediating how value propositions are redesigned, delivery structures are reconfigured, and value capture is adjusted each time trade-offs intensify. Enabled by the four RI principles, this capacity is enacted through three mechanisms: experimentation, which enacts responsiveness and reflexivity by generating evidence for redesign under uncertainty; relinquishing control, which enacts inclusion by redistributing agency to partners and communities while creating new accountability demands; and value prioritization, which enacts anticipation and reflexivity. Together, these mechanisms make RI a consistent way of working, helping the organization navigate paradoxes and maintain more responsible SBMs over time.

5 | Discussion

This study asked how organizations operating in institutionally weak environments can transform their SBMs to become more responsible by embedding RI principles in their SBMI processes. Drawing on the longitudinal case of Sunny Money, our findings revealed that responsible SBMI is an evolutionary and recursive process in which value proposition, value creation and delivery, and value capture are reassessed as new needs, constraints, and externalities arise (Foss and Saebi 2017; Schaltegger, Lüdeke-Freund, and Hansen 2016). Crucially, the case demonstrates that RI principles are not embedded “by the organization” in the abstract. Rather, managers embed RI through ongoing choices regarding what is prioritized, who is included, what risks and harms are anticipated, and how the SBM is adjusted in response to feedback and emergent consequences (Stilgoe et al. 2013; Owen et al. 2013). In settings where regulation and enforcement are weak, these managerial choices function as the primary guardrails that shape and determine the extent to which SBMI remains responsible.

5.1 | Implications for Theory

Our study advances theory in several ways. First, we advance understanding of RI-SBMI coupling (Lehoux et al. 2021; Long and van Waes 2021; Ambos and Tatarinov 2022) by reconciling two research streams that have largely developed in parallel: SBMI scholarship that explains how business models are redesigned for sustainability and RI scholarship that specifies the principles through which innovation can be steered toward socially desirable outcomes. While interest in synergies between SBMI and RI is increasing (Long and van Waes 2021; Magni et al. 2024), existing research has often treated their coupling as normative aspiration rather than a theoretically specified and empirically grounded process. As such, existing scholarship has underexplored the mechanisms through which RI can generate value within innovation ecosystems (Arslan and Tarakci 2022), critiqued the tendency to treat RI as guiding principles detached from operational realities (Genus and Iskandarova 2018), and highlighted its implementation challenges (de Hoop et al. 2016). Consequently, the connection remains conceptually underdeveloped and empirically underexplored. Addressing this gap requires unpacking how RI principles become consequential within SBMI components and are operationalized across organizational and field-level dynamics (Degbey et al. 2024; Liu et al. 2024). Notably, we define RI-SBMI coupling by substantive alignment between organizational action and RI principles, rather than by formal awareness or explicit adoption of the RI framework. In our case, Sunny Money’s choices were shaped by its mission, socio-ethical commitments, and experience of operating in institutionally weak contexts; the RI framework provides the analytical vocabulary through which we identify and theorize the responsibility dimensions embedded in those choices. Coupling is visible when anticipation, reflexivity, inclusion, and responsiveness are expressed in decisions about value proposition redesign, value creation and delivery reconfiguration, and value capture transformation, and when these dimensions constrain purely economic logics across successive SBM iterations. On this basis, we theorize four RI-shaped

organizational capacities, namely equity-centered value orientation, regenerative sustainability logic, contextual innovation capability, and paradox navigation logic, as mechanisms through which responsibility becomes consequential within SBMI. These capacities do not add new business model elements; rather, they explain how organizations continue revising SBM choices while remaining socio-ethically accountable. They describe the organizational means through which iterative reconfiguration across established SBMI loci becomes possible and sustainable over time (Foss and Saebi 2017). In doing so, we move beyond relatively static depictions of SBM structures (Evans et al. 2017; Lüdeke-Freund et al. 2018) and provide a dynamic, process-based account of how RI can guard the development of viable, yet ethically anchored, SBMs (Lubberink et al. 2019; Ranabahu 2020).

