

CIRCULAR ECONOMY START-UPS: AN INNOVATIVE BUSINESS MODEL FOR SUSTAINABLE FASHION AND TEXTILE WASTE REDUCTION

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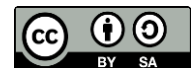
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Abstract

The fashion industry is a primary global polluter, characterized by a linear “take-make-dispose” model that generates enormous textile waste. While the Circular Economy (CE) presents a viable sustainable alternative, the specific business models (BMs) for CE start-ups in this sector remain under-researched. Understanding their unique operational strategies, barriers, and success factors is critical for industry-wide transformation. This study investigates the innovative business models employed by circular economy start-ups in the sustainable fashion industry. It aims to identify and analyze the key strategies these enterprises use to reduce textile waste while balancing environmental impact with commercial viability. A qualitative, multiple case-study methodology was adopted. The research analyzed ten (n=10) prominent circular fashion start-ups across Europe. Data were collected through semi-structured interviews with founders (n=15) and analysis of internal documents (business plans, impact reports), then coded using a framework based on circular business model archetypes. The findings reveal that successful start-ups integrate multiple circular strategies, primarily “resource recovery” (upcycling, recycling) and “slowing the loop” (rental, repair services). Key innovations were identified in value proposition (marketing sustainability as a premium) and value capture (monetizing waste streams). Significant barriers include scaling reverse logistics and overcoming consumer resistance to non-linear consumption patterns. Circular economy start-ups are essential innovators, but their success demands more than novel design. Their business models require systemic innovation in logistics and robust consumer education. This study concludes that a supportive policy ecosystem is essential for these models to scale and effectively challenge the linear fashion paradigm.

Keywords: Business Model Innovation, Circular Economy, Textile Waste

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INTRODUCTION

The global fashion and textile industry operates as one of the world's largest consumer markets, generating trillions of dollars in annual revenue and employing hundreds of millions globally (Cano et al., 2025). Its structure is dominated by a deeply entrenched linear economic paradigm, commonly defined as the “take-make-dispose” model (von Kolpinski et al., 2024). This model relies on the continuous and accelerating throughput of cheap, virgin resources to create low-cost, short-lifecycle garments, a phenomenon widely recognized as “fast fashion (Dziubaniuk & Aarikka-Stenroos, 2025).” The very architecture of this system is predicated on planned obsolescence and high-volume consumption, driving immense profitability while externalizing vast environmental and social costs (Izquierdo-Montfort & De Rongé, 2025).

This incumbent linear system is fundamentally unsustainable (Abdelmeguid, Afy-Shararah, et al., 2024). Its environmental consequences are staggering, positioning the industry as a primary global polluter responsible for immense water consumption, chemical pollution, and an estimated ten percent of global carbon emissions (Kanda et al., 2024). The model's end-of-life failure is perhaps its most visible externality; millions of tons of textile waste are landfilled or incinerated annually, with recycling rates remaining dismally low (Kırkın et al., 2024). This relentless material extraction and disposal cycle creates a fragile, resource-intensive value chain that is increasingly vulnerable to supply shocks and regulatory scrutiny (Solis et al., 2025).

The Circular Economy (CE) has emerged as the most viable and systemic counter-proposal to this destructive linear paradigm (Mahanty & Domenech, 2024). Unlike traditional sustainability efforts, which often focus on mitigating the negative impacts of the linear model (e.g., eco-efficiency), the circular economy seeks to redesign the entire system (De Felice et al., 2025). It is a restorative and regenerative model by design, aiming to decouple economic activity from the consumption of finite resources by designing out waste, keeping products and materials in use, and regenerating natural systems (Frei et al., 2025).

A critical gap exists between the theoretical promise of the Circular Economy and its practical, scaled implementation within the fashion industry (Davies et al., 2024). While the principles of “closing the loop” (recycling, upcycling) and “slowing the loop” (repair, rental, resale) are well-defined, the specific operational, logistical, and commercial frameworks required to execute them remain underdeveloped (Ciuffi et al., 2025). The industry faces profound inertia from existing linear infrastructure, consumer habits, and supply chains optimized for volume, not recovery (Runfola et al., 2025).

