



Customer engagement in circular economy initiatives: Exploring pathways toward climate change mitigation in the apparel industry[☆]

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ABSTRACT

Understanding how brands foster customer engagement in the circular economy (CE) is a critical yet under-researched area. Here, we explore how specific circular practices manifest within the apparel industry. Building on Hollebeek et al.'s (2019) customer engagement framework and the circular engagement practices identified by Verleye et al. (2024), we conducted an abductive single-case study analyzing 31 semi-structured interviews with PUMA employees, partners, and customers.

We identify eight practices across knowledge sharing, resource integration, and customer learning. Beyond established practices, we reveal that *networking*, *facilitating*, and *entertaining* are critical for fostering social interaction, reducing participation effort, and catalyzing motivation. Theoretically, we propose a refined framework conceptualizing how customer engagement along these practices fosters sustained circular behavior. For managers, we show that circularity must be designed as a convenient, social, and rewarding experience to mobilize sustained customer involvement.

1. Introduction

In recent years, the entangled environmental crises of climate change, loss of biodiversity, and pollution have become increasingly challenging. Steady global population growth, combined with increasing urbanization, has driven consumption to ever-new highs, whereas natural resources remain scarce and finite (Ghisellini et al., 2016). For instance, by 2050, the world population is estimated to reach approximately 9 billion and consume resources at more than three times today's rate (Álvarez et al., 2026; UN, 2023). Therefore, the unsustainable levels of human activity are a major driver of the environmental emergency (Schill & Fosse-Gomez, 2025). In response, firms are launching an increasing number of strategies focusing on more sustainable production and consumption. One such strategy focusing on reducing resource consumption is called the circular economy (CE) (Patwa et al., 2021; Zhu et al., 2022).

CE is an economic system based on a business model that reduces the negative environmental impacts of the linear, "take-make-use-dispose" model by reusing, recycling, reducing, and recovering resources, materials, and products in the production-consumption cycle (Castro et al., 2022; Lieder & Rashid, 2016). As CE aims to keep resources at their

highest value for as long as possible (Frishammar & Parida, 2019), it allows firms to decouple economic growth from climate change through waste minimization, cleaner production, and product-life extension (Castro-Lopez et al., 2023). Although CE concepts emerged in the late 1970 s, governments, academia, and companies have only recently begun systematically implementing them as pathways toward sustainability (Abu-Bakar et al., 2024).

However, widespread adoption remains limited, as many firms struggle to operationalize CE. Moreover, research remains at an early stage (Hetherington et al., 2024; Suresh et al., 2024). Recent studies have explored the feasibility and barriers of circular strategies (Gallego-Schmid et al., 2025), circular business model design (Geissdoerfer et al., 2018; Mostaghel & Chirumalla, 2021), the role of digital platforms (Schwanholz & Leipold, 2020), and firm-customer interactions (Anderluh et al., 2025; Frishammar & Parida, 2019).

However, climate change in the context of CE and customer engagement remain largely disparate topics (Odou & Schill, 2020). Customer engagement can be defined as "customers' positively valenced brand-related cognitive, emotional, and behavioral activity during or related to focal customer/brand interactions" (Hollebeek et al., 2014, p. 154). Customers' resource investment in brand interactions contribute

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to the welfare of the social and natural environment (Hollebeek et al., 2019; Pucci et al., 2020). Thus, customers' positive climate change engagement is critical for achieving circularity. While extant research conceptually links circular practices to climate change mitigation, empirical insights into how such engagement is enacted at the micro level remain limited.

Addressing these gaps, we focus on customers' engagement in brand-facilitated circular practices, and interpret these practices as behavioral and interactional mechanisms that can contribute to climate change mitigation (Bellezoni et al., 2022; Chowdhury et al., 2022; de Felice et al., 2025; Le Ha, 2025; Verleye et al., 2024). Rather than directly observing climate change engagement as an explicitly articulated motivation, we examine how engagement in circular practices can be a pathway through which climate relevant engagement emerges. Moving beyond isolated pro-environmental actions, we emphasize interactive, participatory, and co-created engagement through which customers actively collaborate with brands and other stakeholders to shape circular initiatives over time (Mostaghel & Chirumalla, 2021; Re & Mag-nani, 2022).

Circular practices provide the critical link between engagement and mitigation by translating the abstract challenge of climate change into tangible activities such as repair, reuse, refurbishment, and material recirculation (Leal Filho et al., 2024). Through these practices, customers not only reduce consumption-related emissions but also help curb the production of new goods and materials. Therefore, positive climate change engagement is forward-looking and transformation-oriented, and is expressed through customers' interactions, learning, and resource integration in support of circular modes of production and consumption (Hollebeek et al., 2019). CE initiatives are frequently portrayed as collaborative efforts between brands and customers that translate climate change mitigation into tangible practices (Re & Mag-nani, 2022). Yet, limited empirical research systematically examines how customers engage with brands in these sustainability-oriented contexts (Chuah et al., 2020; Pucci et al., 2020).

Here, we focus on PUMA, a globally recognized athletic apparel brand. It operates in a sector that is among the most resource-intensive and polluting industries, and remains strongly characterized by linear production and consumption patterns, high consumption frequency, and short product lifecycles. Concurrently, it faces substantial barriers in transitioning toward circular business models and fostering customer adoption of circular practices (Salmi & Kaipia, 2022). Despite increasing regulatory and societal pressure, the transition toward CE models in this sector remains challenging. This is because firms are constrained by path dependencies, existing product portfolios, and entrenched operational routines, while circular initiatives often face limited customer adoption (Salmi & Kaipia, 2022).

Meanwhile, the apparel industry is at the forefront of experimenting with circular practices such as take-back schemes, recycling programs, repair services, and product-service systems, which inherently require active customer participation (Mishra et al., 2021). Within this context, PUMA is known for its innovative sportswear and lifestyle products, and its commitment to sustainability. We examine its circular practices developed in collaboration with customers, particularly focusing on two recent initiatives: the RE:FIBRE project, which recycles polyester textile waste into new garments; and RE:SUEDE project, which develops a biodegradable version of PUMA's iconic Suede sneaker. While our empirical focus is on apparel, similar challenges of encouraging customer participation in reuse, return, and recycling systems can be observed across other product-centric industries such as electronics, furniture, and consumer goods, suggesting broader applicability of the derived insights. Our main research question is as follows: *How can customer engagement in circular practices act as a pathway toward climate change engagement?*

2. Theoretical background

2.1. Customers' positive climate change engagement in the context of circularity

Branding is crucial in shaping customers' perceptions of a company's ethical responsibility and sustainability commitments (Chuah et al., 2020). As brands move beyond traditional marketing to incorporate societal and environmental responsibilities, value co-creation has emerged as a central mechanism through which brands and customers collaboratively fight climate change (Odou & Schill, 2020; Wannow & Haupt, 2026). This shift aligns with the evolving understanding of brands being dynamic entities shaped through actor interaction rather than passive symbols (Brand et al., 2025). Customers, as central actors, have become active resource integrators and push for social and green branding efforts (Zhou et al., 2021). Therefore, customer engagement in climate-positive behaviors is central to sustainable branding (Chuah et al., 2020; Schiaroli et al., 2024). Climate change engagement reflects an individual's cognitive, emotional, and behavioral responses to climate-related challenges (Köcher et al., 2025; Schill & Fosse-Gomez, 2025). Beyond raising awareness, brands must provide engagement platforms that enable customers to co-create value through sustainable actions (Brand et al., 2025; Re & Magnani, 2022).