Second, we contribute to emerging conversations regarding SBMs for grand challenges (Marti 2018; Pereira et al. 2024; Wang et al. 2025) by placing paradox management at the center of responsible SBMI and identifying the underpinning mechanisms that enable organizations to continue innovating responsibly in the face of tensions. Paradox scholarship has long argued that tensions, such as competing goals and contradictory demands, are persistent features of organizing rather than episodic problems (Smith and Lewis 2011; Jay 2013). Our findings reveal that, in a responsible SBMI process, tensions are not confined to an “implementation” phase; they are generated by the very attempt to simultaneously pursue social, economic, and environmental value and, therefore, re-emerge as the business model evolves. We extend this view by revealing that paradox navigation operates as a structuring capacity that holds the process together across SBM iterations. Moreover, we explain how it is sustained through three recurring mechanisms (experimentation, relinquishing control, and value prioritization). In our case, these mechanisms do not simply “support” innovation, but they make responsibility governable in practice by creating spaces for learning, redistributing agency to build legitimacy and reach, and making explicit what will be protected when viability pressures intensify.

Third, we show that the salience of RI principles varies across capacities and SBMI components as managers embrace specific RI principles in response to what is at stake in specific moments of SBM development. While RI is often presented as a coherent set of principles, prior research has noted the difficulty of translating these principles into practice in a consistent, “one-size-fits-all” manner (Stilgoe et al. 2013; Owen et al. 2013; Genus and Iskandarova 2018). Our findings add processual granularity by revealing that different principles become more prominent depending on which capacity is involved, and which locus of business model change is under negotiation. For example, inclusion becomes focal when managers embed *equity-centered value orientation* into value proposition redesign and delivery choices. Anticipation becomes more salient as *regenerative sustainability logic* brings longer-term environmental consequences and effects into decision horizons. Responsiveness is pivotal when managers cultivate *contextual innovation capability* in the face of local constraints and institutional voids. In contrast, *paradox navigation* draws on the full set of RI principles because tensions in responsible SBMIs are simultaneously distributive (who benefits and who bears costs), temporal (short-term viability versus

long-term stewardship), practical (what is feasible in context), and epistemic (how managers interrogate assumptions and learn from unintended consequences) (Ringvold et al. 2023). These findings add important granularity to the theorization of RI (von Schomberg 2019; Owen and Pansera 2019), thus highlighting the need for a dynamic understanding of principle activation rather than treating RI principles as stable design guidelines.

Finally, by studying a social enterprise operating under conditions of institutional fragility, we contribute to theorizing responsible business model evolution in the absence of strong exogenous institutional pressures (Chabowski et al. 2025; Calderini et al. 2023). Prior RI and SBMI research has often assumed the presence of regulatory scaffolds or societal expectations (Scherer and Voegtlin 2020). Our findings reveal that equity-centered value orientation and regenerative sustainability logic can substitute for missing institutional support; this suggests that in weak institutional contexts, the ethical infrastructure must be endogenously developed by the organization.

5.2 | Implications for Practice

For practitioners addressing grand challenges, there are several implications, particularly for low-income countries with dispersed rural populations. First, developing capacity for organization-wide equity-centered value orientation helps avoid unintentional reinforcement of structural inequalities (Sovacool et al. 2019) in access to services and products. To do this well, inclusive consultation must be undertaken with a wide range of stakeholders to understand their means and access requirements (Kanter 1999; Stilgoe et al. 2013). Ideally, this would be undertaken when developing an SBM, but it can be applied to an existing one and should be undertaken throughout the life of any SBM and associated innovations; this is because impoverished households are the most vulnerable to the impacts of grand challenges and this vulnerability is dynamic. The application of this orientation decreases the likelihood of mission drift, thus acting as a societal guardrail. Second, mapping opportunities where institutional voids are widespread can facilitate economic value capture, geographic reach, and market competitiveness. For example, working with micro-franchisees and local public transport provides effective decentralized distribution systems at the individual level, but it is the application of contextual innovation capability that permits further development of such initiatives—for instance, recognizing agents with potential to become super agents and devolving sales to partner organizations. For dispersed rural customers with precarious incomes, such approaches build on other people's social networks and community trust, saving time and effort to build these internally. Third, even when working with environmentally “sound” practices and technologies, improvements can always be made. While it might be difficult to anticipate negative unintended consequences in nascent markets, a critical review of products or services is essential to remedy such consequences and internalize necessary actions. Finally, while genuine integration of RI with SBMI can help tackle grand challenges, this requires a willingness to sacrifice a certain amount of

economic value capture with social and environmental value creation. Indeed, tensions and trade-offs will feature in all decisions; however, with appropriate leadership, organizations can develop expertise in navigating such paradoxes.

