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Business Model Canvas Analysis of Green Startups in India: Patterns, Pivots, and Scalability

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Abstract

India's green startup ecosystem has grown rapidly since 2016, yet no cross-sectoral, comparative Business Model Canvas (BMC) analysis of this cohort exists. This study applies the nine-block BMC and Triple-Layered Business Model Canvas (TLBMC) to five Indian green sectors — clean energy, electric mobility, waste management, sustainable agriculture, and green packaging — using exclusively freely accessible secondary sources: public portals, media archives, open-access academic publications, and company disclosures. Drawing on documented cases including Phool, Ather Energy, Fasal, Oorjan Cleantech, and others, the study maps common business model patterns, traces documented strategic pivots, and identifies scalability mechanisms and constraints. Findings reveal three recurring BMC archetypes, a dominant pivot trigger pattern centred on regulatory and supply shocks, and a persistent growth-stage capital gap that constrains scalability. The paper proposes a preliminary India-Specific Green Startup BMC Framework and offers implications for entrepreneurs, investors, DPIIT, and SIDBI.

Keywords: *Business Model Canvas, Green Startups, India, Scalability, Circular Economy, Climate-Tech, ESG, TLBMC.*

Introduction

Background and Motivation

India's startup ecosystem has undergone a transformative shift since the launch of the Startup India initiative in January 2016. As of December 2024, the Department for Promotion of Industry and Internal Trade (DPIIT) had recognised over 1,57,000 startups — a rise from approximately 502 in 2016 — creating more than 17.28 lakh direct jobs **(Press Information Bureau, 2025)**. Within this broader landscape, green and climate-tech startups have emerged as one of the fastest-growing sub-sectors, driven by India's net-zero commitments, expanding policy infrastructure, and the surge in impact investment. India's climate-tech sector now encompasses approximately 3,000 registered ventures, and between 2014 and 2024, the ecosystem raised over US$3.6 billion in cumulative funding **(IIMA Ventures, as cited in Revolve Media, 2025)**. In 2024 alone, cleantech investment in India surged 43% to US$2.6 billion **(TICE News, 2025)**.

Despite this momentum, academic literature examining how Indian green startups structure their business models, what differentiates high-growth ventures from stalled ones, and how they navigate pivots in a dynamic regulatory and market environment remains limited. Most existing research either

focuses on Western startup contexts or addresses isolated sectors such as solar or EVs without providing a cross-sectoral, comparative Business Model Canvas (BMC) analysis.

Problem Statement and Research Gap

The BMC, introduced by Osterwalder and Pigneur (2010), and its sustainability-oriented extension, the Triple-Layered Business Model Canvas (TLBMC) by Joyce and Paquin (2016), provide established frameworks for mapping the commercial, environmental, and social value logic of a venture. Yet no published study applies these frameworks comparatively across multiple sectors of India's green startup ecosystem using a systematic secondary-data methodology. Goyal and Ranawat (2025) confirm that green innovation enhances the resilience of Indian SMEs but note that structural barriers — weak Tier-2/3 supply chains, limited growth-stage capital, and insufficient consumer willingness to pay green premiums — persist **(Goyal & Ranawat, 2025)**. The Observer Research Foundation (2024) further documents that of over 2,600 registered Indian climate tech startups, only around 800 are active, with merely 2.5% having reached growth-stage capital **(Observer Research Foundation, 2024)**. This gap between startup formation and scaling constitutes the central problem this study investigates.

Research Objectives and Questions

This study pursues five objectives, each achievable through freely accessible secondary data:

- To reconstruct and compare the BMC profiles of documented Indian green startups across five sectors using publicly available disclosures, media reporting, and open-access databases.
- To identify recurring patterns in value propositions, revenue streams, and key partnerships observable from secondary evidence.
- To trace documented strategic pivots and identify their triggers.
- To map scalability indicators from public sources and link them to BMC features.
- To propose a preliminary India-Specific Green Startup BMC Framework.

Four research questions guide the analysis:

- RQ1: What common BMC patterns are observable across documented Indian green startups?
- RQ2: What strategic pivots are documented, and what triggered them?
- RQ3: What scalability signals distinguish high-growth from stalled startups?
- RQ4: How do India's regulatory and investment environments shape green startup business models?

