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The Emperor's old clothes: a critical review of circular fashion in gray literature

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A consensus across industry, academics, and policy-makers holds that a circular fashion system can reduce pollution and waste while producing continued economic growth. Gray literature, understood here as reports published outside of academic journals, has been foundational to describing and promoting circular economy and circular fashion. Yet, this literature is rarely subjected to critical scrutiny, allowing evidence, claims and methods to go unexamined. This review aims to understand how value and the market are conceptualized in a circular fashion system, and what are the implications of this. The study employs a problematizing review of 20 gray literature documents, including a key text of circular fashion: the Ellen MacArthur Foundation's 2017 report *A New Textiles Economy: Redesigning Fashion's Future*. Textual analysis is used to identify assumptions, inferences and problem framings in the texts. These are evaluated against academic understandings, demonstrating that core concepts of the circular fashion proposal are poorly defined and unconnected to existing theory and knowledge. Existing retail practices and consumer marketing messages are central to circular fashion, while the role of the market in setting prices is ignored. A $460 billion error is revealed, refuting the claim that a circular fashion system provides an opportunity for growth. We offer a critical perspective on the role of gray literature and gray publishers in shaping policy-making and, subsequently, academic research programs. We argue that new proposals for sustainable fashion are needed, based on established knowledge and validated models.

KEYWORDS

circular economy, sustainable fashion, circular fashion, literature review, gray literature, value, innovation

1 Introduction

"More than $500 billion of value is lost every year due to clothing underutilization and the lack of recycling, according to the Ellen MacArthur Foundation" (UK House of Commons Environmental Audit Committee, 2019, p. 9). This widely accepted claim has mobilized governments, industry and research to realize the opportunity to generate revenue, jobs, profits and economic growth while eliminating waste and pollution (Korhonen et al., 2018a). Advocates of the circular economy (CE) argue this can be achieved while reducing resource exploitation and consequent adverse impacts on the environment and society, because circularity will reduce the need to extract new materials and manufacture new products (Korhonen et al., 2018a).

The starting point for this enquiry is our observation that consumption and production are coordinated through the market. CE proposes to transform the economic system, implying both change and growth of the market. This paper aims to understand what market changes are implied in proposals for circular fashion (CF), and how they might contribute to market growth and sustainable outcomes in the garment industry. In exploring this topic, the aim is to illuminate conceptualizations of value, value creation, and the realization of value in the consumer marketplace of a CF system. Therefore, we ask:

> "How are value and the market conceptualised in a circular fashion system, and what are the implications of this conceptualisation?"

To address the question, we examine the implied and inferred understandings of these concepts in gray literature (GL), which has been influential in defining, promoting and applying the CF proposal through policy-making. We employ a problematizing review approach (Alvesson and Sandberg, 2020; Alvesson and Sandberg, 2011), described in section 2, to interrogate the assumptions and omissions underpinning the proposal for a circular fashion system. Background material on CE and the relationship between CE, academic and gray literature is presented in section 3, along with definitions of key concepts. Main findings are presented in section 4, and section 5 reviews critical perspectives on value, markets, economic growth and the proposal for a CF system. Limitations, directions and implications for future research conclude the paper.

2 Methods

Recognizing the contextual nature of knowledge and employing critical enquiry as a tool for examining assumptions, the epistemological position of this study is pragmatic, critical and constructionist (Ormerod, 2006; Dewey, 1916; Crotty, 1998; Horkheimer, 1972). The study employs an abductive (Burks, 1946) qualitative approach to understand textual inferences, augmented with simple deductive quantitative methods to determine the practical implications of the CF proposal.

Describing the shortcomings of frequently used approaches to reviewing literature, (Alvesson and Sandberg, 2020; also Alvesson and Sandberg, 2011) propose the problematizing review as a method for re-evaluating topics and underlying assumptions thereby enabling new understandings to emerge. They advocate a three-stage approach: first targeting a narrow core of texts or an authoritative summary; extending reading to adjacent domains; and, finally, expanding to include "indirectly relevant work" (Alvesson and Sandberg, 2020, p. 1299) that might offer new perspectives on the domain under review.