5.3 | Limitations and Future Research Directions

While our study advances understanding of the dynamic interplay between RI and SBMI in addressing energy poverty, it has limitations. It is based on a single longitudinal case of a social enterprise operating within institutional voids, which limits the generalizability of our findings across broader organizational fields and sectoral contexts. Therefore, future research could deploy comparative multi-case designs (including firms that differ in terms of institutional embeddedness, profit orientation, and innovation scale) to theorize the consistency and variation in RI-SBMI coupling. Moreover, while our analysis foregrounds the successful navigation of tensions and paradoxes, further inquiry should explore cases of failure (where RI-SBMI integration breaks down) to better theorize risks, contradictions, and unintended consequences. Additionally, future research could examine how paradox salience varies across different stages of SBM trajectories, particularly under conditions of resource shocks or shifting governance landscapes (Jay 2013). Finally, as our study is situated in the renewable energy sector in sub-Saharan Africa, future research should investigate how our model (and its underpinning capacities) can unfold in other sectors with less resource-constrained contexts, where market-based solutions may inadvertently reproduce existing inequalities. Addressing these limitations can enrich the existing understanding of structural conditions, actor strategies, and temporal dynamics that enable or constrain responsible business model transformation.

Acknowledgments

We would like to thank everyone who took part in our research and offered valuable time and insights. The usual disclaimers apply. We would also like to thank the Special Issue editorial team and San Francisco State University for hosting an excellent Paper Development Workshop in 2025. This provided a critical forum for development of this paper as well as an opportunity to meet and learn from participants of the Responsible Innovation and Entrepreneurship (RI&E) Conference.

Funding

The authors have nothing to report.

Ethics Statement

The authors have read and agreed to the Committee on Publication Ethics (COPE) international standards for authors.

Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

Endnotes

¹ Consistent with Uzzi's view of ties and network as mechanisms that shape organizational outcomes, and Johns's treatment of context as constraints and enablers of relationships, we treat external actors (agents, partners, and institutions) as contextual factors that influence our focal organization-level SBMI process rather than as independent units of analysis.

² "Agent" refers to a reseller or micro-franchisee who sells the products on behalf of the organization, managing some product distribution, and sending feedback and evaluations on the process.