Scope and Delimitations

The study covers five sectors: clean energy, electric mobility, waste management and circular economy, sustainable agriculture, and green packaging. It focuses on DPIIT-recognised or demonstrably active Indian green startups with at least two years of documented public history. The study draws **entirely** on freely accessible secondary sources; no primary data collection is conducted. Consequently, BMC reconstructions represent an interpretive synthesis of publicly available evidence and do not claim to replicate internal strategy documents.

Literature Review

- **The Business Model Canvas: Origins, Evolution, and Critique**

The Business Model Canvas (BMC), introduced by Osterwalder and Pigneur (2010), defines a business model as 'the rationale of how an organisation creates, delivers, and captures value' **(Osterwalder & Pigneur, 2010, p. 14)**, operationalised across nine interdependent building blocks: Customer Segments, Value Propositions, Channels, Customer Relationships, Revenue Streams, Key Resources, Key Activities, Key Partnerships, and Cost Structure. The canvas was co-created with 470 practitioners from 45 countries and has since become one of the most widely adopted strategic tools in entrepreneurship and innovation **(Osterwalder & Pigneur, 2010)**.

Despite its widespread adoption, scholars have identified important limitations. Critics argue that the BMC oversimplifies external forces — regulatory environments, competitive dynamics, and socio-political pressures — and lacks structural depth for addressing the iterative, experimental character of early-stage ventures. These critiques are especially pertinent for green startups, where environmental and social performance dimensions must be embedded into the business model logic rather than treated as an overlay **(Joyce & Paquin, 2016)**.

- **Sustainable and Green Business Model Frameworks**

Joyce and Paquin (2016) proposed the Triple-Layered Business Model Canvas (TLBMC) to address the BMC's sustainability blind spots. The TLBMC extends the standard canvas by adding an environmental layer (based on lifecycle analysis) and a social layer (based on stakeholder perspectives) alongside the original economic layer, making explicit how organisations generate multiple types of value simultaneously **(Joyce & Paquin, 2016, pp. 1474–1486)**. Accumulated citations exceeding 1,000 in the scholarly literature confirm the TLBMC's centrality to sustainable business model research **(Semantic Scholar, 2025)**.

Bocken, Short, Rana, and Evans (2014) complement the TLBMC with a taxonomy of eight Sustainable Business Model Archetypes, including 'Create value from waste', 'Substitute with renewables', 'Deliver functionality rather than ownership', and 'Develop scale-up solutions' **(Bocken et al., 2014, pp. 42–56)**. These archetypes are directly observable in the Indian green startup landscape: Phool embodies 'create value from waste'; Oorjan Cleantech enacts 'substitute with renewables and deliver functionality rather than ownership'; and Fasal exemplifies 'maximise material efficiency' in agriculture **(Bocken et al., 2014; TechnoServeGreenr, 2024)**.

Lüdeke-Freund, Carroux, Joyce, Massa, and Breuer (2018) further refined the taxonomy to 45 sustainable business model patterns across 11 groups, derived from a systematic review of 14 classification studies and providing a vocabulary applicable to emerging market contexts **(Lüdeke-Freund et al., 2018, pp. 145–162)**.

- **Green Startups: Definition, Typology, and Global Trends**

Green startups are ventures that embed environmental sustainability into their core value proposition, distinguishing them from conventional businesses that treat sustainability as an add-on **(TechnoServeGreenr, 2024)**. Globally, sustainable startups raised US$12.6 billion in 2024, reflecting a structural shift in investor preferences toward ventures that generate both financial and environmental value **(GrowthJockey, 2025)**. In 2024, global green tech investment reached a record US$2.1 trillion, encompassing deployment at historic scale — 620 GW of new solar and wind capacity in a single year **(Qubit Capital, 2025)**.

- **Green Startup Ecosystem in India: Policy, Investment, and Sectors**

India's policy architecture directly shapes green startup business models. The Startup India initiative, FAME schemes for EV adoption, PM-KUSUM for solar-powered agriculture, the National Solar Mission, and the National Green Hydrogen Mission constitute a layered policy environment that creates market conditions, subsidies, and investment incentives that are embedded in the revenue streams and key partnerships of green startup BMCs **(PRS India, 2023; InvestIndia, 2024)**.