In the first stage, this study begins with one authoritative summary: the Ellen MacArthur Foundation (2017) report *A New Textiles Economy: Redesigning Fashion's Future* (ANTE). This is supplemented by GL published by government and advocacy organizations, identified using Dimensions (Digital Science, 2018), citation and snowball searching (see Supplementary Figure S1). A total of 20 documents were selected. Where a document includes discussion of other topics, reading was isolated to CF sections. A full list of GL analyzed in this review is included in Supplementary Table S1 and presented with a simple bibliometric citation analysis. This was performed by laboriously manually collating, sorting, categorizing and counting each reference in every document. Separate lists of citations by organization and by author were produced, sorted by citation count, and combined (Supplementary Table S2). Due to significant variations in reference notation style, this method is prone to inaccuracies. For consistency and ease of comprehension, all GL documents analyzed in this paper are here attributed to the publishing institutions and not to individual authors.

The ANTE report is a suitable focal point for this study because it purports to capture the shared vision and thinking of a wide range of actors and institutions. The report is prefaced by four pages of endorsements from 21 businesspeople, academics, policymakers, industry groups and charities including the CEO of H&M, a VP of Nike, and a deputy director at the UN. The report is supported by 10 corporate partnerships from industry, academia, manufacturing and NGOs. It includes contributions from over 200 named academic researchers, consultants, policymakers, designers, manufacturers, industry participants, observers and other diverse experts.

Positioned as an agenda-setting document, ANTE has commanded influence in academia, industry and policy-making. The reach of such reports is difficult to gauge, because they lack standardized tracking identifiers. A full data search in Dimensions.ai for the text string "New Textiles Economy: Redesigning Fashion's Future" gives an indication of the report's influence locating 938 publications, 2 grants, 15 patents and 42 policy documents, published from 2018 to 2023 (Digital Science, 2018). By contrast, Todeschini et al.'s (2017) highly cited paper (see Saha et al., 2024) which was published the same month as ANTE has been cited between 274 (Scopus) and 329 (Digital Science, 2018) times to the end of 2023. Fletcher and Tham's (2019) "Earth Logic Fashion Research Action Plan" offers an alternative vision of a sustainable fashion future yet has not attracted the same level of attention or funding—a Dimensions.ai search yields 49 publications, 4 policy documents, 0 patents and 0 research grants in the period 2019–2023 (Digital Science, 2018).

The first stage of analysis employs textual inferences to examine meanings, assumptions, and understandings of key concepts of CE and CF in GL and, in particular, the EMF ANTE report. Individual words may have multiple possible meanings, and formal semantic analysis emphasizes the context of words and sentences (Kroeger, 2018). This analysis attempts to untangle those multiple meanings, by making "an educated guess at some of the most likely interpretations that might be made" (McKee, 2003, p. 1–2) by the intended audience(s) of the documents reviewed. The executive summary and main body of ANTE was closely read and coded using Atlas.ti. The most frequently arising terms were identified as conceptually important. Contextual inferences were applied to each instance of these terms, considering the most likely meaning in context of the sentence and the audience of the report. Additional GL was subsequently read and analyzed using the identified terms, with inferences applied to each instance.

In the second phase of the problematizing review, the identified key words, their meanings and inferences are compared to meanings and definitions offered in academic literature addressing those topics. Assumptions, omissions and discrepancies are identified and evaluated. Academic literature addressing and offering definitions for paradigms, systems thinking, and concepts related to value are included to enrich our understanding of these concepts in relation to CF. This section is supported by simple financial calculations using figures supplied in ANTE or otherwise publicly available in 2017. This material is presented in section 3.5 and then applied to understandings of these concepts in circular fashion literature in section 4.2.