Rather than merely knowing about climate change, customers must also be able to act upon it. Therefore, brands should engage with their customers on the issue of climate change in a manner that allows customers to inform themselves, makes them feel personally involved, and motivates them to contribute and express their concerns (Wannow & Haupt, 2026). Owing to the brand's engagement efforts, customers may display greater brand satisfaction and loyalty (Jaakkola & Alexander, 2014), and be more likely to contribute to the brand's product and service offering. This further reinforces customers' engagement with the brand (Chandler & Lusch, 2015). Customers' engagement with specific brand-related offerings, initiatives, or touchpoints can be strategically used to create socio-cultural change and transition pathways that can alter, slow, or minimize the trajectory of climate change globally (Mostaghel & Chirumalla, 2021). Hence, engaging with customers is critical for brands seeking to foster positive climate change behavior (Pucci et al., 2020).

CE naturally aligns with positive climate change engagement by aiming to minimize waste, improve resource efficiency, extend the lifecycle of products and parts, and foster innovation (Bellezoni et al., 2022; Liu & Zhang, 2026). From a customer engagement perspective, CE necessitates active participation from multiple actors, including customers, businesses, and policymakers, to co-create sustainable value (Ghisellini et al., 2016). Customers play a vital role in a CE as they need to be interested and involved in tackling climate change through resource recirculation, and educated on the environmental benefits of sustainable products (Kazeminia et al., 2016). Therefore, if CE branding must function as a pathway through which climate change engagement emerges, it must extend beyond messaging to actively facilitate reuse, recycling, and remanufacturing practices (Mostaghel & Chirumalla, 2021). Here, circular practices are increasingly recognized as critical climate mitigation levers, as they address not only consumption-related impacts but also reduce production-related emissions by extending product lifecycles and minimizing resource extraction (Bellezoni et al., 2022).

Brands across industries have begun introducing business models focusing on incentivizing material recirculation and designing products with longer life spans. In particulars, the apparel industry has started making efforts toward circularity because it is one of the largest and influential, and polluting and resource-draining industries globally (Pal & Gander, 2018). However, efforts to expand circular business models often fall short because brands lack clarity on how to promote customer engagement in circular practices as a pathway toward climate relevant outcomes (Mostaghel & Chirumalla, 2021).

2.2. Conceptualizing customers' engagement in circularity

To examine how customers engage with PUMA and its business partners in circular activities to combat climate change, we build on the integrative customer engagement framework of Hollebeek et al. (2019). As this framework is inherently customer-focused and captures the multidimensionality of engagement, it aligns with our research goal. The framework is informed by the service-dominant (S-D) logic, postulating that customers deliberately invest their focal operant (e.g., knowledge and skills) and operand resources (e.g., equipment) into brand interactions in service systems (Hollebeek et al., 2019; Vargo & Lusch, 2004). Customers' brand-related operant resources include emotional aspects (e.g., brand imagery), cognitive elements (e.g., knowledge of a brand's legacy), social skills developed through brand-based interactions, and behavioral abilities like effectively using brand products (Vargo & Lusch, 2008). Hence, operand resources reflect the multidimensionality of engagement and are pivotal for customer engagement (Brodie et al., 2011). Furthermore, they are an essential source of competitive advantage (Vargo & Lusch, 2016).

The framework of Hollebeek et al. (2019) comprises three foundational processes crucial to fostering engagement. First, customer resource integration denotes a customer's integration, adaptation, and utilization of focal operant and/or operand resources into other actors' processes for brand-related utility optimization (Skålén et al., 2015; Vargo & Lusch, 2008, 2016). Second, customer knowledge sharing is communicating specific perceived brand knowledge, including information- or experience-based knowledge, with others in their networks to create value for the recipient(s), themselves, or both (Ho & Ganesan, 2013). Third, customer learning is defined as an iterative process wherein customers develop mental rules and guidelines for processing relevant brand-related information, acquire new brand knowledge or insights, and adjust their behavior based on the newly gained understanding (Mena & Chabowski, 2015). These foundational processes engender benefits coinciding with engagement. Crucially, the interplay of customer knowledge sharing and customer resource integration fosters value co-creation, which refers to the perceived value derived from interactive, collaborative, or personalized brand-related activities (Ranjan & Read, 2016; Vargo & Lusch, 2008). Additionally, customer knowledge sharing and customer learning engender customer interpersonal operand resources, encompassing a customer's perceived growth or refinement in their brand-related operand resources (Vargo & Lusch, 2008). Finally, when paired with customer resource integration, customer learning contributes to the development of individual operand resources, characterized by the perceived strengthening of personal brand-related knowledge and skills through brand interactions (Vargo & Lusch, 2008, 2016).

Building on these dynamics, we apply the framework of Hollebeek et al. (2019) to the context of customer engagement in circular practices, treating climate change engagement as an implied downstream effect and responding to the authors' call for empirical validation. Specifically, we examine how customers engage with PUMA and its business partners through various engagement practices in a CE that are in line with the framework's three dimensions. Recent developments in the S-D logic emphasize social constructivism, recognizing recurring practices to be essential for customer engagement (Vargo & Lusch, 2016). Schau et al. (2009, p. 31) define practices as "linked and implicit ways of understanding, saying, and doing things." Practices "comprise a temporally unfolding and spatially dispersed nexus of behaviors that include practical activities, performances, and representations or talk" (Schau et al., 2009, p. 31). As such, practices are repeated actions that facilitate engagement by enabling individuals to develop shared meanings and demonstrate competencies reinforcing social order (Reckwitz, 2002). This study adopts the practices identified by Verleye et al. (2024) in the context of actor engagement in the CE. As we seek to comprehensively examine how customers engage with a brand in circular activities, we match the practices of Verleye et al. (2024) to the three dimensions of

Hollebeek et al.'s (2019) customer engagement framework. This helps us examine how these practices ensue within the customer space and identify what is missing from the current practices.

Verleye et al. (2024) propose a set of six practices—*matching*, *supporting*, *signaling*, *empowering*, *convincing*, and *legitimizing*—to examine how actors engage in the CE. First, *matching* and *supporting* fall within the framework's dimension of customer resource integration. *Matching* refers to connecting with others to exchange mutually reinforcing resources in a circularity context. *Supporting* is defined as providing operand resources to a focal actor to embrace circularity. Customers can integrate their resources to contribute to circularity only with adequate operand resources (e.g., infrastructure).

Second, the customer knowledge sharing dimension entails *signaling* and *empowering*. *Signaling* means informing actors about the potential benefits of engaging in a CE. Accordingly, the practice aligns with customers' knowledge sharing, providing others with brand- and circularity-related information. *Empowering* is about developing a focal actor's operand resources for embracing circularity. Customers can effectively share relevant insights with others due to their improved knowledge and skills.

Third, the practice of *convincing* relates to the framework's dimension of customer learning. *Convincing* influences a focal actor's perception of financial and pragmatic benefits of engaging in circularity, shaping their mental rules and processing of circularity-related information. This corresponds with customer learning, which involves acquiring new brand knowledge and modifying behavior based on insights gained.

Finally, we exclude the practice of *legitimizing*, which encompasses creating an institutional context for circularity. While Verleye et al. (2024) identify *legitimizing* as a distinct engagement practice, it did not emerge as a salient and distinct category in our empirical data. Elements of legitimizing, such as signaling approval or encouraging the broader acceptance of circular initiatives, were occasionally observable. However, they were typically embedded within other practices, particularly *networking* and *convincing*, rather than enacted as a standalone practice. Thus, in a circular customer engagement context, *legitimizing* may operate more implicitly through relational and communicative processes rather than as an explicit, discrete practice. Meanwhile, we acknowledge that such behaviors remain theoretically relevant for climate-relevant engagement, even if they are not directly articulated by participants. Accordingly, we do not treat *legitimizing* as a separate category but acknowledge its indirect presence within the broader configuration of engagement practices identified in this study.

Overall, extant research highlights customer engagement's importance for both circularity and climate change mitigation yet lacks a detailed understanding of how such engagement is enacted through specific practices. Addressing this gap, we examine how customer engagement unfolds in circular business models and how these practices may contribute to climate relevant outcomes.