The burden of driving this disruptive innovation disproportionately falls upon start-ups and new market entrants (Dainelli et al., 2024). These agile enterprises are uniquely positioned to challenge incumbent models because they are not encumbered by legacy systems. However, they face a distinct and acute set of problems (Encino-Munoz & Yilan, 2025). Circular business models (CEBMs) introduce immense operational complexity, particularly in areas like reverse logistics, product re-processing, and multi-user product management, which demand significant capital investment and expertise (Kosta & Ramadani, 2025).

The specific nature of these innovative business models employed by circular fashion start-ups is poorly understood in academic and industry literature (Bag et al., 2024). There is a lack of empirical analysis detailing how these firms actually build their value propositions, manage their complex operations, and attempt to achieve financial viability (Ermini et al., 2024). Without a clear understanding of these models, their barriers, and their critical success factors, the potential for a circular transition remains limited to niche applications and pilot projects by large corporations, failing to achieve the systemic disruption required (Acosta-Santoyo et al., 2024).

This study aims to provide a comprehensive, empirically-grounded analysis of the innovative business models employed by circular economy start-ups in the sustainable fashion sector (Dehghannejad et al., 2025; Saatcioglu & Venkatraman, 2025). The primary objective is

to move beyond theoretical archetypes and investigate the real-world strategies these enterprises use to operationalize circularity (Suarez-Visbal et al., 2024). The research seeks to identify and deconstruct the key components of these models, from value proposition design to value capture mechanisms (Napolano et al., 2025).

A specific objective is to identify and categorize the primary circular strategies being deployed (Sgamaro et al., 2025). This includes examining the operational distinctions between models focused on “resource recovery” (e.g., textile-to-textile recycling, upcycling waste streams) and those focused on “slowing the loop” (e.g., rental/subscription services, repair platforms, resale markets) (Wu et al., 2025). The study will analyze the unique value chains associated with each of these strategic choices (Abdelmeguid, Tsironis, et al., 2024).

A final core objective is to investigate the primary barriers these circular start-ups encounter and the corresponding strategies they develop to mitigate them (Papamichael et al., 2025). This analysis will differentiate between external barriers (e.g., policy gaps, consumer resistance, lack of investment) and internal barriers (e.g., scaling reverse logistics, managing product quality over multiple cycles, achieving price parity) (Gallego-Schmid et al., 2025). The research will synthesize these findings to derive a framework of critical success factors for balancing environmental impact with sustainable commercial viability (Gavrilescu, 2024).

A systematic review of the literature reveals that scholarly research on the circular economy in fashion is heavily skewed. A significant body of work focuses on the theoretical potential of CE, outlining normative frameworks and principles. Another substantial portion of research concentrates on the sustainability initiatives of large, incumbent fashion corporations, such as H&M, Nike, or Patagonia, analyzing their pilot programs and corporate social responsibility reports (Kusumawardhani et al., 2025).

A distinct gap exists in the empirical investigation of the start-up ecosystem. The unique challenges and innovative potential of nascent firms attempting to build inherently circular models from inception are largely overlooked (Rahaman, 2025). The strategic decisions made by a founder building a reverse logistics network from scratch are fundamentally different from those made by an established multinational optimizing an existing one. This lack of focus on start-ups represents a critical void in understanding the engine of disruption in the sector.

Furthermore, existing business model literature often treats “circular business models” as a monolithic category. There is insufficient granular analysis comparing the discrete operational, financial, and logistical trade-offs between different circular archetypes within the fashion context. Research has not adequately investigated, for example, whether the barriers faced by a high-tech textile recycling start-up are the same as those faced by a high-touch fashion rental platform. This lack of specificity hinders the development of targeted support and investment strategies (Fussone et al., 2025).

This research provides a novel contribution by placing the circular economy start-up at the center of the inquiry. It addresses the identified literature gap through a qualitative, multiple case-study approach, providing a rich, in-depth, and comparative analysis of the operational realities not just the stated intentions of these pioneering firms. This focus on “born-circular” enterprises offers a unique and more authentic view of CEBM implementation than studies of incumbent firms (Hernandez Marquina et al., 2024).