In the final stage, we examine the broader context of the CF proposal. We consider how gray publishing organizations, in particular think-tanks and advocacy organizations, exercise influence over policy-making, legislation, regulation and research. Critical scholarly perspectives discussing think-tanks, advocacy organizations and for-profit consulting firms are presented in section 3.4, and discussed in relation to CF in section 5.2.

3 Circular economy, gray literature, and foundational concepts

This section offers brief backgrounds on the circular economy (CE), circular fashion (CF), and circular business models (CBMs). We describe the problem space and relationship between GL and academic literature, together with cursory definitions of foundational concepts.

3.1 Circular economy

The widely understood concept of CE involves creating a regenerative economy, eliminating waste and cycling materials in a closed-loop system, powered by renewable energy (Korhonen et al., 2018a). Academic critiques of CE address its conceptual haziness, plausibility, and ideological underpinnings. Korhonen et al. (2018b) argue CE is an "essentially contested concept," a set of ideas encompassing different potential meanings. The Ellen MacArthur Foundation (EMF), a leading proponent of CE, explicitly champions economic growth arguing that circularity would "decouple" growth from environmental degradation (Ellen MacArthur Foundation, 2013). Others dispute that such decoupling is possible (Hickel, 2019), describing CE as a "legend," an "implausible socio-technical imaginar[y]" (Giampietro and Funtowicz, 2020, p. 64) that delays politically difficult decisions.

Scholars outline conflicting perspectives regarding the ideological positioning of CE. While some criticize it as a green growth strategy (Hickel and Kallis, 2020), others argue true CE is constrained by the growth demands of neoliberalism (Schröder et al., 2019). Siderius and Zink (2023) go further, arguing that a functional CE requires change or elimination of core features of the market economy, including moving away from market-based evaluations of price. Recently, scholars have suggested that CE may be aligned to stronger sustainability approaches such as sufficiency (Rask, 2022) or degrowth (Schröder et al., 2019; Nesterova and Buch-Hansen, 2023). However, Valencia et al.'s (2023) review of social aspects of CE do not identify these as important topics within the field, finding <20 of 1,244 journal papers published up to 2022 discussed sufficiency and 6 degrowth. Despite discrepant critiques and contradictory conceptualizations, some point to CE's "power to attract both the business community and policy-making communities to sustainability work," arguing that academic research is vital to ensure measurable advances (Korhonen et al., 2018a, p. 37).

3.2 Circular fashion

The CF proposal does not appear to have been subject to the same level of scrutiny or criticism. There is widespread agreement across industry, policy-makers, and academics that CF will deliver benefits and opportunities. Reviewing the CF literature, Ki et al. (2020, p. 2401) observe a "notable consensus" across groups: "internal fashion stakeholders are driven to adopt CF because they see CF as new business opportunities" while "the government has actively pushed [them] toward CE" (Ki et al., 2020, p. 2411). Academic research does not appear to have led CF but followed, "emerg[ing] only recently in 2017 at the same time as the [EMF's] 'Make Fashion Circular' initiative launched" (Ki et al., 2020, p. 2406). Proposed levers for change in CF include CBMs, consumer behavior change and textile-to-textile recycling. New materials and product design, also a focus for CF, are not discussed in this paper, due to scope restrictions.

Within broader sustainable fashion literature, there is limited research on CF topics (Mukendi et al., 2020). Studies often describe single stakeholder cases (Ki et al., 2020), restricting generalizability and failing to offer a clear direction for industry action (De Aguiar Hugo et al., 2021). Emerging issues around operations and inventory management, geographical factors, and customers' wardrobe management practices raise questions about the viability of rental CBMs and their sustainability benefits (Bodenheimer et al., 2022; Kim, 2024; Johnson and Plepys, 2021). Textile-to-textile recycling does not exist to a meaningful extent, and no clear profit opportunity seems to have emerged in this area (Sandvik and Stubbs, 2019). Thriving markets for used textiles are not a CF innovation, they predate the Industrial Revolution which fueled their expansion and internationalization (Lemire, 2012). Historians provide evidence that by 1850 used garments and textiles were being exported, sorted, processed, remanufactured and recycled in response to trade restrictions and demand in different national markets (Lemire, 1988, 2012; Ginsburg, 1980). Work attempting to align CE with stronger sustainability is absent, with scholars advocating for degrowth or sufficiency approaches criticizing CE for its "growth logic" (Fletcher and Tham, 2019) and "tinkering at the fringes of the system while deflecting collective attention away from the core of the problem and enabling business as usual" (Niessen, 2022).