References

- Al-Tabbaa, O., Z. Khan, and G. Knight. 2024. *Circular Economy and Social Upgrading in Global Value Chains: An Analytical Perspective on Social Upgrading in the Global South*. Palgrave Macmillan.
- Ambos, T. C., and K. Tatarinov. 2022. "Building Responsible Innovation in International Organizations Through Intrapreneurship." *Journal of Management Studies* 59, no. 1: 92–125.
- Amit, R., and C. Zott. 2001. "Value Creation in E-Business." *Strategic Management Journal* 22, no. 6–7: 493–520.
- Anand, A., D. Rottig, N. Parameswar, and A. M. Zwerg-Villegas. 2023. "Diving Deep Into the Dark Side: A Review and Examination of Research on Organizational Misconduct in Emerging Markets." *Business Ethics, the Environment & Responsibility* 32, no. 2: 612–637.
- Arslan, B., and M. Tarakci. 2022. "Negative Spillovers Across Partnerships for Responsible Innovation: Evidence From the 2014 Ebola Outbreak." *Journal of Management Studies* 59, no. 1: 126–162.
- Bacq, S., and R. V. Aguilera. 2022. "Stakeholder Governance for Responsible Innovation: A Theory of Value Creation, Appropriation, and Distribution." *Journal of Management Studies* 59, no. 1: 29–60.
- Bansal, P., and K. Corley. 2011. "The Coming of Age for Qualitative Research: Embracing the Diversity of Qualitative Methods." *Academy of Management Journal* 54, no. 2: 233–237.
- Barry, M. S., and A. Creti. 2020. "Pay-As-You-Go Contracts for Electricity Access: Bridging the 'Last Mile' Gap? A Case Study in Benin." *Energy Economics* 90: 104843.
- Berends, H., A. Smits, I. Reymen, and K. Podoynitsyna. 2016. "Learning While (Re)Configuring: Business Model Innovation Processes in Established Firms." *Strategic Organization* 14, no. 3: 181–219.
- Bhatia, M., and N. Angelou. 2015. *Beyond Connections: Energy Access Redefined (ESMAP Technical Report 008/15)*. World Bank Group.
- Bhatnagar, R., D. Keskin, A. Kirkels, A. G. L. Romme, and J. C. C. M. Huijben. 2022. "Design Principles for Sustainability Assessments in the Business Model Innovation Process." *Journal of Cleaner Production* 377: 134313.
- Blok, V., and P. Lemmens. 2015. *The Emerging Concept of Responsible Innovation. Three Reasons Why It Is Questionable and Calls for a Radical Transformation of the Concept of Innovation*. Springer.
- Bocken, N., F. Boons, and B. Baldassarre. 2019. "Sustainable Business Model Experimentation by Understanding Ecologies of Business Models." *Journal of Cleaner Production* 208: 1498–1512.
- Bocken, N. M. P., and T. H. J. Geradts. 2020. "Barriers and Drivers to Sustainable Business Model Innovation: Organization Design and Dynamic Capabilities." *Long Range Planning* 53, no. 4: 101950.
- Bocken, N. M. P., S. W. Short, P. Rana, and S. Evans. 2014. "A Literature and Practice Review to Develop Sustainable Business Model Archetypes." *Journal of Cleaner Production* 65: 42–56.
- Bocken, N. M. P., and S. W. Short. 2016. "Towards a Sufficiency-Driven Business Model: Experiences and Opportunities." *Environmental Innovation and Societal Transitions* 18: 41–61.
- Boons, F., and N. Bocken. 2018. "Towards a Sharing Economy—Innovating Ecologies of Business Models." *Technological Forecasting and Social Change* 137: 40–52.
- Boons, F., and F. Lüdeke-Freund. 2013. "Business Models for Sustainable Innovation: State-Of-The-Art and Steps Towards a Research Agenda." *Journal of Cleaner Production* 45: 9–19.
- Brand, T., and V. Blok. 2019. "Responsible Innovation in Business: A Critical Reflection on Deliberative Engagement as a Central Governance Mechanism." *Journal of Responsible Innovation* 6, no. 1: 4–24.
- Braun, V., and V. Clarke. 2021. "One Size Fits All? What Counts as Quality Practice in (Reflexive) Thematic Analysis?" *Qualitative Research in Psychology* 18, no. 3: 328–352.
- Braun, V., and V. Clarke. 2024. "A Critical Review of the Reporting of Reflexive Thematic Analysis in Health Promotion International." *Health Promotion International* 39, no. 3: daae049.
- Breuer, H., and F. Lüdeke-Freund. 2017. "Values-Based Network and Business Model Innovation." *International Journal of Innovation Management* 21, no. 3: 1750028.
- Calderini, M., M. Fia, and F. Gerli. 2023. "Organizing for Transformative Innovation Policies: The Role of Social Enterprises. Theoretical Insights and Evidence From Italy." *Research Policy* 52, no. 7: 104818.
- Carson, R. 1962. *Silent Spring*. Houghton Mifflin.
- Casasnovas, G., and J. Jones. 2022. "Who Has a Seat at the Table in Impact Investing? Addressing Inequality by Giving Voice." *Journal of Business Ethics* 179, no. 4: 951–969.
- Chabowski, B. R., P. Gabrielsson, G. T. M. Hult, and F. V. Morgeson III. 2025. "Sustainable International Business Model Innovations for a Globalizing Circular Economy: A Review and Synthesis, Integrative Framework, and Opportunities for Future Research." *Journal of International Business Studies* 56, no. 3: 383–402.
- Chesbrough, H., and R. S. Rosenbloom. 2002. "The Role of the Business Model in Capturing Value From Innovation: Evidence From Xerox Corporation's Technology Spin-Off Companies. Industrial and Corporate Change." *Industrial and Corporate Change* 11, no. 3: 529–555.
- Chirambo, D. 2018. "Towards the Achievement of SDG 7 in Sub-Saharan Africa: Creating Synergies Between Power Africa, Sustainable Energy for All and Climate Finance In-Order to Achieve Universal Energy Access Before 2030." *Renewable & Sustainable Energy Reviews* 94: 600–608.
- Clowes, J., I. Hu, L. Labruto, et al. 2019. "Lighting the Way: Roadmap to Exits in Off-Grid Energy."
- Coffay, M., R. Tveterås, N. Bocken, and M. L. A. M. Bogers. 2024. "Sustainable Business Model Innovation, Dynamic Capabilities, and Organizational Design: Insights From Norwegian Aquaculture." *Business Strategy and the Environment* 33, no. 6: 5386–5404.
- Corley, K. G., and D. A. Gioia. 2004. "Identity Ambiguity and Change in the Wake of a Corporate Spin-Off." *Administrative Science Quarterly* 49, no. 2: 173–208.
- Cross, J., and T. Neumark. 2021. "Solar Power and Its Discontents: Critiquing Off-Grid Infrastructures of Inclusion in East Africa." *Development and Change* 52, no. 4: 902–926.
- Daft, R. L., and K. E. Weick. 1984. "Toward a Model of Organizations as Interpretation Systems." *Academy of Management Review* 9, no. 2: 284–295.
- de Hoop, E., A. Pols, and H. Romijn. 2016. "Limits to Responsible Innovation." *Journal of Responsible Innovation* 3, no. 2: 110–134.
- Degbey, W. Y., E. Pelto, C. Öberg, and A. Carmeli. 2024. "Customers Driving a Firm's Responsible Innovation Response for Grand Challenges: A co-Active Issue-Selling Perspective." *Journal of Product Innovation Management* 41, no. 2: 379–402.