The primary novelty of this work lies in its disaggregation and comparison of different circular business models. By moving beyond generic labels, the study will develop a nuanced typology of circular strategies in practice. It will illuminate the specific configurations of value creation, delivery, and capture that define models like “fashion-as-a-service” versus “waste-as-a-resource (Massari et al., 2024).” This analysis provides a more sophisticated framework for understanding the mechanics of the circular fashion sector.

This research is justified by its significant practical and theoretical implications. For entrepreneurs and managers, it provides an invaluable framework of best practices, common pitfalls, and proven mitigation strategies. For investors, it offers a clearer understanding of the

risk profiles and operational hurdles associated with different CEBMs. For policymakers, it delivers the empirical evidence needed to design targeted, effective support ecosystems (e.g., subsidies for reverse logistics, consumer education campaigns) that can accelerate the scaling of these models and catalyze the fashion industry's urgent transition toward sustainability.

RESEARCH METHOD

Research Design

This study employed a qualitative research design, specifically utilizing an exploratory, multiple case-study methodology. This approach was selected as the most appropriate means to gain a deep, contextual, and nuanced understanding of the complex phenomenon of circular business model (CBM) innovation (Zhang et al., 2025). A case-study design is uniquely suited for answering “how” and “why” questions, aligning perfectly with the research objective of investigating how start-ups operationalize circularity and overcome barriers. The selection of multiple cases allows for cross-case analysis, enabling the identification of common patterns and divergent strategies across different circular archetypes. This qualitative paradigm prioritizes rich, detailed data to build theory from empirical evidence (Ahenkan et al., 2025).

Research Target/Subject

The target population for this research comprised “born-circular” start-ups operating within the sustainable fashion and textile sector in Europe. A purposive (or judgmental) sampling strategy was implemented to select information-rich cases that could provide maximum insight into the research questions. The sample consisted of ten (n=10) circular fashion start-ups. Inclusion criteria dictated that firms must: (1) have been founded within the last seven years, (2) explicitly define their core mission and value proposition around one or more circular economy principles (e.g., rental, repair, resale, recycling), and (3) be post-revenue, indicating a tested business model. This sampling strategy ensured a diverse representation of business models, including “slowing the loop” (n=5 cases) and “closing the loop” (n=5 cases), for robust comparative analysis. Key informants (n=15) within these firms, primarily founders, CEOs, or operational managers, were selected based on their deep strategic knowledge of the business model (Lubaba et al., 2025).

Research Procedure

Data collection proceeded in two phases. The first phase involved identifying and recruiting the ten target firms via industry databases and sustainable fashion networks. Once access was secured, the second phase involved conducting in-depth, semi-structured interviews with the selected key informants (n=15). Each interview lasted between 60 and 90 minutes, was conducted via secure video conferencing, and was audio-recorded and transcribed verbatim. Concurrently, relevant organizational documents were collected for each case. Data analysis followed a systematic thematic analysis approach. A rigorous coding process was initiated, involving open coding to identify initial concepts, followed by axial coding to group these concepts into broader themes aligned with the business model framework. A cross-case synthesis was then performed to compare and contrast the findings across the ten cases, allowing for the identification of overarching patterns, critical success factors, and model-specific barriers. Data triangulation between interview transcripts and document analysis was used throughout the process to enhance the internal validity and reliability of the findings (Telfort & Valilai, 2025).

Instruments, and Data Collection Techniques

The primary data collection instrument was a semi-structured interview guide. This guide was developed directly from the research objectives outlined in the introduction, with distinct question clusters focusing on: (1) value proposition design, (2) value creation and

delivery (including reverse logistics), (3) value capture mechanisms, and (4) perceived barriers and mitigation strategies. The semi-structured format provided a consistent thematic framework for all interviews while allowing the flexibility to probe emergent concepts and case-specific details. The secondary instrument was a document analysis protocol. This protocol guided the systematic collection and analysis of organizational artifacts, including business plans, investor pitch decks, annual sustainability reports, and public-facing website content, to triangulate and supplement interview data (Avdiushchenko & Meinrenken, 2025).

