

Sustainable Entrepreneurship in Emerging Economies: Scaling Circular Business Models for Global Impact

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Abstract

Growing environmental pressures, resource scarcity and increasing waste generation have made the search for economic models that could support sustainable development without compromising sustainable economic productivity more intense. Within this context, various concepts such as circular economy approaches as well as sustainable entrepreneurship have developed as complementary approaches to reduce environmental impacts and increase efficiency of resources. This study analyzes how circular business models developed by sustainable entrepreneurs in emerging economies have the potential to scale to a larger economic and environmental impact. The study has used a theory-driven systematic literature review using exclusively peer-reviewed studies and policy reports related to circular economy, sustainable entrepreneurship, digital transformation and sustainability governance. Relevant sources have been analyzed through thematic synthesis to consider the reoccurring constructs, mechanisms, and contextual factors that influence the scale of circular ventures. The analysis combined insights from circular business model theory, dynamic capability perspectives and ecosystem governance literature and digital transformation research. The findings suggest that circular scaling is influenced by the interplay of four main factors, entrepreneurial and organizational capabilities, circular business model architecture, ecosystem and institutional enablers, and digital and technological infrastructure. Dynamic capabilities and frugal orientation to innovation help entrepreneurs to design adaptive circular models and supportive policy environments, coordinated supply chain relationships and participation of social economy actors enhance the ecosystem conditions for expansion. Digital technologies such as artificial intelligence, blockchain or Internet of Things systems further increase scalability by improving traceability, coordination of operations and lifecycle management.



Keywords: Sustainable entrepreneurship, Circular economy, Circular business models, Emerging economies, Digital transformation, Circular scaling, Sustainability governance, Frugal innovation

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1. INTRODUCTION

Global challenges of sustainability are increasingly revealing fundamental structural tensions between growing patterns of consumption, limited material and energy resources, and rising social and ecological costs of generating waste and destroying the environment. Contemporary waste streams, especially municipal solid waste, have become not only a peripheral matter with respect to the environment but now a key matter of development, governance and economic resilience closely tied to resource security, achievements in public health, climate change mitigation, and long-term productivity. The United Nations Environment Programme has described the current "age of waste" as one characterised by systemic undertakes in waste prevention, inadequate waste collection and treatment infrastructures, and ongoing failure to recover value from discarded materials through circular systems (Programme, 2024). These challenges are particularly remarkable in emerging economies, where rapid urbanization, coupled with population growth and uneven infrastructural development lead to an increase of waste pressures along with many remaining institutional limitations to efficiently dispose of material flows (Programme, 2024). At the same time, increased volatility in global energy markets and persistent energy crises have reinforced the strategic role of energy efficiency and resource productivity whilst strengthening the economic case for circular approaches that depend on using the least volumes of virgin inputs, boost the resilience of systems and stabilise the cost of production over time (Bashir & Bashir, 2025; Osman et al., 2022).

Circular economic logic is becoming established as a system level alternative to linear production and consumption, which is based on strategies that keeps as much value in products, components and materials as possible via patterns such as reuse, repair, remanufacturing, recycling and regenerative design. Scholarly work on circular business model design has highlighted the fact that circularity is not only a technical intervention but a challenge on business model innovation, that demands coherent matching between value proposition, value creation and value capture mechanisms (Awan and Sroufe, 2022). Technology and digitalization have further transformed the feasibility frontier for circular solutions by enhancing traceability, facilitating data driven reverse

logistics, facilitating platform coordination, and supporting broader platforms for the markets of secondary materials, within several reviews, digital transformation has been identified as a cross cutting enabler of sustainability oriented innovation (Böttcher et al., 2023; Monge & Soriano, 2023; Vaio, Latif, et al., 2023). At the same time, the spread of sophisticated digital systems comes with new governance issues such as the potential for exaggerated sustainability claims with the help of data practices that are not accountable and can be understood as a shift from greenwashing to "machinewashing" in digitally mediated sustainability narratives (Seele & Schultz, 2022).

Sustainable entrepreneurship has become a popular topic of discussion as a catalytic mechanism to transform sustainability pressures into innovation and economic activities. Reviews of green business practices suggest that sustainability oriented green business ventured apply environmental objectives not as peripheral corporate responsibility and for the sake of the environment but as a case of core business strategy, providing products, processes and organizational form aimed at minimising such negative impacts while aiming at viability and growth (Odeyemi et al., 2023). Evidence concentrated in green startups indicates that this type of entrepreneurial activity may help deliver economic development through job creation, technological adoption, and the creation of new markets, while at the same time introducing mechanisms that will help disassociate economic growth from environmental degradation (Sharma & Subba, 2025). Yet the journey from localised sustainability innovation to a scale to effect change is patchy and one of the challenges remains how circular business models designed and tested in constrained environments are to be leveraged as part of a system at scale and without undermining ecological integrity or compromising social value creation.

Emerging economies sit at a strategically important spot in this space. They reflect growing markets of consumption and hubs of production, are homes to large shares of global supply chain activity and usually face acute pressures relating to waste management, resource insecurity and climate vulnerability (Programme, 2024; Osman et al., 2022). They also have special institutional conditions that can influence sustainable entrepreneurship such as regulatory uncertainty, fragmented infrastructures, informality, and varying access to capital. These conditions can create barriers to scale whereas they can create opportunity spaces for frugal, resource efficient and



socially embedded innovations. The literature on circular economy and entrepreneurship has begun to consider more and more the intersection between circular economy and entrepreneurship, but existing research is still fragmented in terms of topics such as business model design, supply chain management, digital transformation and governance and accountability, limiting the development of a coherent explanation of how to scale circular ventures in emerging context (Suchek et al., 2022; Vaio, Hasan, et al., 2022).

The central research problem that is addressed here is the absence of an integrative and theory grounded explanation of how sustainable enterprises in emerging economies can scale circular business models to achieve global impact. Prior reviews have mapped the state of circular economy and entrepreneurship research and identified future directions, but the question of scaling has not been sufficiently specified, which is defined as expansion of circular value creation systems across geographies and supply chains while sustaining measurable environmental and social outcomes (Suchek et al., 2022). What is more, scholarship which connects digitalization with sustainable business models identifies enabling mechanisms and often considers institutional realities and accountability impositions as secondary, despite evidence that governance and reporting architecture plays a strong role in influencing sustainability strategies, and what is considered credible about them (Alkaraan et al. 2024; Schaltegger et al. 2022; Seele and Schultz 2022). Meanwhile, the need for enabling ecosystems, especially the role of the social economy actors, policy coherence and place-based development tools, have become increasingly acknowledged in the official policy guidance aimed at informing circular economy transitions. However, this policy-oriented perspective is still insufficiently combined with entrepreneurial scaling theory and structural logic of circular business model architecture and thus its analytical capacity to explain circular ventures to scale and achieve sustained impact at scale is limited (OECD, 2022).