3.3 Gray literature and CE

Gray literature has been defined as "the diverse and heterogeneous body of material available outside, and not subject to, traditional academic peer-review processes" (Adams et al., 2017, p. 433). While this definition is contested, it is sufficient for our purposes to distinguish between literature in academic journals and material published by other actors, including reputable organizations in government, industry, and civil society. GL can be a valuable source of secondary data, practitioner knowledge and contemporary perspectives (Adams et al., 2017).

GL has been instrumental in conceptualizing CE which has been "almost exclusively" developed outside of academia (Korhonen et al., 2018a, p. 37). Academics frequently rely on GL, citing reports and claims to support the authors' premises or conclusions. However, GL publications are frequently excluded from scholarly reviews discussing these topics—reviews which themselves cite GL for background information. Recent review articles illustrate the problem. Highlighting the importance of GL in promoting the concepts, Kim (2024) writes that CE and CF "gained attention from the EU's 2015 Circular Economy Action Plan and Ellen MacArthur Foundation, 2017 report on CF" (Kim, 2024, p. 3). Ki et al. (2020) draw attention to the same two documents. Subsequently, both papers describe using Scopus and WoS to locate literature for review, databases which exclude the publications whose importance has just been described. Yriberry et al. (2023) rely heavily on GL to define CE and the benefits of CF yet exclude it from their review. Saha et al. (2024) credit the EMF as a pioneer which "laid the foundation for understanding and implementing CE principles" (Saha et al., 2024, p. 2) but exclude the

EMF's publications from their attempt "to understand the underlying assumptions and CE framing" (Saha et al., 2024, p. 5). Of the 18 recent literature reviews assessing knowledge of circular fashion 17 (94%) cite GL, 16 (89%) cite the EMF, and 11 (61%) cite *A New Textiles Economy* (Ellen MacArthur Foundation, 2017)—but only five articles (29%) include GL in their data for analysis (see Supplementary Table S3).

Wider reviews of CE literature share this blind spot, relying on claims and ideas from GL but failing to critically analyze these works. Admitting the limitation that "contributions might arise from […] reports and other documents that are not published in academic journals," Geissdoerfer et al. (2017, p. 768) exclude GL they themselves claim is "renowned" and "important" (Geissdoerfer et al., 2017, p. 759). Of five review articles Hossain et al. (2024) describe as "highly cited" and "seminal" (Hossain et al., 2024, p. 5), all cite GL in their background information but only one includes GL in its sample for analysis (see Supplementary Table S4). Hossain et al.'s (2024) meta-review compounds the problem, building from incomplete data to synthesize partial knowledge. Given the importance of GL in conceptualizing and promoting CE, its exclusion from analysis creates an incomplete view of the field.

3.4 Gray publishing and policy-making

Government reports encompass a range of document types whose purpose is not only to inform the policy but to record a range of stakeholder perspectives and evidence, while capturing and communicating consultation processes (MacDonald et al., 2015). They may or may not be written by academic authors and subject to peer-review (MacDonald et al., 2015). The increasing quantity of information available necessitates input by "boundary organizations," "actors at the science-policy interface […] and knowledge brokers whose synthesis and communication skills enable them to translate [information] into a form suitable" for ingestion and use (MacDonald et al., 2015, p. 6). Considering the wide range of organizations that publish GL, Adams et al. (2017) recommend a tiered assessment framework and emphasizing the need for quality assessment by the reviewer. While many of these organizations collect and publish high quality data and analysis, there is cause to exercise skepticism when assessing these outputs.