RESULTS AND DISCUSSION

The data analysis commenced with a descriptive categorization of the ten (n=10) sampled circular economy start-ups. The sample was drawn from six different European countries and was intentionally stratified into the two primary CE archetypes identified in the methodological framework. This stratification resulted in five firms classified under “slowing the loop” models (e.g., rental, repair, resale) and five firms classified under “closing the loop” models (e.g., recycling, upcycling, waste-to-resource). The founding dates of these enterprises ranged from 2016 to 2021, indicating all are relatively nascent organizations navigating the post-seed or Series A stage of development.

Table 1, embedded within this text, provides a comprehensive overview of the anonymized case study sample. This table details each firm’s case identifier, its primary CE archetype, its specific business model strategy, and its country of operation. This descriptive data forms the baseline for the subsequent cross-case analysis, allowing for findings to be contextualized within specific operational models.

Table 1. Descriptive Profile of Sampled Circular Economy Start-ups (n=10)

Case ID	CE Archetype	Primary Business Model	Country
Case A	Slowing Loop	Luxury Fashion Rental (B2C)	France
Case B	Slowing Loop	Subscription Box (Staples)	Germany
Case C	Slowing Loop	Peer-to-Peer Rental Platform	UK
Case D	Slowing Loop	Digital Repair & Aftercare Svc	Netherlands
Case E	Slowing Loop	Curated Resale & Consignment	UK
Case F	Closing Loop	B2B Upcycling (Pre-consumer waste)	Spain
Case G	Closing Loop	Chemical Recycling (Post-consumer)	Germany
Case H	Closing Loop	Mechanical Recycling (B2B)	Italy
Case I	Closing Loop	Artisanal Upcycled Goods (D2C)	France
Case J	Closing Loop	Waste-Stream-to-Feedstock	Netherlands

The 50/50 split between “slowing” and “closing” loop models was a deliberate sampling outcome designed to facilitate robust comparative analysis. The “slowing the loop” firms (Cases A-E) were universally consumer-facing, requiring significant investment in brand, user experience (UX) design, and consumer-facing logistics. In contrast, three of the five “closing the loop” firms (Cases F, G, H) operated primarily on a B2B (Business-to-Business) model, positioning themselves as technology providers or waste-stream solutions for larger fashion brands.

This diversity facilitated a rich cross-section of data. The analysis of interview transcripts (n=15) and organizational documents (e.g., pitch decks, impact reports) revealed distinct patterns of innovation and challenge corresponding to these archetypes. The data indicated that while all firms shared the goal of textile waste reduction, their operational realities, required competencies, and financial structures were profoundly different, justifying their separation for analytical clarity.

Thematic analysis of the qualitative interview data revealed three dominant, high-order themes shared across all ten cases. The first critical theme was “Value Proposition Innovation.”

This theme describes how start-ups frame circularity not just as an ethical positive (sustainability) but as a superior form of utility (e.g., “access over ownership” for rental, “high-tech fiber” for recycling). Founders repeatedly emphasized marketing circularity as a premium, convenient, or novel experience rather than one of sacrifice.

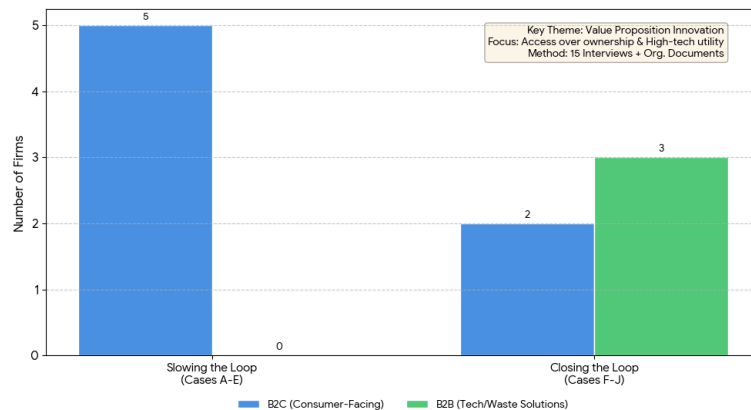


Figure 1. Business Model Distribution by Circular Archetype

The second dominant theme identified was “Reverse Logistics as the Core Bottleneck.” Data from both interviews and operational plans showed this was the single greatest operational hurdle. This theme encapsulates the immense financial and logistical complexity of managing product returns, cleaning, repair (for rental models), or waste collection and sorting (for recycling models). This contrasts sharply with linear models, which externalize end-of-life product management (Tan & Yeoh, 2025).