Accordingly, this manuscript develops a set of conceptual synthesis and propositions explaining determinants and pathways for the scaling of circular business models in emerging economies towards global impact. The goals are to (a) build on the foundational theoretical literature linking circular business model innovation, sustainable entrepreneurship and scaling dynamics by (b) mapping and critically evaluating relevant literature as part of a structured review dealing with an established corpus of literature, (c) propose a conceptual

framework that is integrative in nature in terms of specifying key constructs, relationships, and boundary conditions, and (d) derive theoretically justifiable propositions that can be used as foundation for following empirical research and concrete strategy formulation. The contributions from are expected to be threefold. First, the work furthers the theory by combining insights from circular business model design with dynamic capability and governance perspectives that have been separately developed in the sustainability scholarship (Awan & Sroufe, 2022; Alkaraan et al., 2024; Coppola et al., 2023). Second, it unmasks how digital transformation and technology mediated coordination can help achieve scale without causing the credibility risks, which come from opaque data practices, accountability gaps or machinewashing dynamics (Böttcher et al., 2023; Vaio, Latif, et al., 2023; Seele & Schultz, 2022). Third, it presents policy and managerial implications under emerging economic conditions with a focus on ecosystem building, supply chain governance and inclusive approaches to consider equity and dynamics of behaviour towards sustainability transitions (Sovacool et al., 2022; Rodriguez-Espindola et al., 2022; Emon et al., 2024).

2. THEORETICAL FOUNDATIONS

Circular entrepreneurship in emerging economies is best conceptualized as a multi-level phenomenon, and it spans levels of enterprise strategy, supply chain configuration, and institutional and policy environments. The theoretical foundations presented herein integrate four complementary lenses, including circular economy and circular may well business model design, sustainable entrepreneurship and hybrid value creation, natural source based and dynamic capability perspectives and digital transformation and accountability frameworks, the scaling feasibility and legitimacy of scaling.

Circular Economy theory, as well as contemporary scholarship on circular business models, conceptualize value creation through the continued productive uses of products and materials, reduced virgin materials inputs, and eliminating waste and externalities. Designing circular business models involves the implementation and conception of circular strategies into coherent business architecture, including the value proposition that can be offered to customers, the processes and partnerships involved in value creation and delivery and the revenue and cost structure that allows for value capture (Awan &



Sroufe, 2022). This lens entails that scaling circular businesses is not about scaling sales, it is about scaling the infrastructure behind the circular business, i.e. reverse logistics networks, supplier participation, and engaging customers in take back or service-based usage models. Empirical work on circular principles and sustainable oriented innovation on small and medium sized enterprises suggests that circularity is linked to performance outcomes on social, economic and environmental dimensions - this suggests that circular design can be strategically linked with competitiveness if appropriately integrated in operations and innovation (Rodríguez-Espíndola et al., 2022). Sectoral works on circular transitions, for example, circular textiles, further points to the fact that transitions are determined by interdependencies across actors, infrastructures and institutional arrangements, which is especially important in order to scale circular transitions through system coordination rather than geo-optimising individual enterprises (Reike et al., 2022).

Sustainable entrepreneurship theory emphasizes the importance of entrepreneurs in the process of identifying and capitalizing on opportunities that generate economic value and also offer environmental and social benefits. Reviews of sustainable entrepreneurship focus on the implementation of green business practices, and the need to make sustainability an essential part of business venture strategy, instead of an add on (Odeyemi et al., 2023). Evidence in relation to green startups and development outcomes implies that entrepreneurship is the potential solution as a conduit for sustainability related innovation diffusion, which can reinforce broader development objectives (Sharma & Subba, 2025). In the context of emerging economies, often this type of entrepreneurial activity is in context with the typical constraints of resource constraints and institutional fragmentation, which can stimulate forms of frugal innovation that search for high impact at low cost. Theoretical perspectives on frugal innovation, particularly those that involve the integration of artificial intelligence as drivers of sustainable frugality, propose that technology can bring about resource efficient solutions, if they are matched to the goals of sustainability and the limits of the specific context (Govindan, 2022). These perspectives together provide support for the idea that sustainable entrepreneurship can lead to circular business models that are appropriate to local constraints, but for a circular business model to become scalable requires additional skills and ecosystem complementarities.

The natural resource-based view and dynamic capability perspectives offers an explicative mechanism that help us to understand how firms are building and deploying capabilities to sense, seize, and transform in response to sustainability pressures. Research relating the use of green strategies with Industry 4.0 technologies and governance places the importance of capability building with governance structures in order to strengthen the sustainability outcomes, which implies that the competitive advantage in sustainability context arises from the orchestration of capabilities and the aligned governance mechanisms rather than technology adoption (Alkaraan et al., 2024). Sector focused work on developing dynamic capabilities for the circular economy has also determined that capability development is crucial in circular transition, empowering firms to reconfigure resources and processes in favor of circular operations and help to sustain such changes over time (Coppola et al., 2023). For scaling circular in emerging economies, the dynamic capabilities are expected to impact the ability to formalize processes, standardize circular across sites, manage partnerships and adapt models to varying regulatory and market conditions.

Scaling perspectives in sustainability-oriented ventures must also include system level transition dynamics, as well as behavioral and equity issues. The operationalization of positive tipping points toward global sustainability suggests that well-focused interventions can activate self-reinforcing diffusion processes such that when scaling in sustainability contexts is a matter of triggering reinforcing processes across markets and institutions (Lenton et al., 2022). Equity and technological innovation scholarship stresses that transformations are not solely technical, but are profoundly conditioned by discriminatory consequences, inclusion and behaviour dynamics in low carbon possibilities, which implies that scaling durable circular remedies needs to tackle the fairness/acceptance issues instead of relations of technical efficacy only (Sovacool et al., 2022). Complementary conceptual models, such as sustainalism, propose the idea of integrative socio-economic environmental perspectives and reinforce the argument that sustainable entrepreneurship should be analyzed using integrative value lenses instead of personal performance metrics (Hariram et al., 2023).

Digital transformation and accountability frameworks represent a final Ronald Heifetz's theoretical pillar because increasing scale of circular ventures heavily relies on digital coordination, traceability and data driven decision making. Digital sustainable business model research argues that



digital technologies can lead to integrating ecological sustainability into the core of business models by enabling new forms of value creation including coordination and measuring. Reviews of digitalization in business and management and multidisciplinary research agendas on digital transformation similarly point out that digitalization changes organizational processes and market interactions which create new opportunities for scaling but also entails new dependencies and new risk profiles (Monge & Soriano, 2023; Paul et al., 2024). In the supply chain contexts, research on digitalization and accountability proposes that "artificial knowledge" and data systems can increase accountability but need governance systems to prevent compliance for compliance's sake (Vaio, Latif, et al., 2023). The machinewashing concept further serves to shed light on the fact that with rising support to the claims of sustainability being made considering algorithmic outputs or automated reporting, legitimacy risks arise as stakeholders are unable to verify the integrity of data and methods (Seele & Schultz, 2022). As a result, scaling circular business models in emerging economies cannot be theorized as capacity expansion, but only in terms of ability through digital means ecosystem scaling under accountability constraints.

Together, these foundations provide motivation for an integrative standpoint in which scaling outcomes are shaped by interaction of (a) entrepreneurial orientation and sustainability intent, (b) circular business model architecture and system design, (c) dynamic capabilities and governance arrangements, (d) digital transformation and supply chain accountability, and (e) institutional and equity conditions that affect adoption and diffusion. This synthesized lens is informative to the literature synthesis and conceptual framework developed below.