3. Methodology

As research on circularity needs in-depth analysis, the case study approach is appropriate (Yin, 2014). Hence, this study employed a single case study approach, effectively capturing reality by examining the interactions between PUMA, its business partners, and customers in a natural context (Cavaye, 1996). We deliberately chose a brand from the sports apparel industry, owing to its extraordinary identification potential, high customer loyalty, and well-established traditions. This fostered strong engagement among the brand's actors. Because PUMA is one of the most well-known brands worldwide, customer interactions are manifold. One of PUMA's flagship projects is called RE:SUEDE, which was launched in 2021. This is a pilot project focused on developing a biodegradable sneaker made from sustainable materials, which customers return after use for industrial composting. The initiative aimed to test the feasibility of circular design and end-of-life solutions.

Selected customers were actively involved in the project by testing the shoes and providing structured feedback to help refine the design and assess the feasibility of circular consumption behaviors. Another initiative by the company was RE:FIBRE, which focused on textile-to-textile recycling to create a closed-loop system for PUMA apparel. As part of this initiative, PUMA collaborates with popular soccer clubs, such as Borussia Dortmund, Manchester City, and AC Milan, by having players wear jerseys made from recycled materials. The initiative also includes a joint takeback scheme where fans can return old garments at designated locations. Moreover, PUMA seeks to drive fan engagement by organizing events, such as meet-and-greet sessions with former soccer players, to incentivize participation in circularity efforts.

We collected data via 31 semi-structured interviews with employees, business partners, and customers using Microsoft Teams (Qu & Dumay, 2011) (see Appendix A). Participants were selected using the following criteria: (1) PUMA managers involved in circular projects or day-to-day work related to circularity, including 12 employees from different business units and 4 from the central sustainability team; managers from various business units were deliberately selected because each sport has its specificities, leading to varied priorities and challenges related to circularity. (2) Business partners collaborating with PUMA in different areas of circularity, including 2 recycling partners, 3 employees from two different companies working with PUMA on circular innovation and an overall circular strategy, and 1 employee of a major retail partner. (3) Finally, 9 strongly involved customers who participated in the RE:SUEDE project, and were thus familiar with circularity topics.

One interview guide was developed for each participant group of employees, business partners, and customers, and was deliberately open and exploratory. This ensured that it was informed by general insights from customer engagement research and CE literature, but not structured around specific engagement dimensions or predefined circular practices. They focused on general efforts and knowledge about circularity, interactions in circular activities, engagement levels, and future changes needed to advance circular efforts.

This design choice was intentional, as our analytical framework operates at a higher level of abstraction than the experiential language used by participants. Structuring the interviews around specific theoretical dimensions *ex ante* would have risked imposing academic categories on respondents' accounts and constraining the emergence of practice-based insights. Accordingly, the interview questions focused on eliciting participants' experiences with circular initiatives, digital platforms, and interactions with brands and other stakeholders. This design enabled circular practices to emerge in participants' own terms and enhanced ecological validity in a context where customer roles are still evolving. Accordingly, although our empirical data capture engagement in circular practices rather than explicit climate change motivations, we interpret these practices as a pathway through which climate-relevant engagement may emerge, given the well-established connection between circularity and emissions reduction. The protocol was pre-tested with two PUMA employees for clarity. The full interview guide is available in Appendix B.

Following an abductive research logic (Dubois & Gadde, 2002), we paired open interview design with a theory informed, iterative analysis. The integrative framework combining customer engagement (Hollebeek et al., 2019) and circular engagement practices (Verleye et al., 2024) served as an analytical lens during coding and interpretation. While the design prioritized empirical openness at the data generation stage, it allowed theory and data to iteratively inform each other during analysis. This approach is particularly suitable for studying emergent forms of engagement in CE contexts, where established theoretical categories may not yet fully capture how practices unfold.

The interviews lasted between 21 and 44 min. They were transcribed verbatim, excluding fillers, non-verbal communication, and stutters, which may detract from the actual content of the interviewee's words (MacLean et al., 2004). Subsequently, the qualitative interview data were systematically analyzed, drawing on the guiding frameworks

proposed by Spiggle (1994) and McCracken (1988). Specifically, we applied categorization, abstraction, comparison, and integration to identify themes and practices grounded in the empirical data. During categorization, interview statements were grouped into initial codes reflecting recurring topics. Through abstraction, these codes were then synthesized into broader thematic patterns. Comparison allowed us to examine similarities and differences across interviews. Meanwhile, integration helped connect these insights into a cohesive understanding of circular engagement practices. This process was complemented by the coding approach of Miles and Huberman (1994), which emphasizes iterative coding and constant comparison to develop a structured and reliable coding scheme. To enhance coding rigor, a subset of interviews was initially independently coded to develop a preliminary coding scheme, which was then iteratively refined through joint discussions. Disagreements in coding were resolved through discussion until consensus was reached. With Cohen's kappa at $k = 0.83$ for coded interviews, intercoder reliability is satisfactory (Cohen, 1960, 1968).

Iteration occurred through repeated movement between empirical observations and the integrative engagement framework. Throughout this process, emerging codes were continuously compared across interviews to ensure consistency and conceptual clarity. This enabled theoretical constructs and empirical insights to iteratively inform one another during the analysis, facilitating the systematic organization of data into meaningful categories and subcategories while enhancing analytical clarity and rigor. For example, when interviewees described certain circular activities in terms that did not align with existing engagement practices, these observations were iteratively compared with the theoretical framework, prompting the refinement of existing categories and development of new ones to better capture the underlying engagement mechanisms. Data collection and analysis proceeded iteratively until theoretical saturation was reached (i.e., until no new themes or insights relevant to the research question emerged).

Following this abductive approach, we used ATLAS.ti to systematically code the data based on the previously outlined customer engagement dimensions and practices. The coding process followed a three-step structure. First, open coding was conducted to capture participants' concrete actions, experiences, and perceptions in relation to circular initiatives (e.g., attending workshops, using digital tools, returning products, or providing feedback), yielding 36 initial first-order codes that remained close to the empirical material. Second, these first-order codes were iteratively mapped onto higher-order categories derived from the integrative framework, encompassing Hollebeek et al.'s (2019) customer engagement dimensions (knowledge sharing, customer learning, and resource integration) and the six circular practices proposed by Verleye et al. (2024). Third, where empirical patterns could not be adequately represented by these predefined categories, additional practice-level codes were developed.

During the coding process, circular practices were identified that could not be subsumed under the predefined codes. These additions are driven by our customer-focused approach, recognizing that customers interact (Hollebeek et al., 2021; Quintelier et al., 2023), appreciate convenience (Roy et al., 2020; Shashi et al., 2024), and seek motivation (Bazi et al., 2023; Brodie et al., 2011; Odou & Schill, 2020). Therefore, three new practices, namely *networking*, *facilitating*, and *entertaining*, were developed based on the interview data. Then, corresponding codes were created to reflect them.

This abductive refinement, wherein empirical patterns prompted the initial theoretical framework's extension, yielded a final coding structure comprising three overarching dimension codes and eight distinct practice-level codes, capturing both theoretically derived and empirically emergent patterns. For instance, interviewees described upcycling workshops and gamified brand experiences as "fun" and "playful," aspects not captured by existing practices. Initially, these responses were coded under existing practices. However, iterative comparison across interviews revealed that these codes could not fully capture the experiential, enjoyment-oriented aspects emphasized by participants. This

discrepancy prompted a refinement of the coding structure and the conceptual differentiation of a new practice, *entertaining*, defined by its ability to generate playful, enjoyable interactions that foster circular engagement. This example illustrates the abductive process, showing how raw empirical patterns guided the adaptation and extension of the theoretical framework rather than merely fitting observations into pre-existing categories.