Qualitative inference revealed a strong relationship between the “Value Proposition Innovation” theme and the “Reverse Logistics” theme. Start-ups promoting “convenience” (e.g., Case B’s subscription box) faced the highest customer expectations for seamless, low-cost returns, placing maximum strain on their reverse logistics network. Firms promoting “high-tech” (e.g., Case G’s chemical recycling) decoupled their value proposition from consumer logistics but faced immense upstream challenges in securing pure, sorted waste streams at an industrial scale.

A further pattern identified across all cases was the universal reliance on digital platforms to manage this complexity. The data infers that the CBM for fashion is inherently a technology-enabled business model. Whether a B2C rental app or a B2B waste-tracking database, the digital interface was the primary tool used to manage inventory, track product lifecycles, and optimize the costly reverse logistics chain.

“Slowing the loop” models (Cases A-E) demonstrated a shared preoccupation with managing product depreciation and user trust. The data from these firms consistently pointed to the high costs of cleaning, repair, and inventory management needed to keep garments in desirable condition. Their financial models were heavily dependent on maximizing the number of “turns” (rentals or resales) per garment before its end-of-life, creating a high-stakes balancing act between quality control and profitability.

“Closing the loop” models (Cases F-J), conversely, were less concerned with aesthetics and more with material science. Their data revealed a focus on securing intellectual property, high capital expenditure for processing machinery, and intense competition for high-quality, pre-sorted textile feedstock. Their success was not tied to fashion trends but to industrial efficiency and the ability to produce a reliable, high-quality recycled material at a price competitive with virgin resources.

Case D, a specialized digital repair and aftercare service, provided illustrative data. The founder stated: “We are not a fashion company; we are a service logistics company. Our innovation was not in fixing clothes, but in creating a digital platform that makes the process of

repair invisible and seamless for the consumer.” Their organizational documents showed that over 60% of their operational budget was allocated to software development and logistics partnerships, not tailoring.

Case G, a high-technology chemical recycling start-up, offered a stark contrast. The Chief Technology Officer explained: “Our customers are textile mills, not people. We do not sell sustainability; we sell a recycled PET polymer that is identical to virgin... Our entire challenge is securing non-contaminated post-consumer feedstock.” Their business plans focused almost exclusively on securing long-term waste supply contracts and scaling their patented reactor technology.

The data from Case D explicitly demonstrates that “slowing the loop” models are fundamentally service-oriented businesses. Their success hinges on operational excellence in user experience and reverse logistics, redefining the consumer relationship from a one-time transaction to an ongoing service agreement. This requires a shift in mindset from product design to system design.

The evidence from Case G confirms that “closing the loop” models are technology-intensive industrial processes. Their innovation lies in material science and chemical engineering, aiming to create a commodity (recycled fiber) that can compete with the established linear supply chain. Their primary barriers are technical (scaling the technology) and industrial (securing feedstock), rather than consumer-facing.

A key synthesis finding from the cross-case analysis is the emergence of “hybrid” business models. The most mature start-ups in the sample were actively blending strategies. For example, rental services (Case A) were integrating resale (a “slowing” synergy) and partnering with recyclers (a “closing” synergy) to manage end-of-life garments, thereby creating multiple value-capture points from a single asset.

This pursuit of hybridity suggests that a singular circular strategy (e.g., only rental, only recycling) is insufficient for long-term commercial viability. The results interpret that the most innovative and resilient CBMs are those that stack multiple circular loops, diversifying revenue and minimizing waste by controlling the asset’s entire lifecycle, from first rental to final fiber decomposition (Medaglia et al., 2024).

This research identified two fundamentally distinct archetypes of circular business models (CBMs) operating within the sustainable fashion sector. The first archetype, “slowing the loop” (Cases A-E), consists of primarily consumer-facing, service-oriented businesses (e.g., rental, repair, resale) focused on maximizing asset utilization. The second archetype, “closing the loop” (Cases F-J), is characterized by technology-intensive, often B2B-focused operations (e.g., recycling, upcycling) aimed at material recovery and waste-stream valorization. The findings revealed these two models possess different operational logics, core competencies, and primary market barriers.