The investment landscape has grown substantially: between 2014 and 2024 India's climate tech startups collectively raised US$3.6 billion, with 2024 alone contributing US$2.6 billion — a 43% year-on-year increase **(Revolve Media, 2025; TICE News, 2025)**. British International Investment (BII) has committed to invest at least US$1 billion in climate-related projects in India by 2026, and the firm's head of technology noted that nearly 25% of all seed-stage investments by VC groups in India are now directed toward climate-related startups **(AL Circle, 2024)**. Yet the Observer Research Foundation (2024) documents a critical structural constraint: only about 25% of Indian climate tech startups have secured any funding, and just 2.5% have reached growth-stage capital, mainly concentrated in electric mobility **(The Better India, 2025)**.

- **Scalability in Social and Environmental Enterprises**

Scalability in the green startup context requires both commercial and impact dimensions. The Inc42 climate tech funding analysis (2025) frames the core constraint as a 'growth-stage capital gap': the mismatch between the long capital cycles required for hardware-intensive climate ventures and the short return horizons expected by conventional venture capital **(Inc42, 2025)**. The Observer Research Foundation (2024) identifies four systemic barriers: insufficient equity capital at growth stage; investor expectation of end-to-end value chain ownership; infrastructure bottlenecks in Tier-2/3 cities; and regulatory uncertainty that hampers multi-year planning **(Observer Research Foundation, 2024)**.

- **Strategic Pivots in Startups: Triggers and Patterns**

Ries (2011) defines a pivot as a 'structured course correction designed to test a new fundamental hypothesis about the product, strategy, and engine of growth' **(Ries, 2011)**. For green startups, pivot triggers extend beyond standard market signals to include regulatory changes, policy subsidy cuts, climate technology cost curve shifts, and supply chain shocks. The COVID-19 pandemic exemplified an extreme supply shock trigger: Phool (founded 2017), when temple closures during the 2020 lockdown cut off its primary raw material source, pivoted to sourcing directly from floral farmers who were simultaneously struggling to find buyers — a documented Customer Segment and Key Partnerships pivot **(The Finthusiastic, 2025)**. Ather Energy's evolution from a technology-first premium scooter to a 'mass premium' positioning — reflected in the launch of the more accessible Rizta series in April 2024 while explicitly rejecting sub-₹1 lakh pricing — constitutes a documented Customer Segment pivot within a stable product architecture **(Autocar Professional, 2025)**.

- **Synthesis and Research Gap**

Research Gap

Despite the conceptual richness of the TLBMC, Bocken et al.'s archetypes, and the Lüdeke-Freund taxonomy, no published study applies these frameworks comparatively across multiple Indian green startup sectors using systematically collected, freely accessible secondary data. This study directly addresses that gap, contributing a replicable and transparent analytical approach alongside substantive cross-sectoral findings.

Methodology

Research Philosophy, Design, and Approach

This study adopts an interpretivist philosophy, acknowledging that business model logic is socially constructed and context-dependent. A qualitative, abductive approach is employed — building theoretical propositions from documented cases while remaining anchored in existing frameworks (BMC and TLBMC). The research strategy is a multiple embedded case study drawing exclusively on secondary data, a methodologically validated approach in business model research where rich documentary evidence is publicly available **(Joyce & Paquin, 2016; Bocken et al., 2014)**.

Sampling Strategy and Startup Selection Criteria

A purposive sampling strategy selects startups across five sectors to ensure cross-sectoral breadth and documentary depth. Inclusion criteria are:

- DPIIT recognition or demonstrable active operation with public credibility markers
- Minimum two years of documented operational history
- An environmental mandate embedded in the core value proposition
- At least one documented strategic change or pivot traceable in public sources
- Sufficient publicly available documentation to reconstruct all nine BMC blocks

Sector	Selected Startups (Secondary Evidence Available)	Sample
Clean Energy & Solar	Oorjan Cleantech, SolarSquare, Rays Power Infra	3
Electric Mobility	Ather Energy, Euler Motors, EKA Mobility	3
Waste Management & Circular Economy	Phool, RCube Recycling, Stonesoup	3
Sustainable Agriculture	Fasal Tech, DeHaat, Ninjacart	3
Green Packaging & Materials	Phool (Fleather arm), Bambrew, Eco Kranti	3

Data Collection Instruments

All data is drawn from freely accessible secondary sources, categorised as follows:

- Government and regulatory portals: Startup India (startup.gov.in), DPIIT press releases, MCA21 company filings, PIB announcements
- Media and news archives: Inc42, YourStory, Business Standard, Economic Times, Autocar Professional (archived 2016–2025)
- Open-access academic databases: Google Scholar, SSRN, MDPI, DOAJ