- Eisenhardt, K. M., and J. A. Martin. 2000. "Dynamic Capabilities: What are They?" *Strategic Management Journal* 21, no. 10–11: 1105–1121.
- Evans, S., D. Vladimirova, M. Holgado, et al. 2017. "Business Model Innovation for Sustainability: Towards a Unified Perspective for Creation of Sustainable Business Models." *Business Strategy and the Environment* 26, no. 5: 597–608.
- Faccin, K., N. Beuter, B. Martins, and S. L. Vasconcellos. 2025. "Promoting Sustainable Business Model Innovation: A Dynamic Capabilities Approach." *Management Decision*: 1–28. <https://doi.org/10.1108/MD-07-2024-1548>.
- Foss, N. J., and T. Saebi. 2017. "Fifteen Years of Research on Business Model Innovation: How Far Have We Come, and Where Should We Go?" *Journal of Management* 43, no. 1: 200–227.
- Geissdoerfer, M., D. Vladimirova, and S. Evans. 2018. "Sustainable Business Model Innovation: A Review." *Journal of Cleaner Production* 198: 401–416.
- Genus, A., and M. Iskandarova. 2018. "Responsible Innovation: Its Institutionalisation and a Critique." *Technological Forecasting and Social Change* 128: 1–9.
- George, G., A. M. McGahan, and J. Prabhu. 2012. "Innovation for Inclusive Growth: Towards a Theoretical Framework and a Research Agenda." *Journal of Management Studies* 49, no. 4: 661–683.
- Gioia, D. A., K. G. Corley, and A. L. Hamilton. 2013. "Seeking Qualitative Rigor in Inductive Research: Notes on the Gioia Methodology." *Organizational Research Methods* 16, no. 1: 15–31.
- Groenewoudt, A. C., and H. A. Romijn. 2022. "Limits of the Corporate-Led Market Approach to Off-Grid Energy Access: A Review." *Environmental Innovation and Societal Transitions* 42: 27–43.
- Guo, L., Y. Cao, Y. Qu, and M.-L. Tseng. 2022. "Developing Sustainable Business Model Innovation Through Stakeholder Management and Dynamic Capability: A Longitudinal Case Study." *Journal of Cleaner Production* 372: 133626.
- Gurawska, A. 2021. *Strategic Responsible Innovation Management (SiRIM): A New Approach to Responsible Corporate Innovation Through Strategic CSR*. Routledge.
- Haanyika, C. M. 2008. "Rural Electrification in Zambia: A Policy and Institutional Analysis." *Energy Policy* 36, no. 3: 1044–1058.
- Halme, M., and M. Korpela. 2014. "Responsible Innovation Toward Sustainable Development in Small and Medium-Sized Enterprises: A Resource Perspective." *Business Strategy and the Environment* 23, no. 8: 547–566.
- Hossain, M. M., O. Al-Tabbaa, and M. F. Ahammad. 2025. *Environmental Sustainability in Textile and Apparel Global Value Chain: Towards Achieving the United Nations Sustainable Development Goals*. Springer.
- Independent Evaluation Group (IEG). 2016. *Financial Viability of the Electricity Sector in Developing Countries: Recent Trends and Effectiveness of World Bank Interventions*. World Bank Group.
- Inigo, E. A., L. Albareda, and P. Ritala. 2017. "Business Model Innovation for Sustainability: Exploring Evolutionary and Radical Approaches Through Dynamic Capabilities." *Industry and Innovation* 24, no. 5: 515–542.
- International Energy Agency (IEA). 2021. *World Energy Outlook 2021*. IEA.
- International Renewable Energy Agency (IRENA). 2017. *Accelerating Off-Grid Renewable Energy: Key Findings and Recommendations From IOREC 2016*. IRENA.
- Ivanova, S., C. Reichetzer, A. Martinuzzi, F. Findler, and K. Miko-Schefzig. 2023. "Frames, Interests, and Incentives—A Typology of Institutionalizing RRI in the Business Sector Derived From Ten Pioneering Projects." *Journal of Responsible Innovation* 10, no. 1: 2267736.
- Jasanoff, S., G. E. Markle, J. C. Peterson, and T. Pinch, eds. 2001. *Handbook of Science and Technology Studies*. SAGE Publications.