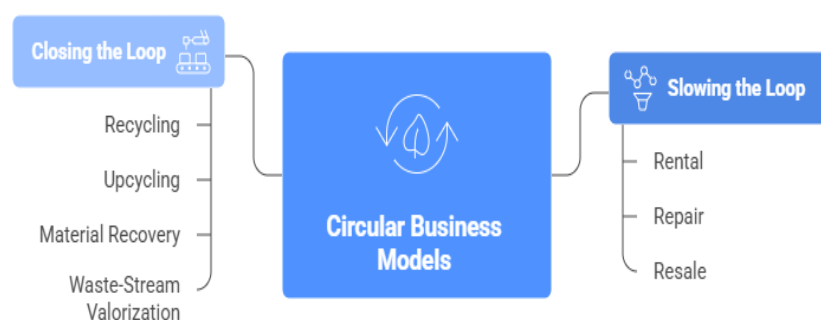


Figure 2. Circular Business Models in Sustainable Fashion

The analysis of qualitative data also revealed a critical innovation in marketing and communication (Gupta & Pathak, 2025). Start-ups across both archetypes are actively reframing their value propositions. They move beyond simple ethical appeals (“sustainability”) to emphasize superior forms in utility, such as “access over ownership” (rental), “seamless convenience” (repair), or “high-performance materials” (recycling). This strategic pivot markets circularity as a novel, premium, or more convenient experience rather than one of consumer sacrifice (Islam et al., 2025).

Two universal themes emerged as central to all ten cases. The first was the identification of “reverse logistics” as the single greatest operational and financial bottleneck, representing a complete inversion of the linear model’s cost structure. The second was the universal reliance on digital platforms as the essential enabling technology. The complexity of inventory management, product lifecycle tracking, and consumer interaction inherent in CBMs makes them an inherently technology-enabled business model (Dulal et al., 2025).

The most significant synthesis finding was the emergence of “hybrid” business models as a strategy for resilience and enhanced value capture. The most mature start-ups in the sample (e.g., Case A) were actively “stacking” circular loops. They combine strategies like rental, resale, and end-of-life recycling partnerships, allowing them to control the asset’s entire lifecycle and create multiple revenue streams from a single item, thereby minimizing final waste and maximizing profitability.

The findings regarding “slowing the loop” models (Cases A-E) strongly support the established academic literature on Product-Service Systems (PSS) and access-based consumption. Scholars like Tukker have long theorized these models, but this study provides concrete, empirical evidence from the high-velocity fashion sector. It confirms that success in this domain is less about product design and more about service-logistics excellence, user experience (UX), and brand-building, reinforcing the shift from product-centric to user-centric value.

The distinction of “closing the loop” models (Cases F-J) as technology-intensive, B2B-focused entities adds a crucial dimension to existing circular economy frameworks, such as those by the Ellen MacArthur Foundation. While the potential of recycling is widely discussed, our findings empirically highlight its reality as an industrial, commodity-based business. The identification of “feedstock security” as the primary barrier for these firms (Case G, H, J) contrasts with the consumer-trust barriers of “slowing” models, offering a more granular view than much of the macro-level CE literature.

This study’s findings on “Value Proposition Innovation” empirically validate the theoretical frameworks proposed by scholars like Bocken et al. on sustainable business model archetypes. Our research provides specific, founder-derived language (“convenience,” “access,” “high-tech”) that demonstrates how these value propositions are constructed in practice. It shows a clear market evolution from the “eco-niche” (ethics-driven) to the mainstream (utility-driven), supporting arguments that sustainability must be embedded as a superior form of value (Karim et al., 2024; Vinkóczy et al., 2024).

The identification of reverse logistics as the “core bottleneck” aligns perfectly with foundational research in supply chain management by scholars such as Rogers and Tibben-Lembke (Ekdahl et al., 2024). However, our study extends this literature. It reframes reverse logistics not merely as a costly add-on for incumbent firms (as in warranty returns) but as the central, defining operational challenge and primary cost-driver for “born-circular” start-ups, making its mastery the key determinant of commercial viability.