3. LITERATURE REVIEW

The literature on the intersections of sustainable entrepreneurship, circular economy and scaling in emerging economies covers several areas of entrepreneurship and development, circular business model design, technology enabled sustainability, supply chain management and governance and accountability. The following synthesis presents some of the key insights and identifies some of the unresolved conceptual and empirical gaps that provide motivation for the proposed framework.

The first stream is that of circular business model typologies and design logics. Conceptual and design

focused work emphasizes the need to take a circularity business model perspective as opposed to more isolated operational improvements. Designing circular business models entails the alignment of circular strategies to value proposition, value creation mechanisms, and value capture logic, which often entails the reconfiguration of customer relationships and pricing structures and end of life processes (Awan & Sroufe, 2022). Focused perspectives of entrepreneurship emphasize the idea that circular economy principles can form the foundation for green entrepreneurship and sustainable business models and suggest that circular economy can be a strategic orientation of ventures aiming to reconcile profitability with environmental outcomes (Munir & Fausiah, 2025). Reviews running through the research on entrepreneurship and circular economy suggest that there is an increasing growth of scholarship in this field that is still scattered along conceptual, empirical and sectoral research and with variations in the operationalisation of circularity and entrepreneurship (Suchek et al., 2022). Sectoral reviews in the field of textiles reveal that circular transitions rely on innovation in terms of materials, production, business and stakeholder collaborations, which implies that focusing on scaling in practice is often sector constrained and path dependent (Harsanto et al., 2023; Reike et al., 2022).

A second stream puts a focus on sustainable entrepreneurship as a vehicle for green innovation and development outcomes. Reviews on sustainable entrepreneurship clarify the practices for sustainability in businesses, the benefits in performance addressing the environment, and the requirement for integrated metrics evaluating both financially and environmentally (Odeyemi et al., 2023). Work which examines green startups and economic development emphasizes the potential macro level contribution through employment, innovation diffusion, productivity, and thus the importance of the sustainable ventures being scaled to have impact at the trajectory of development (Sharma & Subba, 2025). Complementary studies that associate social entrepreneurship with environmental sustainability e.g. research tracing a pathway from cultural tourism to social value creation, are reflecting the entrepreneurial activity addressing environmental goals through locally embedded value creation, in particular where community engagement and social value propositions shape adoption (Li, Abbas, et al., 2022). Tourism focused scholarship that frames the sector's contribution to sustainable development goals suggest that sector level scaling can be matched with SDG



oriented strategies, and system level coordination and policy support is needed to manage tradeoffs between economic growth and environmental protection (Buhalis et al., 2023; Dredge, 2022). Collectively, this stream brings us to the point of arguing that social and environmental value creation at the organization/venture level can be achieved through sustainable entrepreneurship but scaling this is still subject to the characteristics of the sector, the institutional conditions and the support of ecosystem.

A third stream puts emphasis on supply chain and ecosystem dynamics that are central to scaling circular business models. The circular scaling is usually reliant on various upstream suppliers' engagement, downstream customer participation, and intermediary systems within logistics, recovery, and accountability. Research quantifying influences of supplier relationship management for supply chain performance suggests that relationship management capabilities and coordination processes can materially shape performance outcomes, which implies that scaling circular models requires relationship and coordination capabilities outside from the internal operations (Emon et al., 2024). Evidence from small and medium enterprises that put circular economy principles into practice and adopt sustainability-oriented innovation also suggests that benefits in performance, social, entrepreneurs, and environmental aspects, emerge when there is greater integration of innovation and circular principles, indicating that scaling may depend on how high the level of integration across the operation and innovation systems (Rodríguez-Espíndola et al., 2022). Policy perspectives on the social economy's contribution to circular economy focus on how cooperative and social economy players can help improve circular ecosystems by means of inclusive employment, local service provision and community-oriented recovery systems, this is of relevance in emerging economies, where formal waste systems may be incomplete (OECD, 2022). This suggests a possible dependence of scaling circular models onto hybrid economies involving a mix of entrepreneurial ventures, social economy organisation and public sector coordination.

A fourth stream deals with digital transformation and Industry 4.0 technologies as well as new techno organizational forms as enablers and complicating factors. Research on reinforcing green business strategies against Industry 4.0 and governance argues that the adoption of technology needs to be accompanied by governance and capability frameworks to attain sustainability and not

superficial digitalization (Alkaraan et al., 2024). Reviews of digital transformation in business and management highlight the extent of the impacts of digitalization (new coordination mechanisms, new capabilities in data and new competitive dynamics) that imply increasing spatial scale dimensions of sustainability increasingly needs to be able to scale in terms of digital capability as a strategic asset (Monge and Soriano, 2023; Paul et al., 2024). The literature on digital sustainable business models provides a direct argument that digital technologies can embed ecological sustainability into business model cores with a view to enabling new forms of circular value creation e.g. platforms enabled reuse marketplaces or predictive maintenance models or digitally managed product as a service offering (Böttcher et al., 2023). Studies linking structuring of the digital economy to sustainable development, which regards blockchain and artificial intelligence, can support supply chain coordination while lessening detrimental environmental impacts in the process with enhancing traceability and decision making, but the efficacy of these strategies rely on implementation and governance policies (Hong & Xiao, 2024). Additional works on digital transformation and green innovation suggest that digital transformation can impact enterprise green innovation through transmission mechanisms that redefine information flows and organizational processes (Feng et al., 2022). Research looking at servitization towards digital servitization also suggests that digitalization can be a way for firms to transition to services, which is relevant when speaking of circular models which are based on access over ownership, maintenance and lifecycle management (Favoretto et al., 2022).

The technology stream is also defined by Internet of Things and artificial intelligence scholarship that are not exclusively focused on circularity but identify infrastructural and operational capabilities relevant to scaling such as smart city integration, sensor-based monitoring, and hybrid AI IoT systems which can manage resources more efficiently (Alahi et al., 2023). Assessment of IoT potentials of financial increase has highlighted the role of digital infrastructures in creating economic stability and increasing since financial performance and resilience is relevant in terms of venture scaling (Allioui & Mourdi, 2023). However, there are also labor market/workforce implications associated with technology adoption. As research on artificial intelligence and employment points out, that AI can change employment patterns through various mechanisms such as virtual agglomeration, the



scaling up of technology intensive circular models may change the trend of labour demands, and a workforce strategy is needed. Human resource management perspectives in the age of generative AI Eggert and Vitzil, A. (2022) highlights that workforce governance, skills development, and ethical issues are strategic priorities in the context of the diffusion of AI systems. These insights suggest that the scaling of circular ventures that depend on digital systems need to include a consideration of workforce and equity and not assume these transitions to be frictionless.