Member checking was performed to enhance our findings' credibility. Selected participants were provided with summarized results of their interviews and invited to provide feedback on whether the interpretations accurately reflected their experiences. All feedback was incorporated to refine the coding structure and final analysis. All research activities complied with ethical standards and the legal requirements under the General Data Protection Regulations (GDPR). Informed consent was obtained from all participants at the beginning of each interview before any questions were asked. The interviewer explicitly explained the study's purpose, participants' voluntary participation, their right to withdraw at any time, and how their data would be used. Participants were also explicitly asked for permission to record and transcribe the interview. Data was anonymized during transcription by removing personal identifiers and assigning participant codes. Audio recordings were securely stored on encrypted drives accessible only to the research team and all transcripts were password-protected to prevent unauthorized access. These measures ensured participant privacy, data confidentiality, and compliance with GDPR requirements. Having established the coding structure and identified the emergent practices, we now describe each of the latter.

First, *networking* refers to facilitating interactive, social, and knowledge-sharing activities. It fosters community-driven learning, enabling customers to actively participate in discussions, workshops, and collaborative initiatives which enhance their understanding and application of circular behaviors. While both *matching* and *networking* involve interaction among customers around circularity topics, they serve distinct analytical functions. *Matching* focuses on the functional coordination of complementary resources between actors to enable specific circular outcomes. Conversely, *networking* emphasizes the creation of social interaction spaces wherein customers exchange experiences, construct shared meanings, and motivate each other over time. Whereas *matching* addresses who should collaborate to effectively align resources, *networking* addresses how ongoing interaction sustains engagement through social learning and collective sensemaking. Collapsing *networking* into *matching* can obscure these social and relational dynamics, which are particularly critical for understanding how circular engagement diffuses and stabilizes beyond isolated resource exchanges. Hence, *networking* falls within the framework's dimension of customer knowledge sharing because it emphasizes exchanging brand-related information and experiences among customers.

Second, *facilitating* supports customers in adopting new behaviors by providing digital tools which simplify engagement in circularity. It differs from *supporting* in its analytical focus. *Supporting* refers to the provision and availability of resources or infrastructure which make circular participation possible. However, *facilitating* captures how brands reduce friction in engagement processes by simplifying access, enhancing usability, and lowering effort across touchpoints. This distinction is particularly relevant in circular contexts, where engagement often fails due to perceived complexity or inconvenience. Hence, *facilitating* aligns with the customer resource integration dimension as tools which should be used to ease the process of adopting circular behaviors by providing support, guidance, and convenience.

Third, we define *entertaining* as motivating customers to contribute to a CE through enjoyable, emotionally rewarding, and socially attractive experiences. Rather than constituting a learning practice per se, *entertaining* functions as a motivational catalyst that lowers psychological barriers and increases customers' willingness to engage, thereby enabling and amplifying customer learning processes. Therefore, these additions to Verleye et al. (2024) are data-driven rather than purely

conceptual and were introduced into our research framework while analyzing the empirical findings (see Fig. 1). The resulting framework illustrates customer engagement in circular practices and positions it as an enabling mechanism through which such practices may contribute to climate change mitigation.

4. Findings

4.1. Customer knowledge sharing in the CE

4.1.1. Signaling through transparent information and customer education

Brands can foster customer engagement in circular practices by increasing transparency around their initiatives and informing customers about relevant developments and benefits, thereby creating a pathway through which climate change engagement may emerge. As an employee of a major Retail partner (P1) of PUMA stated, customers must have easy access to information on the circularity efforts.

"We are trying to figure out the best way to deliver our messages to the customers together with PUMA. We think it is very important to inform them about this topic and show them what we do, but we keep it very factual at the moment to avoid any kind of overpromising."

A PUMA employee (E3) added that this makes digital means indispensable, effectively providing information to customers.

"On our website, we have a section called Forever Better, which is dedicated to informing our customers about our sustainability efforts. [...]. We have a podcast on Spotify where employees from the sustainability team share information on how circularity contributes to reducing CO2 emissions or how customers can engage in circular activities."

This was confirmed by a customer (C1) who perceives PUMA's communication on its sustainability efforts as genuine.

"For me, it is important to get information that I think is real and reliable and not exaggerated. I think that PUMA could still communicate more, for example, how products are sourced, produced, and recycled, but what they communicate is credible."

4.1.2. Networking through workshops and community events

Networking is crucial in customer knowledge sharing by fostering interactive, social, and experience-driven information exchanges between brands and customers. Unlike one-way communication, *networking* actively connects customers with brand representatives and among each other, creating a shared space for discussion, learning, and collaboration. For example, E1 mentioned that while digital communication mediums are effective for communicating with customers, PUMA also continues to inform and educate customers offline.

"We have an initiative called Voices of Regeneration, where we regularly invite people from outside the industry to have a chat on how they perceive PUMA's circularity efforts. This is well perceived because it adds a personal touch, and we can address specific questions that customers might have. However, it also helps us to understand where we can still improve our communication on circularity and what our customers are most interested in."

C5 also highlighted the relevance of offline get-togethers through interactive workshops and events.

"I think in the end, circularity is a joint effort, so we need to connect about it. [...] For example, PUMA could host local gatherings where they set up upcycling stations. [...] Further, it's not just about the gear; it's about the experience. Live music, maybe some local food trucks, creating this vibe where sustainability is not just a task but [...] a celebration."

Finally, C6 increased customers' involvement in the design process by offering collaborative design workshops where customers can actively participate in product design.

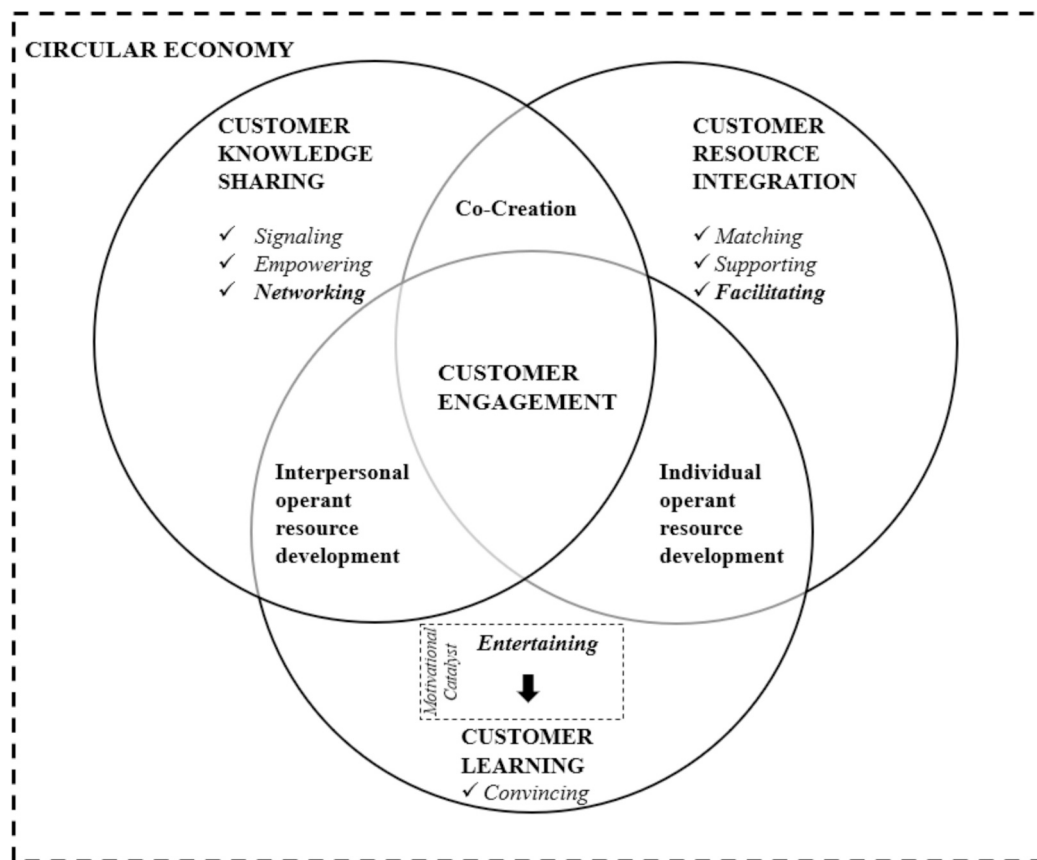


Fig. 1. Conceptual model of customer engagement in circular practices (and . adapted from Hollebeek et al. (2019)Verleye et al. (2024))

“PUMA could set up pop-up customization stations in their stores or offer design workshops. You can be the designer of your gear and get inspired by exchanging ideas with others or receiving feedback from actual designers.”