- Jay, J. 2013. "Navigating Paradox as a Mechanism of Change and Innovation in Hybrid Organizations." *Academy of Management Journal* 56, no. 1: 137–159.
- Johns, G. 2006. "The Essential Impact of Context on Organizational Behavior." *Academy of Management Review* 31, no. 2: 386–408.
- Kanter, R. M. 1999. "From Spare Change to Real Change. The Social Sector as Beta Site for Business Innovation." *Harvard Business Review* 77, no. 3: 122–132.
- Lehoux, P., H. P. Silva, J.-L. Denis, F. A. Miller, R. Pozelli Sabio, and M. Mendell. 2021. "Moving Toward Responsible Value Creation: Business Model Challenges Faced by Organizations Producing Responsible Health Innovations." *Journal of Product Innovation Management* 38, no. 5: 548–573.
- Liu, Y., Y. Xing, F. Vendrell-Herrero, and O. F. Bustinza. 2024. "Setting Contextual Conditions to Resolve Grand Challenges Through Responsible Innovation: A Comparative Patent Analysis in the Circular Economy." *Journal of Product Innovation Management* 41, no. 2: 449–472.
- Long, T. B., and A. van Waes. 2021. "When Bike Sharing Business Models Go Bad: Incorporating Responsibility Into Business Model Innovation." *Journal of Cleaner Production* 297: 126679.
- Lubberink, R., V. Blok, J. Ophem, and O. Omta. 2019. "Responsible Innovation by Social Entrepreneurs: An Exploratory Study of Values Integration in Innovations." *Journal of Responsible Innovation* 6, no. 2: 179–210.
- Lüdeke-Freund, F., S. Carroux, A. Joyce, L. Massa, and H. Breuer. 2018. "The Sustainable Business Model Pattern Taxonomy—45 Patterns to Support Sustainability-Oriented Business Model Innovation." *Sustainable Production and Consumption* 15: 145–162.
- Macnaghten, P. 2020. *The Making of Responsible Innovation*. Cambridge University Press.
- Magni, D., R. Palladino, A. Papa, and P. Cailleba. 2024. "Exploring the Journey of Responsible Business Model Innovation in Asian Companies: A Review and Future Research Agenda." *Asia Pacific Journal of Management* 41, no. 3: 1031–1060.
- Mahto, R. V., O. Belousova, and S. Ahluwalia. 2020. "Abundance—A New Window on How Disruptive Innovation Occurs." *Technological Forecasting and Social Change* 155: 119064.
- Marti, I. 2018. "Transformational Business Models, Grand Challenges, and Social Impact." *Journal of Business Ethics* 152, no. 4: 965–976.
- Mendes, J. A. J., A. Y. Oliveira, L. S. Santos, M. C. Gerolamo, and V. G. Z. Zeidler. 2025. "A Theoretical Framework to Support Green Agripreneurship Avoiding Greenwashing." *Environment, Development and Sustainability* 27, no. 9: 21779–21835.
- Mignon, I., and A. Bankel. 2023. "Sustainable Business Models and Innovation Strategies to Realize Them: A Review of 87 Empirical Cases." *Business Strategy and the Environment* 32, no. 4: 1357–1372.
- Munro, P., V. Jacome, and S. Samarakoon. 2022. "Off-Grid Enterprise: A Critical History of Small-Scale Off-Grid Solar in Sub-Saharan Africa." In *Off-Grid Solar Electrification in Africa*, 25–64. Springer International Publishing.
- Munro, P., S. Samarakoon, T. N. Ngwenya, et al. 2023. *Off-Grid Solar Repair in Africa: From Burden to Opportunity*. SolarAid.
- Ortiz-Avram, D., N. Ovcharova, and A. Engelmann. 2024. "Dynamic Capabilities for Sustainability: Toward a Typology Based on Dimensions of Sustainability-Oriented Innovation and Stakeholder Integration." *Business Strategy and the Environment* 33, no. 4: 2969–3004.
- Osterwalder, A., and Y. Pigneur. 2013. *Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers*. John Wiley & Sons.
- Owen, R., J. Bessant, and M. Heintz, eds. 2013. *Responsible Innovation: Managing the Responsible Emergence of Science and Innovation in Society*. John Wiley & Sons.