A fifth stream is related to governance, accountability and legitimacy, which plays into whether scaled circular business models maintain credibility and have measurable outcomes. Systematic reviews of corporate sustainability management accounting depict the significance of connecting accounting and performance measurement systems on different levels to assist sustainable governance, implying scaling sustainable ventures need robust measurement and reporting architectures (Schaltegger et al., 2022). Reviews concerned with the switch to circular economy and waste in accounting and accountability frameworks also identify the role accounting and accountability structures play in verifying circular claims and facilitating trust with stakeholders (Vaio, Hasan, et al., 2022). Supply chain accountability reviews show that digitalization and artificial knowledge may be helpful to accountability but need careful design so that the accountability is not superficial (Vaio, Latif, et al., 2023). The machinewashing framework highlights the risks of legitimacy when algorithmic/automated systems are used to make sustainability claims without grounded verifiability, which may be intensified in emerging economies, where regulatory oversight and data infrastructures may be haphazard (Seele & Schultz, 2022). The empirical finds linking ESG ratings with financial performance in the food industry show that the influence of sustainability ratings and metrics on market outcomes makes them a key element in driving the strategic value of credible reporting for scale and investment access (Sandberg et al., 2022). Research on tax avoidance culture, employee's behavior and the moderating role of corporate social responsibility, theorizes that internal ethics and behavior are impacting sustainable performance and can moderate the organizational outcomes with additional evidence that scaling requires internal governance coherence in addition to external legitimacy (Li, Al Sulaiti, et al., 2022).

A sixth stream has to do with the wide range of sustainability transitions, energy systems and sectoral dependencies which influence the feasibility and urgency of scaling circular. Evidence on the influence of the global energy crisis on energy efficiency suggests that energy shocks can reshape incentives and can point out the worth of efficiency strategies (Gajdzik et al., 2024). Reviews on the costs and environmental impacts of renewable energy and its climate change resilience include that energy transitions are complex and uncertain, suggesting that circular entrepreneurship may have to incorporate renewable energy strategies and resilience planning in scaling pathways (Osman et al., 2022). Research on blockchain in energy transitions reveals possible applications of blockchain, in enabling sustainable energy systems that intersect with circular entrepreneurship in a scenario where traceability of energy, distributed coordination system and decentralized infrastructures are needed (Lv, 2023). Related research on distributed blockchain ecosystems in healthcare can be used to demonstrate how blockchain can be used to support distributed data integrity and coordination in the context of complex service ecosystems (Cerchione et al., 2022) to give transferable insights applicable to circular supply chains that demand traceability and trust among a range of actors that span across different players. Sustainable agro food systems research point to the intersection of climate change, food security, and agricultural sustainability, meaning that circular models in agro food systems may have an especially relevant approach for the emerging economies, where food security is a developmental priority (Wijerathna Yapa and Pathirana 2022). Bibliometric analysis of SDG research highlights that the SDG agenda has progressed and areas where challenges persist thereby defending the conception of models that can be scalable to support multiple SDGs simultaneously (Mishra et al., 2023).

Finally new digital phenomena such as the metaverse are now entering sustainability debates. Work on the sustainability of the metaverse projects as part of a move towards Industry 5.0, and queries the energy intensity, and the governance of the metaverse as well as the potential for digital spaces to contribute to, or undercut, goals of sustainability (Giovanni, 2023). Research on the use of metaverse in teaching and learning has shown that platform based virtual environments have the potential to reshape the education processes, which could in turn have indirect effects on sustainability capability building and diffusion,



albeit the environmental footprint and governance structures of these environments are still contested (Onu et al., 2023). These strands relate to relevance of the boundaries, which give an idea that new scaling opportunities may be opened up by using digital infrastructures, but they also bring new hazards and new needs in terms of resources.

Synthesis of gaps suggests three major issues that are left open. First, in research, circular business model design, digital enablement, and governance are often considered separable even though for scaling these aspects need to be aligned jointly to maintain circularity and legitimacy throughout scaling (Awan & Sroufe, 2022; Böttcher et al., 2023; Seele & Schultz, 2022). Second, the emerging economy context is often recognized but under-theorized as a source of both constraint and innovation drivers, especially about the composition of ecosystems, involvement in social economy, and accountability architectures (OECD, 2022; Vaio, Hasan, et al., 2022; Rodriguez-Espíndola et al., 2022). Third, the scaling question remains specified in a manner that links between micro level entrepreneurial capabilities, meso level supply chain coordination and macro level policy and transition dynamics, equity considerations to influence adoption and diffusion (Suchek et al., 2022; Sovacool et al., 2022; Lenton et al., 2022). These gaps provide the impetus for the integrative conceptual framework and propositions offered next.

4. METHODOLOGY

A theory-driven systematic literature review was undertaken from a corpus in the form of filtered list of references with the scope of drawing conclusions on recent peer reviewed and official policy-oriented evidence pertinent to sustainable entrepreneurship, circular business models, digital transformation and scaling dynamics in the emerging economies contexts. The corpus was initially available for cataloging and screening of topical relevance to at least one of four analytic domains, namely circular business model design, sustainable entrepreneurship and development, digital transformation and enabling technologies and governance and accountability for sustainability with retracted items flagged and excluded from evidentiary support and retained for quality reflection. Each source was then coded using an iterative thematic approach that gleaned from sources each focal constructs and definitions, mechanisms or relationships proposed or

evidenced, conditions contextual, explicit attention given to emerging economy settings, sectors or institutional constraints, and implications for scaling and global impact. Cross source synthesis has been carried out by comparing the construction usage and mechanism claims of the different domains, aligning the converging insights, and finding conceptual discontinuities where constructs were applied inconsistently. The synthesis was embodied in a conceptual framework of integration specifying determinants and pathways of circular business model scaling and proposition development was based on recurring mechanisms and boundary conditions identified across the corpus, and particular emphasis was given to official and primary sources regarding waste, policy and governance, and peer reviewed reviews and empirical studies on the circular design, digitalization and accountability (Programme, 2024; OECD, 2022; Suchek et al., 2022; Awan & Sroufe, 2022; Vaio, Hasan, et al., 2022).

5. DETERMINANTS AND PATHWAYS OF SCALING CIRCULAR BUSINESS MODELS

The conceptual framework proposes to understand the role of the sustainable entrepreneurship of SMEs in emerging economies in scaling circular business models to global impact through the combination of capabilities of enterprise level and the enabling conditions of the ecosystem level under the constraint of governance and accountability. The framework is organised around: 5 groups of constructs, which are entrepreneurial and organisational capabilities, circular business model architecture, ecosystem and institutional enablers, digital and technological infrastructure, and impact integrity outcomes. Scaling is modelled as the variation or growth of circular value creation systems over markets and geographies whilst upholding the maintenance of environmental & social benefits and legitimacy through credible accountability.

Circular business model architecture refers to the setup of value proposition, value creation, and value capture that are aligned with the circular principles. Prior research emphasizes that circular business models require systemic design choices including those related to mechanisms for product return, refurbishment, remanufacturing or recycling as well as customer involvement in support of circular loops (Awan & Sroufe, 2022). In emerging economies, circular architectures may also include the informal sector dynamics and community embedded



recovery ecosystems, which, according to the policy guidance on social economy, can be a critical complement to formal systems (OECD, 2022). A key assumption is that circular models need to be scalable, which means the potential for modularity, replication, and local adaptability while maintaining local adaptation, particularly in the context of diverse regulatory environments, infrastructure, etc.