Think-tanks and their publications can play an important role in knowledge transfer. This process is social, cultural and can be political in character (Plehwe, 2015). Think-tanks coordinate diverse networks of actors, institutions and ideas, creating discourse coalitions that deploy influence and expertise to promote competing policy positions (Plehwe, 2015). In contested policy spaces, such as carbon, nuclear power or tobacco, the existence of competing discourse coalitions, "counter-expertise" and "destructive knowledge" have contrived debates that delayed effective policy responses (Plehwe, 2015, p. 375–376). The role of academic expertise in this process is not clear cut, as academics may be employed by think-tanks or targeted by them for ideological ends (Plehwe, 2015).

Professing extensive capabilities in business, market analysis and knowledge management, consulting firms research and write reports for clients and publish their own GL. Mazzucato and Collington (2023) describe the quasi-academic approaches of consulting firms, who seek to capitalize on policy initiatives by setting up research centers, publishing journals and demonstrating thought leadership. Pointing to a lack of methodological rigor, exaggerated claims to expertise and conflicts of interest that asymmetrically push failure risk onto clients and the public sector, they argue against the credibility of these firms (Mazzucato and Collington, 2023).

Despite the concerns outlined above, these organizations have been very successful in packaging information for policy-makers to use. Impact-seeking researchers are advised to adopt similar methods, providing synthesized information by "writing a good policy brief, or preparing an engaging slide-pack or infographic" (Rose and Tyler, 2023, p. 35). The engaging strategies employed by these firms should not be the only object of academic attention. Understandings of the broader context, competence and positioning of contributing organizations should inform critical assessment of published GL.

3.5 Foundational concepts

The study of complex systems describes components including stocks, flows, feedback loops, parameters, buffers and leverage points (Meadows, 1999). Meadows sketches out a hierarchy of interventions which might change the functioning of a system. The lowest leverage points are parameters and flows: targets, standards, taxes and subsidies, feedback loops and material flows (Meadows, 1999). The highest are ideas and information: paradigms and understandings (Meadows, 1999). A paradigm is a shared model for understanding which shapes and gives direction to thinking, methods and analysis in scientific enquiry (Kuhn, 2012). Paradigm change, the overturning of established thinking to generate novel understandings, is characterized by competing models as established theory is revealed as inadequate to explain all observations (Kuhn, 2012).

Acknowledging that the role of markets in society has become a highly charged and contested topic, we draw attention to some basic, orthodox points. Markets are believed to foster innovation, delivering customer value and public good (Rutherford, 2007; Smith, 1776). Markets coordinate consumption to production, and vice versa, through the price mechanism which is itself determined by the interplay of supply and demand, assumed to be scarce and unlimited, respectively (Rutherford, 2007; Smith, 1776). In idealized markets, prices should converge at an equilibrium point where supply, demand, social and private good are all maximized. Optimal outcomes are not guaranteed, and the term "market failure" is used to describe situations in which "the free working out of the forces of demand and supply does not achieve a welfare goal" (Rutherford, 2007, p. 135). Market failures can include externalities like pollution, illness, and overproduction. Overproduction in the fashion industry is estimated at up to 51% of total production, with excess goods discounted, liquidated, "onwards disposed" to the customer, destroyed or landfilled (Wijnia, 2016; Cobbing and Vicaire, 2017; Changing Markets Foundation, 2023).

Current economic understandings of value distinguish and focus on utility and exchange value (Rutherford, 2007; Smith, 1776). In business, management and innovation literature, value is explicitly linked to price and benefits for the customer, "value is what buyers are willing to pay" (Porter, 1985, p. 3; also Osterwalder and Pigneur, 2010). The term value chain refers to a set of linked processes within a firm that creates value for the customer while a value system describes a value-creating network of inter-connected firms (Porter, 1985). Value can be delivered through