- Owen, R., and M. Pansera. 2019. *Responsible Innovation: Process and Politics*. Edward Elgar Publishing.
- Owen, R., M. Pansera, P. Macnaghten, and S. Randles. 2021. "Organisational Institutionalisation of Responsible Innovation." *Research Policy* 50, no. 1: 104132.
- Pan, L., Z. Xu, and M. Skare. 2023. "Sustainable Business Model Innovation Literature: A Bibliometrics Analysis." *Review of Managerial Science* 17, no. 3: 757–785.
- Pereira, V., Y. Temouri, G. Wood, U. Bamel, and P. Budhwar. 2024. "How Do Grand Challenges Determine, Drive and Influence the Innovation Efforts of For-Profit Firms? A Multidimensional Analysis." *Journal of Product Innovation Management* 41, no. 2: 184–210.
- Prno, J., and D. Scott Slocombe. 2012. "Exploring the Origins of 'Social License to Operate' in the Mining Sector: Perspectives From Governance and Sustainability Theories." *Resources Policy* 37, no. 3: 346–357.
- Ranabahu, N. 2020. "'Wicked' Solutions for 'Wicked' Problems: Responsible Innovations in Social Enterprises for Sustainable Development." *Journal of Management & Organization* 26, no. 6: 995–1013.
- Rathobei, K. E., H. Ranängen, and Å. Lindman. 2024. "Stakeholder Integration in Sustainable Business Models to Enhance Value Delivery for a Broader Range of Stakeholders." *Business Strategy and the Environment* 33, no. 4: 3687–3706.
- Reece, J., B. Hanlon, and R. Edwards. 2022. "Philanthropic Investment in Equity: Cultivating Grass Roots Leaders for the Equitable Revitalization of Marginalized Communities." *International Journal of Community Well-Being* 5, no. 2: 401–429.
- Ringvold, K., T. Saebi, and N. Foss. 2023. "Developing Sustainable Business Models: A Microfoundational Perspective." *Organization & Environment* 36, no. 2: 315–348.
- Rip, A. 2014. "The Past and Future of RRI." *Life Sciences, Society and Policy* 10, no. 1: 17.
- Ritala, P., P. Huotari, N. Bocken, L. Albareda, and K. Puumalainen. 2018. "Sustainable Business Model Adoption Among S&P 500 Firms: A Longitudinal Content Analysis Study." *Journal of Cleaner Production* 170: 216–226.
- Schaltegger, S., E. G. Hansen, and F. Lüdeke-Freund. 2016. "Business Models for Sustainability: Origins, Present Research, and Future Avenues." *Organization & Environment* 29, no. 1: 3–10.
- Schaltegger, S., F. Lüdeke-Freund, and E. G. Hansen. 2016. "Business Models for Sustainability: A co-Evolutionary Analysis of Sustainable Entrepreneurship, Innovation, and Transformation." *Organization & Environment* 29, no. 3: 264–289.
- Scherer, A. G., and C. Voegtlin. 2020. "Corporate Governance for Responsible Innovation: Approaches to Corporate Governance and Their Implications for Sustainable Development." *Academy of Management Perspectives* 34, no. 2: 182–208.
- Shakeel, J., A. Mardani, A. G. Chofreh, F. A. Goni, and J. J. Klemeš. 2020. "Anatomy of Sustainable Business Model Innovation." *Journal of Cleaner Production* 261: 121201.
- Siggelkow, N. 2007. "Persuasion With Case Studies." *Academy of Management Journal* 50, no. 1: 20–24.
- Smith, W. K., and M. L. Besharov. 2019. "Bowing Before Dual Gods: How Structured Flexibility Sustains Organizational Hybridity." *Administrative Science Quarterly* 64, no. 1: 1–44.
- Smith, W. K., and M. W. Lewis. 2011. "Toward a Theory of Paradox: A Dynamic Equilibrium Model of Organizing." *Academy of Management Review* 36, no. 2: 381–403.
- SolarAid. 2013. "Impact Report." <https://solar-aid.org/wp-content/uploads/2016/09/SolarAid-Impact-Report-2013.pdf>.