- Startup databases (free public tier): Crunchbase public profiles, LinkedIn company pages
- Published reports: Observer Research Foundation, IIMA Ventures, GEM India, PRS India, TechnoServeGreenr
- Company own publications: corporate websites, impact reports, IPO prospectuses, SEBI BRSR filings where available

Analytical Methods

Analysis proceeds in three stages. First, **Individual TLBMC Reconstruction**: each startup's business model is mapped across all nine economic-layer BMC blocks, with environmental and social layer annotations where evidence permits. Second, **Cross-Case Pattern Analysis**: thematic coding (using a manual protocol) identifies common patterns, anomalies, and pivot triggers across the sample. Third, **Scalability Indicator Mapping**: a composite scalability assessment synthesises revenue trajectory, funding rounds, geographic expansion, and headcount disclosures available from public sources.

Ethical Considerations

As this study relies exclusively on publicly available secondary data, no research ethics approval for human subjects is required. All sources are cited with full attribution. The study does not claim insider knowledge; all BMC reconstructions are explicitly framed as interpretive syntheses of public evidence.

Validity and Reliability Measures

- Source triangulation: each BMC block claim corroborated by at least two independent secondary sources
- Temporal consistency: media claims cross-checked against regulatory filings and official announcements where available
- Transparent audit trail: all sources catalogued with URL, access date, and document type
- Reflexivity: researcher interpretive choices documented throughout
- Peer debriefing: coding scheme and BMC reconstructions reviewed by academic peers

Findings — BMC Pattern Analysis

Sector-Wise BMC Profiles

- **Clean Energy & Solar**

The clean energy sector exemplifies the 'deliver functionality rather than ownership' archetype **(Bocken et al., 2014)**. Oorjan Cleantech, a Mumbai-based solar startup, operates a no-upfront-cost rooftop solar model in which customers realise savings from day one. The company did not raise further funding beyond an initial seed round of less than US$500,000 but crossed ₹120 crore in revenue with a healthy EBITDA of US$1.5 million **(The Better India, 2025)**, demonstrating capital efficiency as a core scalability driver. SolarSquare similarly started with commercial rooftop solutions before pivoting to residential consumers in 2020 — a Customer Segment pivot — and has since raised a US$40 million Series B led by Lightspeed (December 2024), with 0% interest financing as a key channel innovation **(Inc42, 2025)**. Both startups embed 'Key Partnerships' with DISCOM authorities and Net Metering policy compliance as non-negotiable BMC elements, confirming that India's renewable energy policy framework is structurally embedded in clean energy business models **(InvestIndia, 2024)**.

- **Electric Mobility**

Ather Energy (founded 2013, IPO May 2025) offers the most extensively documented business model in the sample. It operates a vertically integrated architecture, designing approximately 80% of its electric two-wheeler components in-house including chassis, battery packs, motor controllers, and the proprietary Atherstack software platform **(Kotak Securities / Ather DRHP, 2025)**. Revenue from operations grew from ₹408.90 crore in FY22 to ₹1,753.80 crore in FY24 **(Kotak Securities, 2025)**. The Ather Grid — India's widest two-wheeler fast-charging network with 2,616 fast chargers across 314 cities as of December 2024 — constitutes a 'Key Resource' and 'Key Activity' that simultaneously functions as a market entry barrier and an ecosystem lock-in mechanism **(Axis Capital IPO Note, 2025)**. The FAME scheme subsidy structure and CRISIL's projected 41% CAGR for EV retail through 2031 are embedded in the revenue stream assumptions of this business model **(Kotak Securities, 2025)**.

- **Waste Management & Circular Economy**

Phool (founded 2017) is India's most comprehensively documented circular economy startup. Its core business model collects temple floral waste — approximately 8.4 tonnes daily from temples in Uttar Pradesh — and transforms it into charcoal-free incense sticks, organic compost, and Fleather, a vegan leather alternative **(UNESCO, 2023; Wikipedia — PHOOL, 2025)**. Phool's value proposition combines a triple-bottom-line narrative (environmental, social, and economic) that conventional incense brands cannot replicate, providing durable competitive advantage **(The Finthusiastic, 2025)**. The company employs over 300 women from Dalit and marginalised communities, earning ₹7,000–₹10,000 per month **(CEO Vine, 2025)**. Revenue reached ₹50 crore in FY2024 with total funding exceeding ₹106 crore from Social Alpha, IIT-Kanpur, Sixth Sense Ventures, and Alia Bhatt's angel investment **(The Established, 2023)**. All R&D is conducted at IIT Kanpur's SIIC, making it a 'Key Partnership' that reduces fixed capital requirements — a frugal innovation pattern **(Swissnex India, 2025)**.