Entrepreneurial and organizational capabilities are conceptualized as dynamically capabilities and governance aligned competences which enable sensing circular opportunities, taking advantage of them by viable business models and changing organizational and supply chain configurations over time. The natural resource-based view and dynamic capability perspectives recommend that the advantage of sustainability is when firms develop capabilities in combining the resource constraints, technology adoption and a governance mechanism (Alkaraan et al., 2024; Coppola et al., 2023). For emerging economy ventures, the capabilities also include frugal innovation orientation and learning routines in making use of constraints as innovation drivers, in conjunction with research on AI enabled sustainable frugal innovation (Govindan, 2022).

Ecosystem and institutional enablers including policy coherence, participation of social economy, financial and market institutions, supply chain relationships that facilitate reverse logistics, standards and access to markets. Supplier relationship management and supply chain performance work shows that relational governance and coordination mechanisms are performance relevant, which suggests that scaling circularity is dependent on managing upstream and downstream relationships at scale (Emon et al., 2024). Circular economy and waste governance reviews stress the way that accountability and accounting frameworks influence how circularity and waste is measured and legitimized and how this impacts access to finance, partnerships and approvals from the State (Vaio, Hasan, et al., 2022; Schaltegger et al., 2022). Evidence of the links between ESG ratings and financial performance has led to the view that credible measurement of sustainability can influence financial performance in the market, implying that in this context, accountability is not so much about compliance as it is a scaling enabler (Sandberg et al., 2022).

Digital and technology infrastructure as a cross-cutting scaling accelerator through enabling coordination, traceability and efficiency. Digital sustainable business

model research proposes that digital technologies can incorporate environmental sustainability into the business model that creates new circular mechanisms and market linkages (Böttcher et al., 2023). Digital transformation literature raises awareness that digitalization changes the process in organizations as well as the strategies of competition, which can be understood as a need for scalable circular ventures to require digital capability to coordinate ecosystems and track performance (Monge & Soriano, 2023; Paul et al., 2024). Blockchain and AI in supply chains are discussed as a tool for mitigating negative environmental impacts by enhancing transparency and quality of decisions, though there are dangers in respect of governance and verification (Hong & Xiao, 2024). Digital servitization also lays the foundation for circular scaling by moving the business from selling products to offering services with lifecycle producer responsibility and maintenance and reuse support (Favoretto et al., 2022). IoT And Ai Integration and Smart City Scenarios implies that the digital sensor infrastructures can support resource monitoring and efficiency, circular operations and integration of urban services (Alahi et al., 2023). However, there are also workforce and equity implications of digitalization such as the changes in the employment patterns and skills requirements which might impact the legitimacy and adoption (Shen and Zhang, 2024; Budhwar et al., 2023).

Impact integrity outcomes represent the group of a dependent construct (framework) Scaling is not only assessed in terms of growth measures but it is also assessed in terms of (a) environmental value retention, in terms of reduction of waste and resource efficiency, (b) social inclusion and equity (in terms of employment and fair distribution of transition benefits), (c) legitimacy and accountability (in terms of robustness of sustainability claims, and resistance to machine-washing). Official waste outlook evidence underlines that waste-to-resource Aligned with a system-based view on waste management - overweight waste, particularly sources with very high waste streams, the sharing economy, black-figure waste streams, and the "last mile" - extracting value from waste streams, and especially for industrial processes or business-to-customer value - zero waste and circular design systems are increasingly portrayed as the way forward, especially for waste production and less so for its logistics and distribution. Official waste outlook evidence underlines that turning waste into a resource can yield environmental and economic gains, but require credible system design and



governance arrangements (Programme, Equity and innovation scholarship suggests that technological transitions need to address issues of fairness and behavior to ensure their continued adoption, suggesting the idea of inclusive scaling as a necessary condition for having a long-lasting global impact (Sovacool et al., 2022). The machine-washing framework highlights that digital systems may create more legitimacy risks when sustainability claims are not verifiable and this may harm stakeholder trust and acceptance by regulators (Seele & Schultz, 2022). These concerns are amplified in emerging economies where the measurement infrastructure may be weaker making accountability architecture the key to global scalability.

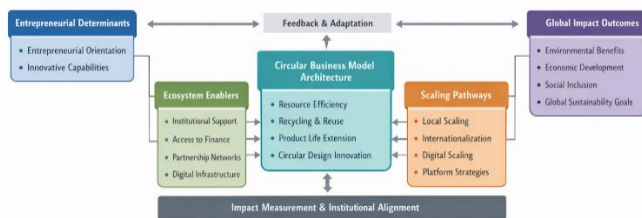


Figure 1: Framework for scaling circular business models in emerging economies toward global impact

Circular scaling is conceptualized as a systemic interaction amongst organizational capability, business model architecture, ecosystem conditions, and digital infrastructure and together defining the integrity of sustainability outcomes at scale. Entrepreneurial and organisational capabilities such as dynamic capabilities, frugal innovation orientation and governance competence offer the internal basis through which circular opportunities are identified, operationalised and continuously adapted. These are the capabilities being put in action through circular business model architecture that align value proposition, cause value creation and cause value capture mechanisms with closed-loop processes that aim at maintaining the value of material and economic value over long-living lifecycles. The effectiveness of such architecture is dependent on ecosystem and institutional enablers, most notably policy coherence, participation of

the actors of the social economy, coordination of suppliers and strategic partners, access to finance and the existence of standards that support circular practices. Digital and technological infrastructure also enhances the potential for scaling as it makes digital transformation capabilities possible, IoT-based monitoring, traceability supported by blockchain and artificial intelligence, and also creates digitally enabled servitization models that enable lifecycle management. Together, these parts provide rise to special scaling pathways, such as replication to different locations, platform-based coordination, extension of circular supply chains and cross-border partnerships. The interaction between these pathways is ultimately responsible for global outcomes on impacts of integrity, expressed in the sustainability of environmental value retention, inclusive development, institutional legitimacy, accountability, and system resilience.

The framework assumes that scaling pathways constitute the translation of determinants into impact outcomes. Scaling pathways such as replication at completely different sites/regions, platform based coordination, extension of supply chains into reverse logistics, and cross border partnerships which link emerging economy ventures to global markets. However, the effectiveness of these pathways is dependent on governance and accountability capacity and stability of core infrastructures such as energy systems. Energy crisis and renewable energy research that energy costs and resilient energy under climate change can influence the operational feasibility, which can be interpreted as the idea that energy efficiency and renewable integration are important contextual moderators (Bashir & Bashir, 2025; Osman et al., 2022). For instance, circular ventures based on reverse logistics might have increased energy needs, which makes efficiency and integration of clean energy both relevant in terms of cost as well as environmental impact. Blockchain's potential role in energy systems hints another means of coordination of decentralized energy resources that can support circular operations, but their feasibility is different in terms of implementation (Lv, 2023).