These examples illustrate how networking enables a more engaging and participatory approach to sharing customer knowledge and transforming circularity into a social and interactive experience.

4.1.3. Empowering through close collaboration with customers along the product lifecycle

Promoting circularity entails fostering collaboration, sharing knowledge, and contributing throughout the product lifecycle. This requires *empowering* customers by developing their operant resources. This encompasses enhancing their knowledge, skills, and ability to make informed decisions about circularity. By actively involving customers in feedback loops and product development processes, *empowering* participants ensures that they are not just passive recipients of sustainability efforts but are active and knowledgeable in circular initiatives. As E4 indicated, it does not create any value if PUMA develops new, circular products, while customers neither buy nor return them at the end of their life cycle. E5 provided an example of how PUMA ensures customers are *empowered*, and can develop their operant resources by exchanging information and feedback in jointly developing circular products.

“We have this footwear program called RE:SUEDE. Our goal is to develop a biodegradable shoe, produce and sell it, and eventually collect it from customers and biodegrade it. To get customer feedback, we sent 500 pairs to eligible participants willing to test and regularly use the product for a certain period. We received super valuable feedback.”

Hence, by letting customers test the shoes, share real-life feedback,

and see how their input shapes the product, PUMA *empowered* them to become part of the solution. The testing process also encouraged customers to think more deeply about circularity and potentially develop their own ideas on contributing. This is underlined by C5, who stated that circular feedback loops are effective for feeling more engaged and *empowered* in PUMA's circular efforts.

“Talking about the RE:SUEDE, it is a good start, and I think it is a cool effort. I was happy to be part of it, and hopefully, my feedback and that of the other participants can help to improve the shoes further.”

The three aforementioned practices within the knowledge sharing dimension work together in a mutually reinforcing manner to enhance customer understanding and participation in circular initiatives. *Signaling* provides customers with clear, credible information about circular practices, establishing the knowledge base necessary for informed engagement. *Networking* builds on this by creating interactive spaces for discussion, social learning, and experience exchange, allowing customers to contextualize and apply the information received. *Empowering* complements these practices by actively involving customers in feedback loops, product testing, and co-creation, ensuring that knowledge is translated into actionable skills and operant resources. Together, these practices create a layered process wherein customers not only receive information but also engage socially and experientially, engendering deeper understanding and more meaningful engagement in circular activities.

4.2. Customer resource integration in the CE

4.2.1. Supporting through strong relationships with strategic sustainability partners

Under the customer resource integration dimension, *supporting*

involves equipping customers with operand resources to facilitate their engagement in circular activities. Ensuring customers return old products, correctly recycle, or participate in circular initiatives requires the right tools, infrastructure, and access to make sustainable choices feasible. A concrete example is the RE:SUEDE footwear project, where PUMA ensured that logistical support was in place for customers to return the used pairs of shoes. This practical support enabled customers to act on their intention to participate, making it easy and attractive to do so. As E5 described, participants were provided clear guidance and the necessary infrastructure. Furthermore, P2 elaborated on the project from a business partner's perspective:

"It was about discussing with PUMA an entirely new business and operating model because if we can do it the right way, it's a huge opportunity. [...] Further, we found a solution on making sure that if we put PUMA's sneakers in our composting facility, we can assure that they biodegrade."

Thus, collaboration with customers alone is not enough. Rather, brands must also work closely with business partners to build the necessary infrastructure that allows customers to effectively integrate their resources. E8 highlighted that customers' resource integration for circularity can only occur if brands collaborate with specialized recyclers and strategic sustainability partners.

"We don't have our supply chain, so we rely on our partners to work on innovative materials and new or improved ways of recycling. For example, we are in steady exchange with our suppliers to communicate our needs and get updates on what they are working on."

P2 underlined the importance of collaborating with other recyclers and manufacturers for recycling.

"We are now facing the difficult recycling challenges, but the difficult ones can only be solved if you have an open discussion with the producers of raw materials, the factory that makes the products, the people that use the products, and the waste management companies that collect, sort, and transform them into new feedstock."

Altogether, *supporting* is not just about what is offered directly to customers, but also about enabling the conditions behind the scenes through partnerships and systems so that customers can easily and meaningfully participate in circular initiatives.

4.2.2. Matching using online interactions

In the customer resource integration context, *matching* focuses on resource exchange by facilitating direct collaboration among customers, the brand, and its business partners. Unlike *networking*, which focuses on building relationships and fostering informal knowledge exchange through social interactions among customers, *matching* provides structured opportunities for customers to exchange tangible resources, such as feedback, used products, or sustainability-related content. C3 suggested enhancing *matching* by enabling structured exchanges through online platforms:

"You could easily produce or watch tutorials on social media with tips for sustainable living. For example, I sometimes watch tutorials on how to clean my white sneakers, remove stains from clothes, or upcycle old garments into something new, and I also read the comments where people ask questions or share their experiences."

This showed how customers can easily exchange resources online, making it easier for them to contribute to circularity.

4.2.3. Facilitating through convenience and digital tools

Facilitating refers to brands' role in enabling customers to seamlessly integrate their resources into circular activities by providing convenient solutions (e.g., through digital tools) which make sustainable actions easier and more intuitive. *Facilitating*'s importance is highlighted by C1's statement, whereby a broader rollout of takeback schemes in stores or providing a prepaid shipping label for returns would increase the

likelihood of returning old products for recycling. This underlines the need for brands to develop systems which facilitate customers to resell or recycle their products. A potential mechanism to facilitate customer resource integration is by developing an artificial intelligence (AI)-powered resale assistant, a concept proposed by one of PUMA's partners. This assistant can help guide customers through the resale process. P5 suggested:

"Customers often want to sell their old products but are unsure where to start. An AI-powered assistant could simplify it by analyzing product condition, providing price suggestions, and even handling the listing process for them."

Another suggestion for *facilitating* customer resource integration, coming from a PUMA employee, is a digital sustainability passport. E9 explained:

"The digital passport could transform the customer experience. Imagine scanning a QR code on your shoes to view a complete sustainability profile, from the extent of their recyclability to where you can return them for recycling. This would make circularity so much more actionable."

These digital solutions help overcome customer participation barriers, especially by making sustainable actions more convenient and accessible.

Collectively, *supporting*, *matching*, and *facilitating* practices interact to enable customers to seamlessly integrate their resources into circular initiatives. *Supporting* ensures that the necessary infrastructure and operational resources are available, allowing customers to act on their intentions with ease. *Matching* provides structured opportunities for exchanging tangible resources, such as used products or feedback, thereby connecting customers, brands, and partners in collaborative processes. *Facilitating* lowers participation barriers through convenient digital tools and process simplification, making it easier for customers to act on the knowledge and social motivation gained through other practices. Together, these three practices form an ecosystem wherein customers are equipped, motivated, and guided to meaningfully contribute to circular initiatives, transforming intentions into concrete actions.