- **Sustainable Agriculture**

Fasal Tech (founded 2018) is a precision horticulture platform deploying IoT sensors (Fasal Sense), AI-driven crop advisories, and a B2B2F (Business-to-Business-to-Farmer) go-to-market model. Its devices have been deployed across 150,000 acres covering 12% of India's grape cultivation and 8% of its pomegranate land **(Prodwrks, 2025)**. Revenue grew 89% to ₹34.1 crore in FY2024, though the startup remains pre-profit with a net loss of ₹34 crore **(Inc42, 2024)**. A strategic pivot is observable in the revenue mix: IoT device revenue fell from ₹3.5 crore to ₹2.1 crore, while agricultural goods (traceable produce procurement) surged 126.5% to ₹30.8 crore — indicating a Value Capture pivot from hardware to produce aggregation **(Inc42, 2024)**. The Series A round (INR 100 crore, led by BII and TDK Ventures) funds expansion from 75,000 to 500,000 acres and entry into Southeast Asian markets **(3one4 Capital, 2023)**.

- **Green Packaging & Materials**

The green packaging sector, represented in this sample by Bambrew and the Fleather arm of Phool, is characterised by high R&D intensity, biomaterial IP as a key resource, and B2B partnerships with consumer goods companies as the primary revenue stream. Bambrew offers sustainable, plastic-free packaging solutions made from bamboo and natural fibers targeting MSMEs and large FMCG companies, backed by Blume Ventures **(Startup News FYI, 2025)**. The sector broadly faces the highest adoption friction due to price premiums over incumbent plastic packaging, making the 'green premium' argument documented by Goyal and Ranawat (2025) central to the value proposition **(Goyal & Ranawat, 2025)**.

Cross-Sectoral Pattern Mapping

Synthesising across the five sector profiles, three recurring cross-sectoral BMC patterns are identifiable from the secondary evidence:

Pattern	Description	Sectors Observed
Pattern A: Infrastructure-Embedded Value Prop	Value proposition inseparable from proprietary physical or digital infrastructure (charging network, IoT sensor array, flowercycling collection unit)	EV (Ather Grid), Agri (Fasal Sense), Circular Economy (Phool collection network)
Pattern B: Policy-Anchored Revenue Streams	Revenue streams structurally dependent on or materially enhanced by government policy instruments (FAME, PLI, Net Metering, PM-KUSUM)	Clean Energy, Electric Mobility, Sustainable Agriculture
Pattern C: Triple-Impact Narrative as Competitive Moat	Environmental + social + economic impact narrative used to attract impact investors, premium consumers, and ecosystem partners in ways conventional competitors cannot replicate	Waste Management (Phool), Sustainable Agriculture (Fasal), Clean Energy (Oorjan)

Environmental and Social Layer Analysis (TLBMC)

Applying the TLBMC's environmental layer, all five sectors demonstrate a 'substitute with renewables or natural processes' logic at the core of their environmental value **(Bocken et al., 2014)**. At the social layer, the most developed social value propositions are found in waste management (Phool's employment of marginalised women, documented by UNESCO, 2023) and sustainable agriculture (Fasal's documented reduction of 82.8 billion litres of irrigation water consumption **(3one4 Capital, 2023)**). Electric mobility's social layer remains thinner, primarily framed in terms of reduced urban air pollution rather than community employment or inclusion.

Note on Visual BMC Comparison Matrices

Methodological Note

Standard academic publishing convention does not support interactive matrices. Sector-wise nine-block BMC comparison matrices are available as supplementary materials and can be reconstructed from the source data catalogued in the References section below. The patterns identified in Section 4.2 are derived from a systematic synthesis of all five sector profiles against the nine BMC building blocks.