Table 1: Construct definitions and indicative indicators for scaling circular business models

Construct group	Construct	Definition aligned with the reviewed literature	Indicative indicators for future studies
Entrepreneurial and organizational capabilities	Dynamic capabilities	Capacity to reconfigure resources and practices to embed circularity and sustain change over time (Alkaraan et al., 2024; Coppola et al., 2023)	Reconfiguration routines, learning mechanisms, partner orchestration capability
Entrepreneurial and organizational capabilities	Frugal innovation orientation	Pursuit of resource efficient innovation under constraints, potentially enabled by AI (Govindan, 2022)	Low resource intensity design, affordability, localized adaptation rates
Circular business model architecture	Circular value proposition	Customer and stakeholder value designed around reduced waste and extended product life (Awan & Sroufe, 2022)	Service based offerings, take back programs, product durability commitments
Circular business model architecture	Circular value creation	Operational and partner processes enabling circular loops (Awan & Sroufe, 2022; Reike et al., 2022)	Reverse logistics capacity, refurbishment facilities, supplier participation levels
Circular business model architecture	Circular value capture	Revenue and cost structures supporting circularity (Awan & Sroufe, 2022)	Recurring revenue share, secondary market margins, lifecycle cost reductions
Ecosystem and institutional enablers	Supply chain relational governance	Relationship management enabling coordination and performance (Emon et al., 2024)	Supplier relationship management maturity, collaboration intensity, contract structures
Ecosystem and institutional enablers	Policy and social economy alignment	Enabling institutions and social economy contributions (OECD, 2022)	Policy incentives, public procurement inclusion, cooperative partnerships
Digital and technology infrastructure	Digital transformation capability	Organizational capacity to adopt digital technologies to reshape processes (Paul et al., 2024; Monge & Soriano, 2023)	Data infrastructure maturity, digital skills, platform integration
Digital and technology infrastructure	Traceability and accountability tech	Blockchain, AI, IoT systems supporting transparency and monitoring (Hong & Xiao, 2024; Alahi et al., 2023)	Traceability coverage, monitoring granularity, auditability
Impact integrity outcomes	Environmental value retention	Reduction in waste and resource intensity (Programme, 2024)	Material circularity indicators, waste diversion, energy efficiency
Impact integrity outcomes	Inclusive development and workforce outcomes	Distributional and employment effects of scaling (Sovacool et al., 2022; Shen & Zhang, 2024; Budhwar et al., 2023)	Job quality, skills upgrading, inclusion metrics
Impact integrity outcomes	Legitimacy and anti machinewashing safeguards	Credibility of sustainability claims under digital mediation (Seele & Schultz, 2022; Vaio, Hasan, et al., 2022)	Verification processes, external assurance use, transparency practices

The framework is meant to be sector adaptable. Textile sector-related research provides an example of where circularity can be operationalised through recycling, reuse and sustainable materials and reverse logistics, and where there are also complex stakeholder coordination issues which challenge the scaling of circularity (Harsanto et al., 2023; Reike et al., 2022). Sectoral analogies include tourism and agro food systems relevant to the context as they focus on locally implicit value creation, community participation, and scarce resources which are relevant in emerging economies (Dredge, 2022; Wijerathna Yapa & Pathirana, 2022; Li, Abbas, et al., 2022). Digital phenomena like metaverse, may prove to be future enablers towards education, coordination and consumer engagement but sustainability assessments warn us of energy and

governance implications which may lead to rebound effects on resources (Giovanni, 2023; Onu et al., 2023).

6. PROPOSITION DEVELOPMENT

Proposition development comes to translate the conceptual framework into testable propositions regarding the influence of determinants on scaling pathways and impact on integrity outcomes in emerging economies. Each proposition is built on mechanisms that are suggested across the reviewed corpus, with an emphasis on capability orchestration, ecosystem alignment and digital accountability as an essential part of enabling the scaling of circular business models to global scale for impact.



6.1 Dynamic capability strength is positively associated with the scalability of circular business model architecture in emerging economies.

Circular business models necessitate reconfiguration on an ongoing basis in terms of product design, operations, partners, and customers. Research relating green strategies, governance and Industry 4.0, while underlining that success in sustainability arises in capability building and joined up governance (exc. static) within sector-based evidence that dynamic capabilities support circular transitions allowing firms to reconfigure resources and practices (Alkaraan et al., 2024; Coppola et al., 2023). In emerging economies, institutional conditions tend to be volatile, and dynamic capabilities tend to be more important for dealing with the potential and adaptability of circular architectures across geographies and regulatory environments.

6.2 Frugal innovation orientation mediates the relationship between resource constraints and the emergence of scalable circular solutions.

Resource constraints in emerging economies can be an inhibiting factor for scaling; but it also can be a stimulus for frugal innovation producing resource efficient and affordable circular solutions. Multitheoretical perspectives opine that AI can drive sustainable frugal innovation through improving the decision-making processes and enabling efficiency-oriented solutions, which implies that frugality can be systematically improved through technology (Govindan, 2022). Where frugal innovation is strong, there are more likely to be escalating circular designs to make sense of the local affordability and infrastructure constraints.

6.3 Supply chain relational governance positively influences scaling pathways by enabling coordinated circular loops across supplier and customer networks.

Scaling circular business models need to be a coordinated effort involving numerous actors such as suppliers, logistics providers and customers. The evidence on the impact of supplier relationship management in enhancing supply chain performance, indicating that the capabilities of relational governance and coordination are performance relevant (Emon et al., 2024), is quantitative and highlights that relationship management between the

provider and the buyer is important for supply chain performance. Circular transitions in sectors, such as textiles, also highlight the need for coordinated systems on collecting, sorting and recycling which strengthen the idea that relational governance is a key enabler of the scaling of circular loops (Reike et al., 2022).

6.4 Policy coherence and social economy participation strengthen scaling outcomes by reducing ecosystem gaps in reverse logistics, inclusion, and local legitimacy.

Policy perspectives are emphasising that the social economy can contribute to circular economic objectives with cooperative and community-oriented actors are able to fill in the gaps in the ecosystem and can improve inclusion (OECD, 2022). Official waste outlook evidence shows that to transform waste from a resource, systems wide solutions are required, suggesting that there is a need for public sector and community actors to support infrastructure and governance (Programme, 2024). Therefore, coherent policy and participation in the social economy are likely to boost the process of scaling by enabling reverse logistics capacity, inclusive employment and local legitimacy especially where there would otherwise be deficits in infrastructure and growth.

6.5 Digital transformation capability positively affects scaling by enabling platform coordination, process efficiency, and measurement capacity for circular outcomes.

Digital transformation scholarship suggests that digitalization induces changes in organizational processes and management practices in the form of new means of coordination and new strategic capabilities (Paul et al., 2024; Monge & Soriano, 2023). Digital sustainable business model research states that digital technologies can make sustainable values part of business models to facilitate circular value creation and new coordination mechanisms (Böttcher et al., 2023). Together, these glimpses suggest that ventures with stronger ability in terms of digital transformation are better able to scale circular efforts, including through the coordination of platforms, and measuring better circular metrics.



6.6 Traceability technologies, including blockchain, AI, and IoT, increase scaling feasibility when coupled with governance mechanisms that ensure auditability and credibility.

Research on blockchain and AI for sustainable supply chains has suggested that these technologies can help to minimize the negative environmental impacts through improved supply chain coordination and transparency (Hong & Xiao, 2024). IoT and AI integration in smart city scenarios shows that sensor enabled monitoring can contribute to improving resource management and efficiency of operation that can support circular operations at scale (Alahi et al., 2023). However, accountability reviews warn of the possibility that digitalization can create artificial systems of knowledge that call for governance in order to prevent shallow accountability and there are dangers of over-inflated or unverifiable claims (Vaio, Latif, et al. 2023; Seele & Schultz 2022). Therefore, it is expected that traceability technology cannot help scale without governance conditions for verification and trust from concerned stakeholders.