The clear bifurcation between “slowing” and “closing” models signifies that “circular fashion” is not a monolithic concept. It represents, in fact, at least two fundamentally different industrial systems operating in parallel. One is a high-touch, consumer-facing service industry obsessed with brand, asset depreciation, and user experience. The other is a high-tech, capital-intensive industrial materials industry obsessed with chemical engineering, feedstock purity,

and scaling technology. Conflating these two under a single “circular” umbrella hinders a clear understanding of the sector’s mechanics (Fuentes & Hedegård, 2025).

The pivot in value proposition from ethics to utility signifies a critical maturation of the sustainable fashion market. It signals that circularity is actively moving beyond its original niche of environmentally-conscious consumers and beginning to compete directly with fast fashion on its own terms: convenience, price, and novelty. This suggests a strategic imperative for all circular firms to lead with utility, embedding sustainability as a “reason to believe” rather than the sole “reason to buy (Wang et al., 2024).”

The finding that all CBMs are “inherently tech-enabled” signifies the end of large-scale, non-digital circularity. The immense complexity of tracking millions of unique items through multi-lifecycle journeys (rental, repair, resale, recycling) is an information management problem that can only be solved with a robust digital backbone. This positions CBMs as a specific vertical within the broader digital platform economy, requiring core competencies in software development and data analytics.

The emergence of “hybrid” models signifies the next evolutionary stage of the circular economy. It reflects a growing realization among practitioners that isolated, single-loop models (e.g., rental-only) are financially fragile and operationally incomplete. The future of commercially viable circularity appears to lie not in specialization in one loop, but in the creation of integrated, closed-loop ecosystems that internalize the entire asset lifecycle, from first use to final material recovery (Wallius & Näyhä, 2025).

The implications for investors and venture capital are profound. Investors must cease evaluating all “circular fashion” start-ups using identical metrics. Our typology provides a clearer due diligence framework. A B2C rental service (Case A) carries risks related to brand adoption, consumer churn, and service logistics. A B2B recycling plant (Case G) carries risks related to capital expenditure, technology scaling, and feedstock contracts. These are fundamentally different investment theses.

The findings carry significant weight for policymakers. A “one-size-fits-all” policy for the circular economy will fail. “Slowing the loop” models (Cases A-E) require policy support that encourages service-based consumption, such as VAT reductions on repair and rental services or consumer education campaigns. “Closing the loop” models (Cases F-J) need robust industrial policy, including R&D grants for material science, green public procurement, and, most critically, standardized national collection systems for textile waste.

For incumbent fashion corporations, this research has direct strategic implications. Attempting to “add on” a circular initiative to a linear business model is likely to fail due to conflicting operational logics. Our findings imply that incumbents must either acquire or build entirely separate, autonomous business units. These units must possess either the service-logistics DNA of a company like Case D or the material-science DNA of a company like Case G.

The implications for entrepreneurs are stark. Founders must explicitly identify their core identity and competency from day one. Are they building a brand-led service logistics company or a technology-led industrial processing company? A lack of this foundational clarity leads to a critical misallocation of early-stage capital and an inability to correctly prioritize solutions for the core reverse logistics bottleneck (Chrispim et al., 2024).

The “slowing” and “closing” models emerged as distinct because they are designed to solve two different core problems of the linear system. “Slowing the loop” models (rental/repair) directly fight over-consumption by decoupling revenue from the production of new units; they sell access instead of product. “Closing the loop” models (recycling) fight material waste; they create economic value from the disposal phase. These are fundamentally different economic functions (Nieto-Cerezo & Mendoza, 2025).

The strategic pivot in “Value Proposition Innovation” exists because the mainstream consumer market is overwhelmingly driven by utility, cost, and convenience. Start-up founders

(Case A, B) explicitly stated that while ethics attract early adopters, scaling requires competing with fast fashion. They recognized that “sustainability” is a feature, but “access to a rotating wardrobe” or “seamless repair” is the core product that wins and retains a mass-market customer.