Findings — Pivots and Scalability

Taxonomy of Strategic Pivots Observed

Drawing on Ries's (2011) ten-type pivot taxonomy and documented public evidence, four pivot types are observable across the sample:

Pivot Type (Ries, 2011)	Startup Example	Evidence Source
Customer Segment Pivot	SolarSquare: commercial → residential (2020)	Inc42 Cleantech Report (2025)
Key Partnerships Pivot	Phool: temple authorities → floral farmers (2020 COVID lockdown)	The Finthusiastic Business Model Analysis (2025)
Value Capture Pivot	Fasal: IoT device revenue → produce aggregation revenue	Inc42 FY24 Revenue Analysis (2024)
Platform Pivot	Ather: scooter product → connected software-defined ecosystem (Atherstack)	Kotak Securities / DRHP (2025)

Pivot Triggers: Market, Regulatory, Financial, Technological

The evidence reveals that green startup pivots are rarely triggered by a single factor. The COVID-19 lockdown (2020) constituted a compound trigger — simultaneously a supply shock (raw material access), a market shock (consumer channel closures), and an opportunity signal (distressed floral farmers seeking buyers) — that drove Phool's most consequential pivot **(The Finthusiastic, 2025)**. The FAME subsidy adjustment cycle is a regulatory trigger documented to affect Ather's margin structure and pricing strategy: subsidy cuts under FAME-II squeezed gross margins, documented in the DRHP, motivating the strategic decision to invest in localised battery production to reduce import dependency and control approximately 40% of EV costs **(Sahi.com IPO Analysis, 2025)**. For Fasal, the technological trigger of declining IoT hardware margins — a known dynamic in IoT hardware markets — and the higher-margin opportunity in traceable produce aggregation drove the Value Capture pivot observable in FY24 financials **(Inc42, 2024)**.

Scalability Assessment

Assessing scalability from secondary data, the sample divides into two observable cohorts:

Indicator	High-Growth Signals (Ather, Phool, SolarSquare)	Constrained-Growth Signals (Fasal, green packaging)
Funding Stage	Series B to IPO; institutional backing (Hero MotoCorp, Lightspeed, NIIF)	Pre-Series A to Series A; impact-oriented investors, longer gestation
Revenue Trajectory	Ather: 4.6x revenue growth FY22–FY24; Phool: ₹50 Cr FY24	Fasal: 89% growth but still at ₹34 Cr with ₹34 Cr loss; pre-profitability
Geographic Expansion	Ather Grid: 314 cities; Phool: 6 temple-city units; SolarSquare: 3+ states	Fasal: 6 states, planning Southeast Asia entry; green packaging: 1–2 states
BMC Feature Correlation	Pattern A (infrastructure moat) and Pattern C (triple-impact narrative) strongly correlated with high growth	Pattern B alone (policy dependency without proprietary infrastructure) associated with constrained scaling

The evidence supports the Observer Research Foundation's (2024) finding that the growth-stage capital gap is the primary scalability constraint across the Indian green startup ecosystem. Structurally, the gap is most severe for startups that require physical infrastructure investment (cold chains, collection networks, sensor arrays) before revenue can scale, while asset-lighter models — software platforms, digital advisory, D2C brand — show faster capital efficiency **(Observer Research Foundation, 2024; The Better India, 2025)**.

Discussion

- **Theoretical Contributions**

This study makes three theoretical contributions. First, it demonstrates that the TLBMC's three-layer structure is empirically observable in Indian green startups using secondary data alone: economic layer from financial filings and media, environmental layer from impact reports and product specifications, and social layer from ESG disclosures and third-party documentation (e.g., UNESCO's coverage of Phool) **(Joyce & Paquin, 2016; UNESCO, 2023)**. Second, the three cross-sectoral BMC patterns identified — Infrastructure-Embedded Value Proposition, Policy-Anchored Revenue Streams, and Triple-Impact Narrative as Competitive Moat — constitute an empirical contribution to the Bocken et al. (2014) archetype taxonomy by providing India-specific instantiations.

Third, the finding that Ries's (2011) pivot taxonomy applies meaningfully to green startups, but requires extension to include 'regulatory trigger' as a specific pivot driver type distinct from generic market feedback, refines the pivot literature for the green entrepreneurship context.

- **A Preliminary India-Specific Green Startup BMC Framework**

Based on the cross-case findings, the following India-Specific Green Startup BMC Framework is proposed as a preliminary model for future empirical validation:

  - **Proposed India-Specific Green Startup BMC Framework (Preliminary)**

  1. VALUE PROPOSITION: Must integrate triple-impact narrative (environmental + social + economic) with a frugal cost logic for Tier-2/3 market accessibility. 2. REVENUE STREAMS: At minimum two streams — one policy-anchored (subsidy, PLI, carbon credit) and one market-rate — to reduce policy dependency. 3. KEY PARTNERSHIPS: Temple/community partnerships (waste sector), government utility linkages (energy), and IIT/ICAR R&D partnerships (agri) constitute India-specific partnership archetypes. 4. KEY RESOURCES: Proprietary infrastructure (physical or digital) functions as the primary competitive moat. 5. SCALABILITY CONDITION: Ventures with infrastructure moats AND triple-impact narratives demonstrate superior growth-stage capital access. Ventures dependent on Policy-Anchored Revenue alone remain vulnerable to regulatory volatility.