6.7 Digital servitization increases circular scaling potential by shifting value capture from unit sales to lifecycle-based service revenues.

Digital servitization research suggests that digitalization changes firm transitions toward their services, to allow new business models with a focus on ongoing relationships and lifecycle management (Favoretto et al., 2022). In circular business model design literature, the emphasis is on the fact that circular business models can be achieved through a service-based model, which also facilitates maintenance and reuse, as well as the producer responsibility in end-of-life processes (Awan & Sroufe, 2022). Accordingly, the move towards (digitally enabled) services should expand circular scaling potential through aligning revenue with lifecycle performance and supporting take back and refurbishment systems.

6.8 Robust sustainability accounting and accountability architecture moderates the relationship between scaling and impact integrity by reducing legitimacy risks and improving access to finance and partnerships.

Scaling also adds to the complexity and scrutiny of the stakeholders and accountability systems is critical. Sustainability management accounting, literature highlights the significance of multi-level connection and measurement in assisting in sustainability management governance (Schaltegger et al., 2022). From reviewing circular economy, waste, accounting and accountability, it has been suggested that models of accountability shape legitimacy and stakeholder engagement in circular transitions (Vaio, Hasan, et al., 2022). Evidence that ESG ratings are related to financial performance implies that information that provides guaranteed indicators of sustainability performance can be related to financial performance and may therefore affect the outcomes of financial transactions such as access to capital or partnership (Sandberg et al., 2022). These insights together suggest that effective accountability architectures help moderate scale results, enshrining legitimacy and facilitating resource mobilization.

6.9 Workforce governance and skills development mediate the relationship between technology intensive circular scaling and inclusive development outcomes.

AI and digitalization can reorganisation job through processes such as virtual agglomeration which insinuates possible displacement or transformation of working patterns as technology diffuses (Shen and Zhang, 2024). Human resource management perspectives regarding generative artificial intelligence focus on the fact that firms require governance and skills strategies to ethically and effectively utilize the benefits of AI (Budhwar et al., 2023). Equity scholarship also emphasizes technological innovations and how low carbon transitions need to care for fairness and behaviour (Sovacool et al. 2022). Therefore, workforce governance and skills development are expected to mediate the relationship between whether technology enabled circular scaling will produce inclusive development and avoid distributional harms.



6.10 External shock conditions in energy systems and climate related stressors moderate circular scaling feasibility through cost and resilience channels.

Energy crisis analysis indicates that energy shocks across the globe influence energy efficiency and can influence the way forward towards incentives for efficiency-oriented strategies (Gajdzik et al., 2024).

Renewable energy resilience reviews the point that costs and climate impacts play a role in energy system reliability and sustainability, having implications in business resilience (Osman et al, 2022). In sectors where circular operations are reliant on energy intensive processes such as recycling or remanufacturing, the volatility of the energy system can limit the ability to scale easily while on the other hand, energy efficiency and integration of renewables can reinforce the feasibility and help improve environmental impacts.

Table 2: Proposition map linking determinants, scaling pathways, and impact integrity outcomes

Proposition	Primary determinant(s)	Key mechanism	Scaling pathway emphasis	Impact integrity emphasis
P1	Dynamic capabilities	Reconfiguration and adaptation	Replication, cross border expansion	Persistence of circular practices
P2	Frugal innovation orientation	Constraint driven design	Local diffusion, affordability scaling	Resource efficiency and access
P3	Relational governance	Partner coordination	Supply chain extension, reverse logistics	Operational reliability
P4	Policy and social economy alignment	Ecosystem gap filling	Ecosystem scaling, inclusion	Local legitimacy, inclusion
P5	Digital transformation capability	Coordination and measurement	Platform scaling, process scaling	Data driven circular metrics
P6	Traceability tech plus governance	Transparency with verification	Cross border trust, partner onboarding	Anti machinewashing legitimacy
P7	Digital servitization	Lifecycle revenue alignment	Service expansion, customer retention	Longer product lifetimes
P8	Accountability architecture	Credibility and finance access	Investment enabled scaling	Integrity, ESG signaling
P9	Workforce governance and skills	Inclusive adoption	Technology enabled scaling	Equity and job quality
P10	Energy and climate shock context	Cost and resilience constraints	Feasible expansion pace	Resilience and emissions impact

In addition to these propositions, boundary conditions and matters of caution appear from the literature. First, the fact that there are withdrawn studies on the topics of sustainability technology shows the need for a careful evaluation of the evidence and the potential for overstating the benefits of technology without proper control of validation. Two of the items in the corpus were explicitly labeled retracted, to indicate the importance of methodological rigor and replication in sustainability technology claims (Bradu et al., 2022; Huang et al., 2022). Second, emergent forms of digital infrastructures, such as the metaverse, may provide new coordination and education (relevant to scale circular knowledge), however, the impacts on sustainability point out that energy and governance implications must be watched out for (Giovanni, 2023; Onu et al., 2023). These boundary conditions enforce the fact that the scaling-out of circular

business models needs to be informed by quality evidence, governance and system level evaluation of sustainability.

7. DISCUSSION: THEORETICAL ADVANCEMENT AND MODEL INTERPRETATION

The proposed framework and propositions help in advancing theory by combining fragmented literature into a coherent explanation of circular business model scaling in the emerging economies. Three theoretical advances stand out: Scaling and firm growth: the articulation of the phenomenon of scaling in terms of system expansion as opposed to firm growth alone, the positioning of digitalization as a conditional accelerator under the conditions of accountability constraints; and Inclusive transition governance: the identification of inclusive



transition governance as central to the sustenance of the integrity of global impact.

First, scaling is re-conceptualized as scaling a circular system, rather than just another form of enterprising growth. Prior work on circular business model design emphasizes the systemic nature of circularity and demands proper alignment of value proposition, value creation and value capture with circular loop processes (Awan & Sroufe, 2022). Transition studies in sectors such as textiles persuasive that circular economy transitions rely on the multi actor coordination, infrastructures, and institutional arrangements sets the basis for circularity being a property of a system rather than the attributes of the firm level (Reike et al., 2022). The framework expands on this view by formalizing scaling pathways, which explicitly model the way circular systems scale (including the replication and platform coordination phenomena, extending supply chains into reverse logistics, and cross border partnerships). This move, if theoretical, explains why there are many circular ventures at the pilot and local level, because expanding recovery networks together with expanding supplier coordination and measurement systems is required if scaling is to take place.