4.3. Customer learning in the CE

4.3.1. Convincing through innovation

As part of customer learning, *convincing* involves providing customers with the necessary information, insights, and incentives, thereby helping them understand the value of engaging in circularity for their personal values, lifestyles, and needs. However, simply explaining circularity and setting the right conditions for participation is insufficient to *convince* customers. To inspire genuine commitment, customers must experience tangible benefits and practical applications of circular principles. Innovation plays a crucial role here, enabling brands to develop new, attractive, and functional circular products and solutions which demonstrate circularity's practical advantages to customers. As E12 emphasized, *convincing* customers entails offering an appealing, circular product design and educating on proper recycling:

"It could easily be that circularity is an innovation story. Our innovation teams work closely with our procurement teams to understand the materials available and think about ways to create attractive products that are easier to disassemble, repair, and recycle, or that are biodegradable. [...] However, it also includes finding new solutions on eco-friendly packaging with clear instructions for customers on how the packaging can be recycled."

Similarly, P6 highlighted the importance of collaboration to overcome challenges in developing closed-loop solutions: *"It is difficult to find a closed loop solution, so we had to find some partners with additional expertise in this area..."*

This underscores that *convincing* customers to participate in the CE

requires effective and innovative solutions to be developed in collaboration with various business partners.

On the customer side, C7 suggested that *convincing* can be further supported by an innovative digital platform or app where customers can participate in sustainability challenges:

“PUMA could become more innovative in how customers can engage with PUMA and other fans of the brand, for example, through setting up an interactive app, and offering creative sustainability challenges and events.”

Finally, E9 discussed how PUMA’s retail partners play a significant role in *convincing* customers, suggesting that financial incentives (e.g., discounts) should not be the primary motivator. Instead, discounts could be tied to customer learning: *“Some retailers also work with financial incentives, such as offering discounts when customers return products. I would envision a discount being linked to customers completing sustainability courses, rather than just providing monetary incentives for returns.”*

4.3.2. Entertaining through gamification and incentives as a motivational catalyst for learning

To effectively foster customer learning and engagement in circularity, brands must make sustainability fun, interactive, and emotionally rewarding. *Entertaining* acts as a motivational catalyst that enables customer learning by engaging customers in gamified, social experiences. By lowering the cognitive effort required to process information, these enjoyable interactions allow customers to internalize circular principles through positive reinforcement rather than formal instruction. As E6 highlighted, all efforts of PUMA to foster circularity are useless if customers are unwilling to engage. E14 added to this by emphasizing that incentives should not be monetary, as vouchers may controversially encourage overconsumption. Instead, the RE:FIBRE project uses *entertaining* as a motivational catalyst for learning by creating a circular feedback loop that fans can see and touch. Instead of reading about abstract recycling processes, fans participate in a tangible story where their old jersey becomes the professional athlete’s new kit.

“We don’t rely on vouchers as an incentive to bring back old garments because this would be controversial, as we would encourage the customer to buy more, so we thought about other methods. [...] For example, we have a project called RE:FIBRE where we collaborate with the football clubs Manchester City, Borussia Dortmund, AC Milan, and Olympique Marseille. We ask fans to give back their old jerseys that they no longer wear. We then take these polyester products to create new jerseys through chemical recycling, which are then worn by the football players of these clubs.”

E10 further elaborated on the RE:FIBRE project by stating that to incentivize fans to return their old garments, PUMA regularly offers them the opportunity to engage in fun experiences, such as a meet and greet with athletes. P3 confirmed that finding new ways to constantly *entertain* customers is vital to lowering cognitive barriers to learning.

“We have to think about new ways of communication and fun elements. [...] So we created bins and if people put their old garments in there, then there is a screen on the bin where you can start playing the PAC-Man game and the PAC-Man is collecting waste.”

Recognizing that *entertaining* drives customer learning by making circularity socially attractive, E16 emphasized that PUMA’s plans to engage with customers are not limited to the RE:FIBRE project or scaling it.

“For example, it would be fun for customers to design their shoes and at the end they get a circularity score based on how durable or dismantlable the product is. [...] Further, PUMA could let customers vote for the best design, which will then be produced.”

Customers themselves see gamification as a powerful tool for internalizing circular principles. For example, C3 suggested making recycling

an interactive challenge: *“Imagine PUMA turning recycling into a game – for example, you return your old gear, and by doing this, you score points. [...] It’s like leveling up in a video game [...], and you’re getting tangible rewards for being a sustainability champ. [...] Alternatively, what if PUMA had a tree-planting initiative? You hit a certain point threshold, and PUMA plants a tree in your name. That would not result in more consumption but help the planet.”*

These examples show how *entertaining* helps customers learn and embed circularity into everyday behaviors by making participation emotionally rewarding rather than a functional chore.

Together, *convincing* and *entertaining* interact within the learning dimension to enhance customer comprehension and engagement with circular practices. *Convincing* provides customers with compelling information, innovative solutions, and practical examples that demonstrate circularity benefits. *Entertaining* complements this by creating enjoyable, gamified, and emotionally rewarding experiences that lower cognitive barriers and strengthen motivation. When combined, these practices ensure that customers not only intellectually understand circular principles but also internalize them through enjoyable participation, making learning more effective and engagement more sustainable.

Overall, fostering customer engagement in circular activities is a complex process that requires steady interaction between brands and customers. Across the three engagement dimensions, the eight practices interact to create a holistic engagement system. Knowledge sharing equips customers with understanding, resource integration ensures that they can act, and learning fosters internalization and motivation. *Signaling*, *networking*, and *empowering* build the informational and experiential foundation, while *supporting*, *matching*, and *facilitating* provide the means and convenience to participate. Finally, *convincing* and *entertaining* further motivate and reinforce learning, making engagement both comprehensible and enjoyable. Through the coordinated orchestration of these informational, social, practical, and motivational mechanisms, meaningful engagement emerges, embedding circular behaviors and generating sustained value for both customers and the brand. Importantly, climate relevant outcomes may arise even without explicitly stated climate motivations. Further, stakeholders such as recyclers, retail partners, and strategic circularity partners play a critical role, as circular initiatives would not succeed without their involvement.

5. Discussion

5.1. Theoretical contributions

To combat climate change, brands increasingly incentivize customers to engage with more sustainable offerings (Odou & Schill, 2020). While research has explored customer participation in sustainability initiatives (White et al., 2019), a deeper understanding of how brands can actively involve customers in circularity is needed (Mostaghel & Chirumalla, 2021). Recent studies emphasize the importance of customers in the circularity context (Frishammar & Parida, 2019). However, they lack a detailed perspective on how brands can engage with customers in circular activities. We address the research gap by providing insights from PUMA’s employees, business partners, and customers about joint circular efforts.

Positioned within the broader climate change engagement context, our findings focus on how customers participate in circular practices such as product returns, repairs, and brand led initiatives rather than capturing climate change as an explicitly articulated motivation. Our key contribution is identifying the engagement practices and mechanisms that enable and sustain customer participation in circular activities. We interpret these practices as the micro-foundations that can engender the emergence of climate change engagement, as they translate abstract sustainability goals into tangible customer behaviors. In this sense, circular customer engagement represents a behavioral pathway through which climate relevant engagement may emerge and scale, while also providing a systematic understanding of the customer’s

role in circularity and how different engagement practices facilitate their active contribution to circular business models. This is relevant, as engaging with customers on the topic of circularity builds trust, facilitates knowledge sharing, and secures customer support when introducing new circular initiatives, services, and products (Geissdoerfer et al., 2018; Shevchenko et al., 2023).

Therefore, by complementing recent research on critical factors facilitating the CE transition (Bianchini et al., 2019), and customers' acceptance of circular products and processes (Mostaghel & Chirumalla, 2021), we provide detailed insights into how brands can engage with customers on circularity. Specifically, we apply the customer engagement framework of Hollebeek et al. (2019) and integrate it with circular practices identified by Verleye et al. (2024). Thus, we respond to Hollebeek et al.'s (2019) research call to empirically test their framework and extend Verleye et al.'s (2024) work by identifying three additional customer engagement practices: *networking*, *facilitating*, and *entertaining*.