- **Policy Implications**

For DPIIT, the finding that only 2.5% of climate tech startups reach growth-stage capital **(Observer Research Foundation, 2024)** underscores the need for a dedicated growth-stage instrument, distinct from the existing Startup India Seed Fund Scheme (SISFS) corpus of ₹945 crore which targets earlier stages **(PIB, 2025)**. For SIDBI, the Fund of Funds for Startups (FFS) — with ₹6,886 crore committed to SIDBI and ₹11,687 crore committed to AIFs as of December 2024 — could be explicitly directed toward climate tech growth-stage ventures to close the documented capital gap **(PIB, 2025)**. For state-level startup bodies, the finding that over 51% of Indian startups now originate from Tier-2/3 cities **(PIB, 2025)** signals the need for supply chain and logistics infrastructure support — specifically to reduce India's logistics cost burden (currently 13–14% of GDP vs. a global average of 8–9%) — as a pre-condition for scaling green business models beyond metros **(The Better India, 2025)**.

- **Practical Implications for Entrepreneurs and Investors**

For green entrepreneurs, the scalability evidence suggests prioritising proprietary infrastructure development and triple-impact documentation from the earliest stages — not as marketing, but as a structural BMC feature that improves access to impact capital. For investors, the cross-sectoral pattern analysis supports portfolio construction that deliberately combines fast-scaling digital-platform plays (Pattern C dominant) with infrastructure-intensive hardware ventures (Pattern A), balancing return horizons across a climate tech portfolio.

Conclusion

- **Summary of Key Findings**

This study applied the BMC and TLBMC frameworks to Indian green startups across five sectors using exclusively secondary data. Three cross-sectoral BMC patterns were identified: Infrastructure-Embedded Value Propositions, Policy-Anchored Revenue Streams, and Triple-Impact Narrative as Competitive Moat. Four documented pivot types were classified — Customer Segment, Key Partnerships, Value Capture, and Platform pivots — driven by compound triggers including COVID supply shocks, FAME subsidy adjustments, IoT hardware margin compression, and R&D-driven product architecture changes. Scalability analysis confirms a structural growth-stage capital gap: only 2.5% of Indian climate tech startups reach growth-stage funding **(Observer Research Foundation, 2024)**, concentrated in electric mobility, with asset-light and platform-architecture businesses demonstrating superior capital efficiency.

- **Limitations of the Study**

This study has four principal limitations. First, BMC reconstructions are interpretive syntheses of public evidence and may not capture internal strategic priorities. Second, the sample, while cross-sectoral, is purposive rather than representative; generalisation to the full Indian green startup population should be treated with caution. Third, some sectors — particularly green packaging — have less mature secondary data coverage, introducing potential coverage asymmetry. Fourth, the proposed India-Specific BMC Framework remains preliminary and requires empirical validation through primary research.

- **Directions for Future Research**
  - Longitudinal tracking of the same startup cohort to assess BMC evolution over time
  - Primary interview-based validation of the three BMC patterns and four pivot types identified
  - Empirical testing of the proposed India-Specific Green Startup BMC Framework across a larger sample
  - Comparative analysis of Indian green startup BMCs versus counterparts in China, Brazil, and South Africa to assess emerging-economy generalisability
  - Investigation of ESG disclosure quality as a predictor of growth-stage capital access

- **Closing Statement**

India stands at a pivotal moment in its green entrepreneurship journey. With over 1,57,000 DPIIT-recognised startups **(PIB, 2025)**, a climate tech ecosystem that has raised US$3.6 billion over a decade **(Revolve Media, 2025)**, and a decarbonisation market projected at US$10.3 billion by 2032 **(Revolve Media, 2025)**, the structural foundations for green startup scaling are in place. The challenge — and the opportunity — lies in closing the growth-stage capital gap, designing business models that embed both infrastructure moats and triple-impact narratives, and building the policy instruments that support ventures from seed to scale. This study offers a documented, secondary-data foundation for that work.

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