Second, the analysis contributes to the development of digital sustainability theory by considering digital transformation as a conditional scaling accelerator. Digital sustainable business model research suggests digital technologies can make ecological sustainability an integrated part of the business model, while general digital transformation reviews refer to digitalization as the transformation of organizational processes and competitive strategy (Böttcher et al., 2023; Paul et al., 2024). Yet literature also puts the risks to legitimacy in focus, especially where the claims for sustainability depend on using automated or algorithmic systems. Such risk stemming from automated sustainability claims leading to misinformation among stakeholders is explicitly included in machinewashing theory (Seele & Schultz, 2022). Accountability focused reviews similarly demonstrate that digitalization can increase accountability but can also create artificial artifacts of knowledge that need governance to be meaningful (Vaio, Latif, et al., 2023). The framework brings these insights together, by suggesting that the scaling of digital traceability and AI is possible by linking it with governance arrangements that can ensure auditability and credibility. This is especially important when it comes to emerging economies where the institutional capacity and verification infrastructure may not be very even. Thus,

digital transformation is theorized as a necessary but unsufficient condition to scale it, being that accountability is a moderating mechanism for it.

Third, the framework enriches the sustainability transition theory while the dimensions of equity, workforce and social economy are integrated into the scaling logic. Equity and innovation scholarship underscores the need to pay attention to issues of fairness and behavioural dynamics in the low carbon futures we face, contesting purely technocratic narratives of scaling these. Equity and innovation scholarship emphasises how low carbon futures call for attention to issues of fairness and behavioural dynamics, challenging purely technocratic accounts of scaling these. Employment related research suggests that AI shaped employment patterns in virtual agglomeration mechanisms, this implies that the scaling that the technology led results in can change the dynamics of labor markets (Shen and Zhang, 2024). Human resource perspectives emphasize how governance and skills development are increasingly important due to the diffusion of generative AI and the values of organizations, which is driving the need for organizational strategies to deal with workforce transition (Budhwar et al., 2023). The framework captures these concerns through the concept of workforce governance as a go-between between inclusive development outcomes. Additionally, in the policy guidance on the social economy, it is stressed that for the circular economy actors in the social economy can support circular economy through inclusive employment and provision of local services, which is particularly relevant in the context where public services and formal labor markets are limited (OECD, 2022). Coupled with this and the focus on system level solutions offered by the official global waste outlook to convert waste into resources, this imply that inclusive ecosystem building is an important lever to scale circular systems in emerging economies (Programme, 2024).

Emerging economic conditions create a unique theoretical tension. On one hand, infrastructure, financial and regulatory capacities which limit scale, especially for circular models depending on the quality standards of reverse logistics and recovery of materials and the possibility of guaranteeing energy. On the other hand, constraints also have the potential to stimulate frugal innovation and hybrid value creating approaches leading to affordable, context fitted solutions - which could in turn enable the diffusion to similar contexts around the world. AI Driven Sustainable Frugal innovation perspectives



implies that Technological tools can amplify frugal innovation in terms of improving efficiency and decision making even under constraints (Govindan, 2022). The framework thus sees emerging economies in terms of dual character contexts of constraint and innovation in which scaling is a matter of capability building and ecosystem alignment as opposed to mirroring high income economy circular solutions.

Sectoral interpretation further makes it clear how the problem of scaling can be made operational. Textiles are an arena of salient circular transition because of high material throughput and lack of waste caused problems and there is evidence indicating that circular transitions require a combination of innovation and capability development in whole supply chains (Harsanto et al, 2023; Coppola et al, 2023; Reike et al, 2022). Service oriented business model, enabled by digital servitization, offers another operational pathway suggesting how the ownership models may change towards services and maintaining and reusing at scale (Favoretto et al., 2022; Awan & Sroufe, 2022). Tourism oriented sustainability scholarship draws attention to the evaluation need for systemic coordination and policy support-infirming also the ecosystem dependence of scale (Buhalis et al., 2023; Dredge, 2022). Agro food system research focuses on the linkages of food security and climate change and proposes that circular models in food systems could contribute simultaneously to the climate change adaptation and resource efficiency goals in the emerging economies (Wijerathna Yapa & Pathirana, 2022).

One more theoretical layer is energy and climate context. The global energy crisis has increased the focus on efficiency and resilience, and reviews of renewable energy focus on uncertainties and costs of climate change (Gajdzik et al., 2024; Osman et al., 2022). The framework puts the shock of energy as a moderator, implying that a scaling of circular business models is dependant partly on macro level energy system stability, and on the ability of the venture to incorporate energy efficiency and renewable strategies. Blockchain related energy research supports energy transition paths by finding that distributed coordination technologies may accompany that energy transition methodology, which may support circular operations, where decentralized energy supply and traceability are important (Lv, 2023). These insights highlight the need for circular scaling as being nested into the framework of the wider sustainability transitions and requires to be evaluated holistically.

An additional governance insight is with respect to the role of accounting, measurement, and ethics in scaling. Sustainability management accounting literature focuses on multi-level links for sustainability which suggests that ventures need multi-level measurement system as ventures scale up (Schaltegger et al., 2022). Accounting and accountability-focused circular economy reviews suggest that these systems help to determine legitimacy of and trust in stakeholders and their policies (Vaio, Hasan, et al., 2022). Evidence from ESG ratings shows that the signs of sustainability can be related to the financial outcome and therefore can have an impact on access to money and partnerships (Sandberg et al., 2022). Internal ethics and conduct research: Internal ethics and employee behavior studies propose suggesting that organizational culture and CSR practices can influence sustainability performance, which suggests that the scaling process necessitates harmonious internal governance on sustainability performance to prevent potentially compromising sustainability performance due to misaligned incentives (Li, Al Sulaiti, et al., 2022). These considerations in governance are all interwoven with the risks of machine-washing to shore up the idea that as there is more digital reporting, verification and ethical governance are critical.

Finally, speculative emerging digital environments like the metaverse have relevant considerations to note. Scholarship in metaverse sustainability brings up questions of the environmental footprint of digital infrastructures and governance of digital spaces while research target on education offers a potential for capability development and knowledge diffusion (Giovanni, 2023; Onu et al., 2023). In the framework, such phenomena are considered as boundary conditions that may have new scaling channels for education and coordination but must be carefully assessed for sustainability to avoid rebound effects.

Overall, the framework considers scaling circular entrepreneurship in emerging economies as a capability driven, ecosystem mediated process in which digitalization and technology enhance coordination and measurement, but only under the conditions of governance for which certain legitimacy to group coordination and scale-inclusive development is preserved. This theoretical interpretation offers a platform for empirical testing and strategy design for entrepreneurs, policymakers and investors.



8. CONCLUSION

Sustainable entrepreneurship in emerging economies is an important way ahead for very rapid transition to circular economic systems with wider international relevance. However, such transformation cannot happen without the successful scaling of circular business models that can scale beyond localized initiatives whilst doing so without losing environmental and social value. Evidence sourced through a synthesis of the literature shows that there are several key aspects of the circular scale-up that must be in concert to be successful, such as circular business model architecture, entrepreneurial capabilities, governance competence, ecosystem and policy support, and enabling digital infrastructures. When these elements work in combination with each other, circular ventures are positioned better to increase operational reach while maintaining environmental value preservation and economic viability. In addition, the use of circular entrepreneurship as a strategic tool for waste management challenges and system-level solutions for converting waste streams to productive resources has begun to be recognized. At the same time, there are aspects of sustainability to address, both in terms of equity and workforce implications of scaling efforts. As reshaped organizational processes and labor structures by digital technologies and artificial intelligence shape circular ventures, it is important for expansion strategies to remain inclusive and sensitive to impacts on behavior and distribution throughout communities and workers.

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