Incorporating these three additional practices enhances the theoretical understanding of customer engagement in circularity in several ways. First, *networking* highlights the social dimension of circularity, emphasizing how customers learn from and inspire each other in shared spaces both online and offline. This builds on research on collaborative consumption and peer influence in sustainable behavior (Böcker & Meelen, 2017; Ozanne & Ballantine, 2010). Second, *facilitating* underscores the need for brands to reduce engagement barriers by making circular behavior more convenient and accessible. This aligns with research on the role of digital tools and infrastructure in fostering sustainable customer (Langley et al., 2023; Riggs et al., 2024). Finally, *entertaining* introduces the importance of making circularity enjoyable and emotionally engaging for customers, linking it to gamification and experiential marketing studies in sustainability contexts (Bittner & Shipper, 2014; Hamari et al., 2014). These additional practices contribute to a more nuanced understanding of how brands can engage customers in circularity beyond traditional economic incentives or informational approaches.

Finally, this study contributes to the S-D logic by providing micro-level insights into how engagement practices are enacted in sustainability-oriented settings. Specifically, it illustrates how operant resources, such as knowledge, skills, and relationships, are mobilized and integrated through customer engagement. The identified practices show that value is co-created through ongoing interactions among actors rather than being solely embedded in products or services, supporting the core S-D logic axioms. Furthermore, the interplay of knowledge sharing, resource integration, and customer learning practices extends the S-D logic by highlighting how engagement in circular practices can sustain resource integration and relational value creation over time. These findings also provide empirical grounding for the premise that customer engagement constitutes a mechanism through which social and environmental value can emerge, aligning value co-creation with broader sustainability objectives.

5.2. Managerial contributions

Integrating customers into the CE requires brands to embrace a multifaceted approach that draws on various practices, and spans the three overarching dimensions of knowledge sharing, resource integration, and customer learning. In the customer knowledge sharing dimension, *signaling* plays a crucial role in establishing trust and transparency, which can be achieved through education on social media, corporate websites, and podcasts. Furthermore, *empowering* customers entails collaborating throughout the product lifecycle, such as in PUMA's RE:SUEDE and RE:FIBRE projects, where customers provide feedback on new circular products and return products for recycling. Finally, *networking* is enabled through interactive workshops and community events, whether it is online through webinars, or offline through hands-on upcycling and sustainable packaging sessions.

On customer resource integration, brands should focus on *facilitating*

by offering digital tools that simplify circular participation, such as digital product sustainability passports or AI-powered resale assistants. Second, *supporting* requires collaborations with business partners, including retailers, recyclers, and circular innovation firms. Building relationships with these partners ensures customers have the necessary infrastructure to integrate their resources into circular activities. For instance, providing clear guidance and logistical support for returning products can make it easier for customers to contribute to circular efforts. Third, *matching* involves creating structured opportunities for customers to integrate resources through online reviews, tutorials, or other peer-to-peer content promoting circularity.

In the customer learning dimension, *entertaining* customers through non-monetary incentives and gamification acts as a motivational catalyst for learning. By incorporating fun, interactive experiences in circularity, brands transform sustainability into an enjoyable challenge. For example, gamifying recycling programs, where customers can earn points or rewards for returning products or engaging in sustainable actions, creates an emotionally rewarding experience that reinforces the internalization of circular principles. This approach triggers learning by lowering cognitive barriers and allowing customers to master sustainable actions through positive reinforcement and social play rather than formal instruction. Finally, *convincing* customers through innovation is crucial, such as by making circular products more appealing and introducing innovative ways of interaction.

Although these practices individually drive engagement, their interplay rather amplifies their impact. Customer knowledge sharing and resource integration jointly foster value co-creation by equipping customers with information and enabling them to act. For example, *signaling*, through transparency about circular efforts, paired with *matching*, such as offering upcycling tutorials, helps customers better understand circular solutions and apply their knowledge through interactive content. Similarly, *networking*, where customers exchange knowledge about circularity in a social and interactive environment, combined with *facilitating* (e.g., convenience-enhancing AI assistants) provides an integrated experience which encourages customers to engage in co-creating circularity with minimal barriers. Additionally, *empowering* customers to provide feedback on design and reuse options, together with *supporting* infrastructure such as clear takeback processes and product tracking, enables them to make informed, sustainable decisions and apply their circular competencies in practice, thereby co-creating value with the brand and other stakeholders.

Next, knowledge sharing and customer learning together drive interpersonal operant resource development. For example, *signaling* via a podcast series on circular fashion paired with *networking* through workshops support knowledge sharing, while gamified challenges under *entertaining* support learning. By combining these practices, customers learn about circularity and share this knowledge within their communities.

Finally, customer learning and resource integration foster individual operant resource development. For instance, *convincing* customers through innovative circular products paired with *facilitating* tools like a digital sustainability passport enhances customers' knowledge of the products by providing insights into their features and environmental impact.

Therefore, managers can view circular practices not only as a means to enhance customer participation and value co-creation but also as a pathway for encouraging climate change engagement. These practices help translate brand-led sustainability efforts into customer actions that support broader environmental objectives.

Importantly, while we focus on the apparel industry, the underlying managerial implications are transferable across industries. Any firm with physical or digital products, ranging from consumer electronics to furniture, automotive, or even service ecosystems, can apply these practices to structure customer engagement in circular systems. Crucially, effective circular engagement does not depend on the industry itself, but on how well firms combine complementary practices across

knowledge sharing, resource integration, and learning to reduce participation barriers and sustain customer engagement.

From a managerial perspective, this shifts CE strategies from isolated sustainability initiatives to an integrated engagement architecture. Rather than treating circularity as a downstream recycling problem, managers should actively design customer journeys that embed circular practices at multiple touchpoints.

Furthermore, the most effective circular strategies are not driven by single interventions (e.g., only recycling incentives or product transparency), but by reinforcing bundles of practices that jointly shape motivation, capability, and opportunity. Therefore, managers should prioritize cross-functional coordination between marketing, digital product teams, supply chain, and external partners to ensure that circular engagement is frictionless and behaviorally coherent across channels.

Finally, managerial relevance extends beyond environmental outcomes. By embedding these practices into customer interactions, firms can strengthen brand trust, deepen long-term customer relationships, and build resilience in increasingly resource-constrained markets. Here, circular engagement becomes not only a sustainability lever but also a strategic mechanism for differentiation and customer loyalty creation.

5.3. Limitations and future research directions

First, while this study is positioned within the context of climate change engagement, the empirical data did not capture explicit climate-related motivations in participants' accounts. Instead, participants primarily frame their engagement in terms of circular practices. Thus, our findings do not directly demonstrate climate change engagement but rather identify the engagement practices through which such engagement may be enabled.

Second, we conducted our research within a single case study setting, which presents methodological limitations. Although this approach allows for an in-depth exploration of engagement practices within a specific context, it also limits our findings' generalizability. The insights derived may not fully capture variations across engagement platforms, industries, or customer segments. While we are confident that the findings are transferable to other brands, future research should validate and substantiate them with evidence from other brands pursuing circular efforts.

Third, the interviewees were participants in a circular pilot initiative, and therefore, already positively predisposed toward sustainability and circularity. While this selection bias limits the transferability of findings to less engaged or skeptical customer segments, it also reflects a novel and analytically valuable focus. By focusing on highly engaged customers, this study provides relatively rare insights into the practices through which customer engagement for circularity is enabled. These customers often function as early adopters and catalysts within broader consumption systems. Understanding how their engagement is supported offers important guidance for designing practices which may

later be adapted to less engaged segments. Future research can build on this study by examining how the identified practices operate across different engagement intensity levels by longitudinally tracing engagement trajectories or testing the effectiveness of specific practices in mobilizing less engaged customer groups. Comparative studies across brands, industries, or cultural contexts can further refine the boundary conditions under which circular engagement practices support positive climate change engagement. In addition, future research can explore when and how engagement in circular practices becomes explicitly linked to climate change awareness, intentions, and advocacy.