- SolarAid. 2015. "Solar Household Systems: Evidence of Impact."
- SolarAid. 2016. "Market Update." <https://solar-aid.org/wp-content/uploads/2017/02/solaraid-10-year-update-v3.pdf>.
- SolarAid. 2022. "The Solar Light Library Project Manual." <https://solar-aid.org/light-libraries-resource-download/>.
- SolarAid Sunny Money. 2021. "Picosolar Diagnosis & Repair Manual." https://solar-aid.org/wp-content/uploads/2021/01/SolarAid_SM_Repair-Manual_A4-5-1-1.pdf.
- Sovacool, B. K., M. Martiskainen, A. Hook, and L. Baker. 2019. "Decarbonization and Its Discontents: A Critical Energy Justice Perspective on Four Low-Carbon Transitions." *Climatic Change* 155, no. 4: 581–619.
- Stilgoe, J., R. Owen, and P. Macnaghten. 2013. "Developing a Framework for Responsible Innovation." *Research Policy* 42, no. 9: 1568–1580.
- Stubbs, W., and C. Cocklin. 2008. "Conceptualizing a Sustainability Business Model." *Organization & Environment* 21, no. 2: 103–127.
- Teece, D. J. 2007. "Explicating Dynamic Capabilities: The Nature and Microfoundations of (Sustainable) Enterprise Performance." *Strategic Management Journal* 28, no. 13: 1319–1350.
- Teece, D. J., G. Pisano, and A. Shuen. 1997. "Dynamic Capabilities and Strategic Management." *Strategic Management Journal* 18, no. 7: 509–533.
- Tracy, S. J. 2010. "Qualitative Quality: Eight 'Big-Tent' Criteria for Excellent Qualitative Research." *Qualitative Inquiry* 16, no. 10: 837–851.
- Tuckman, L., J. Nelles, K. Walsh, and T. Vorley. 2023. "Sustainable Innovation Policy: Examining the Discourse of UK Innovation Policy." *Environmental Science & Policy* 145: 286–297.
- Umoru, U., O. M. Ogundana, M. Mangena, and V. Udezor. 2026. "Informal Institutions and Multinationals' Drive Towards Sustainable Development Goals (SDGs): A Dark-Side Perspective." *Business Ethics, the Environment & Responsibility* 35, no. 1: 75–98.
- Uzzi, B. 1997. "Social Structure and Competition in Interfirm Networks: The Paradox of Embeddedness." *Administrative Science Quarterly* 42, no. 1: 35–67.
- van de Poel, I., and M. Sand. 2021. "Varieties of Responsibility: Two Problems of Responsible Innovation." *Synthese* 198: S4769–S4787.
- van Lente, H., T. Swierstra, and P. B. Joly. 2017. "Responsible Innovation as a Critique of Technology Assessment." *Journal of Responsible Innovation* 4, no. 2: 254–261.
- Voegtlin, C., and A. G. Scherer. 2017. "Responsible Innovation and the Innovation of Responsibility: Governing Sustainable Development in a Globalized World." *Journal of Business Ethics* 143, no. 2: 227–243.
- Voegtlin, C., A. G. Scherer, G. K. Stahl, and O. Hawn. 2022. "Grand Societal Challenges and Responsible Innovation." *Journal of Management Studies* 59, no. 1: 1–28.
- von Schomberg, R. 2019. "Why Responsible Innovation." In *International Handbook on Responsible Innovation*. Edward Elgar Publishing.
- Wang, L., W. Zhang, S. White, and H. Fan. 2025. "Digital Technology-Based Business Model Design and Innovation to Address Grand Challenges: A Process Model." *Strategic Entrepreneurship Journal* 19, no. 4: 749–776.
- Yaghmaei, E., and I. van de Poel. 2020. *Assessment of Responsible Innovation: Methods and Practices*. Taylor & Francis.
- Yin, R. K. 2018. *Case Study Research and Applications: Design and Methods*. SAGE.

Supporting Information

Additional supporting information can be found online in the Supporting Information section. **Table A:** Summaries of reasons for slow adoption of SBMI and RI. **Table B:** The RI-shaped capacities across the three SBMs (SM = Sunny Money).