Reverse logistics was identified as the “Core Bottleneck” because it represents a complete financial and operational inversion of the linear supply chain. The entire linear system is optimized for one-way, aggregated, predictable shipping (e.g., one pallet of 1,000 shirts to one store). The circular model, particularly for “slowing” loops, must manage millions of unique, single-item, geographically dispersed, and unpredictable returns an exponentially more complex and costly logistical problem (Rehman et al., 2024).

“Hybrid” models are emerging because single-loop models are economically vulnerable and incomplete. A rental-only firm (Case A) faces a terminal problem: a depreciated garment it must eventually pay to dispose of (a cost). By integrating resale (selling the used item) and recycling partnerships (selling the final fibers), that end-of-life asset is transformed from a liability into a final revenue stream. This “stacking” creates a more robust, vertically integrated financial model that minimizes true waste.

Future research must move beyond qualitative, descriptive case studies. There is an urgent need for quantitative modeling to rigorously assess the financial viability and, critically, the net environmental impact of these different CBMs. We need robust data answering questions like: What is the optimal number of rental “turns” before a garment becomes unprofitable or environmentally detrimental? What is the true break-even price point for chemically recycled feedstock versus virgin material?

A longitudinal research design is the necessary next step. This study’s cross-sectional data provides a snapshot of intent and current strategy. We must now follow these (or similar) start-ups over a five-to-ten-year period. Only a longitudinal approach can reveal which models (slowing, closing, or hybrid) successfully navigate scaling challenges, achieve sustained profitability, and deliver a measurable reduction in textile waste (Alhosani, 2025).

For practitioners, the findings recommend a clear prioritization of “reverse logistics excellence” as a core competitive advantage, not as a secondary cost center. Founders in the “slowing” loop space should treat themselves as service-logistics companies first and fashion companies second (Bilancia et al., 2025). The data also strongly suggests actively seeking “hybrid” partnerships early, such as rental firms collaborating with recyclers, to de-risk their end-of-life problem.

For policymakers, this research offers a clear and urgent recommendation. The single greatest policy action to unlock the “closing the loop” industrial models (Cases F-J) at scale is the creation of standardized, government-mandated, and harmonized collection and sorting systems for post-consumer textile waste. This action would solve the primary feedstock bottleneck currently crippling the high-tech recycling industry and preventing it from competing with virgin materials.

CONCLUSION

This study’s primary contribution is the empirical identification and clear bifurcation of two distinct, non-interchangeable circular business model (CBM) archetypes operating in the fashion sector: the service-oriented, consumer-facing “slowing the loop” models and the technology-intensive, industrial-focused “closing the loop” models. This finding dismantles the monolithic view of “circular fashion.” The research further reveals the emergence of sophisticated “hybrid” models, which strategically stack multiple circular loops (e.g., rental, resale, and recycling), as the most resilient and commercially-advanced strategy for achieving total asset lifecycle control and minimizing terminal waste.

The value of this research is primarily conceptual, providing a new, empirically-grounded typology (“slowing” vs. “closing”) that offers a precise diagnostic framework for

investors, policymakers, and academics to deconstruct the sector's operational realities. This study extends existing supply chain and sustainable business model theory by reframing reverse logistics not as a peripheral cost, as it is often treated in linear models, but as the central, defining operational challenge and primary determinant of commercial viability for “born-circular” enterprises.

The findings of this research are bound by its qualitative, cross-sectional methodology. The study provides a deep snapshot of strategic intent and current operational models but cannot confirm long-term commercial success or rigorously measure net environmental impact. Future research must therefore pivot to two critical areas: (1) robust quantitative modeling to assess the financial viability and true ecological footprint of these competing archetypes, and (2) longitudinal studies to track the scaling trajectories of these firms over time, determining which models (slowing, closing, or hybrid) ultimately achieve sustained profitability and deliver measurable waste reduction at scale.

AUTHOR CONTRIBUTIONS

Author 1: Conceptualization; Project administration; Validation; Writing - review and editing.

Author 2: Conceptualization; Data curation; Investigation.

Author 3: Data curation; Investigation.

CONFLICTS OF INTEREST

The authors declare no conflict of interest.

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