Fourth, our integrative customer engagement framework for circularity was used iteratively during the data analysis stage, rather than fully guiding our interview design from the outset. This abductive approach enabled us to remain open to unexpected insights and avoid leading questions. However, additional targeted questions specifically aligned with the refined theoretical frame were not included in the original interview guide. Specifically, because the interview guide was not pre-structured around every subdimension of the framework, we may have missed opportunities for more granular, targeted probing into specific theoretical categories. Consequently, while our findings provide a robust foundation for understanding emergent circular practices, the depth of certain dimensions remains restricted to participants' insights. Scholars can utilize this integrated framework as a deductive starting point for structured interviews or surveys to more rigorously test and validate the specific relationships between the identified engagement dimensions across diverse circular contexts.

Fifth, future research can complement our findings by examining how brands can engage customers in positive climate change behavior in a real-world context. In particular, experimental or longitudinal research can unveil the long-term effects of various engagement strategies. Lastly, the role of digital engagement platforms and AI-powered tools in facilitating customer engagement in circularity are promising future research directions.

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CRedit authorship contribution statement

Frederic Dreher: Writing – original draft, Methodology, Data curation. **Tim Ströbel:** Writing – review & editing, Supervision.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A.: Interview participants

Code	Type	Role
E1	PUMA employee	Product Line Manager Sportstyle Footwear
E2	PUMA employee	Senior Sustainability Manager
E3	PUMA employee	Lead Product Line Manager Sportstyle Apparel
E4	PUMA employee	Head of Global Go to Market Merchandising for Basketball, Motorsport & Accessories
E5	PUMA employee	Director Global Innovation Apparel & Accessories
E6	PUMA employee	Senior Manager Material Design & Innovation
E7	PUMA employee	Junior Project Manager Team Sports

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Code	Type	Role
E8	PUMA employee	Senior Manager Material Engineering Innovation
E9	PUMA employee	Sustainability & Tech Manager Sportstyle Apparel
E10	PUMA employee	Senior Product Line Manager Team Sports
E11	PUMA employee	Manager Materials Footwear
E12	PUMA employee	ESG Analyst
E13	PUMA employee	Senior Manager Corporate Strategy
E14	PUMA employee	Senior Head of Corporate Sustainability
E15	PUMA employee	Junior Product Line Manager Apparel
E16	PUMA employee	Sustainability Analyst
P1	Retail Partner	Product Manager
P2	Recycling Partner	Manager Materials & Innovation
P3	Recycling Partner	Manager Sustainability & Communications
P4	Consulting Partner	CEO
P5	Consulting Partner	Senior Strategist
P6	Consulting Partner	Sustainability Manager
C1-C9	Customer	Engaged PUMA customers participating in the RE:SUEDE project

Appendix B.: Interview guide

The purpose of the interviews is to better understand the efforts of Puma, its business partners and its consumers in the context of circularity. Circularity means recycling and reusing materials to reduce waste. It entails setting up product takeback schemes, reducing production waste to landfills and developing recycled materials as alternatives to conventional ones.

Employees.

1. *Status quo*

- Can you please provide a short summary of Puma's circularity strategy?
 - Do you have an example of current circularity efforts at Puma that you can describe in more detail?
 - What are the benefits for Puma to increase efforts on circularity?
 - How does circularity contribute to your business goals?
- How do you interact with your customers on circular activities?
 - How do you educate your customers on the benefits of circularity?
 - How can customers currently participate in the process of circularity and how do you explain it to them?
- How do you interact with business partners on the topic of circularity?

2. *Forward looking vision*

- How would you envision circularity at Puma in the future?
 - What are challenges to achieve circular loops?
 - How could you engage and involve customers more on the topic of circularity?
 - How can you further improve the collaboration with business partners?
- How could circularity contribute to Puma's business goals going forward?
 - How could circularity contribute to Puma's brand perception and increased green product purchases?
 - How would you assess the importance to understand better how circularity can contribute to (1) Puma's brand perception and (2) actual purchases of green products and why?
- What are in your opinion critical success factors for a working circular business model?

3. *The role of digital platforms*

- How do you currently use digital platforms (i.e. your website and social media) to interact with customers and partners on circularity?
- How could you use digital platforms in the future to stimulate circularity?
 - What would be the underlying structure of this digital platform?
 - What features would be relevant for such a platform?
- How could you increase interaction on circularity with customers and business partners through digital platforms?
- How could you drive adoption of circularity through your website and/or social media?
- What are potential blockers of leveraging digital platforms for circularity?

Consumers.

1. *Status quo*

- How important is the topic of circularity for you and why?
- How do you perceive the current circularity efforts of Puma? Please explain.
 - What do you think is well done by Puma regarding their circularity efforts?
 - What do you think is currently missing in the circularity efforts of Puma?
- How do you interact with Puma on the topic of circularity?
- Do you have a clear understanding of how you can contribute to the circularity efforts of Puma?

2. *Forward looking vision*

- How do you envision Puma's engagement in circularity in the future?
- How would you like to be informed about Puma's circularity offerings?
- What would be relevant factors that would encourage you to engage more with Puma on circularity?

- o How could Puma involve you more in the process of circularity?
 - o How could Puma make it easier for you to contribute to circularity?
3. **The role of digital platforms**
1. How should Puma use digital platforms, such as their website or social media, to engage with you about circularity?
 - o How would you envision interaction with Puma on circularity through digital platforms?
 2. How could Puma's social media encourage you to engage more in circular efforts?
 - o What type of content on social media would encourage you to engage in circularity?
 - o How relevant would it be to involve athletes in the content?
 3. What do you think about a section on Puma's website where you can engage with Puma on sustainable and circular activities?
 - o What activities could you think of that would be interesting for you?
 - o How important would it be for you to get rewards for your efforts and why?
 - o How could such a reward look like?

Business Partners.

1. **Status quo**

- How do you contribute to circularity?
 - o What is your field of expertise when it comes to circularity?
 - o Can you please describe your activities on the topic of circularity?
 - o How does circularity contribute to reaching your business goals?
- How do you interact with Puma on the topic of circularity?
 - o Can you please share in some detail one example where you collaborated with Puma?
 - o How do you benefit from collaborating with Puma on circularity?
- What are currently challenges to achieve circular loops?

2. **Forward looking vision**

- How would you envision circularity going forward?
 - o Is there anything that requires improvement and if so, what?
 - o What are you currently working on to improve the process of circularity?
 - o Are there specific company milestones you would like to reach and if so, which are they and how do you reach them?
- How could the current circularity engagement with Puma be improved?
 - o How could the interaction with Puma become more effective?
- Do you collaborate with other companies and if so, is there anything you find particularly useful in the context of circularity?
 - o How could the knowledge from cooperations with other companies be transferred and applied to the relationship with Puma?
- What are critical success factors that must be fulfilled to enable effective circular processes?

3. **The role of digital platforms**

- Do you currently use digital platforms for the purpose of circularity and if so, which and how?
 - o Do you engage with customers via social media and if so, how?
 - o Do you allow interaction with partners/customers through your website?
- How could digital platforms improve the interaction between Puma, customers and you on circularity?
- How could you use digital platforms to stimulate circular activities?
- What are potential blockers of leveraging digital platforms for engaging customers on circularity?
- How could you set up a digital platform that would help to stimulate circularity and engage with partners and customers?
 - o What would be the underlying idea of how this platform would be structured?
 - o What features would be relevant for such a platform?

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