low prices or superior benefits (Porter, 1985), while disruptive innovators (Bower and Christensen, 1995) offer superior value through lower quality and lower price. A value proposition describes this package of customer benefits, while value capture refers to the ability of a firm to retain some of the value it creates for customers as profits (Payne et al., 2017; Osterwalder and Pigneur, 2010). A supply chain is a retail-centered perspective describing the combined operations of firms in a value network who provide goods or services to an end customer (Hamilton and Petrovic, 2011). From the perspective of consumption studies, Holbrook emphasizes that "value resides *not* in the product purchased, […] *not* in the object possessed, but rather in the *consumption experience(s)* derived therefrom" [original emphasis] (Holbrook, 1999, p. 9). This aligns with the axioms of service-dominant logic (S-DL) in marketing literature, which argues that value is a phenomenological determined by the customer or beneficiary and is co-created by customers and firms in the marketplace (Vargo and Lusch, 2004, 2016, 2017; Vargo, 2021).

4 Findings

4.1 Gray references in GL

GL heavily references other GL, with limited penetration of academic research in the sample (see Supplementary Figure S2). Gray publishers comprise 85% of the top 20 cited authors or organizations. The most cited authors are the EC with 58 citations, the EMF with 43 and WRAP with 30. Journal authors are low on the list. Authors identified by Saha et al. (2024) as influential, Bocken, Hvass, and Niinimäki appear at positions 16–18 with seven, six and five citations each (Supplementary Table S2).

Large policy organizations such as the EC, UNEP and the ILO frequently cite their own publications, suggesting somewhat closed systems for acquiring and managing knowledge. Hand-coding of references revealed a further omission from academic reviews: reports from academic research institutes, such as Mistra Future Fashion. These reports are not published in journals and therefore do not appear in searches of databases such as Scopus or WoS. The lack of a standardized reference style or cataloging system creates complexities in tracing networks of citations and influence across these documents, authors and organizations.

4.2 Meanings and inferences

The ANTE report claims that a circular fashion system offers the "opportunity to deliver substantially better economic, societal, and environmental outcomes" in the fashion industry (Ellen MacArthur Foundation, 2017, p. 3). In making its case, the report makes use of terms including "value," "value chain," and "value capture" which are commonly used in management, enterprise and innovation communities. Yet, the apparent meaning of crucial terms in ANTE and other GL reviewed does not always conform to established or commonly understood definitions. Nevertheless, policy-makers and governments have adopted the ideas and arguments of ANTE, with many echoing its language and conflated meanings. The lack of precision and clarity in language puts a positive gloss on what could be an extreme contraction of garment industry revenues—an "opportunity" that may not even exist.

4.2.1 Problem framing

The promise of continued economic growth while ending destructive resource extraction and environmental degradation is central to the CE concept. The aim of a CE, advocates write, is "to redefine growth, […] gradually decoupling economic activity from the consumption of finite resources" (Ellen MacArthur Foundation, 2017, p. 48). Many of the GL authors have embraced decoupling as an idea based in evidence: "the science is clear on the need to decouple economic growth from natural resource use and environmental impacts" (United Nations Environment Programme, 2021, p. 9). This is "the overarching goal of CE, the decoupling of economic growth and resource consumption" (European Union Joint Research Council, 2021, p. 108). In fashion, CE promises to fill a need for "new economic models for fashion which are based on reducing the material consumption associated with growth" (UK House of Commons Environmental Audit Committee, 2019, p. 58).

The ANTE authors elaborate four areas for action. Ambitions 1, 3 and 4 address increasing the scale and efficacy of recycling, describing a system in which a perpetual flow of pure materials (and separable blends) is powered by renewable energy. The nature, types, and adverse impacts of environmental pollutants are defined with reference to research-based frameworks and elaborated with findings from numerous studies. Limitations are acknowledged, calls for future research are precise, and ANTE definitively recommends ending the use of substances which harm human health and the environment.

The second ambition addresses clothing utilization, consumption and customer behavior. It is bold: declaring the need to "transform the way clothes are designed, sold, and used" (Ellen MacArthur Foundation, 2017, p. 70). However, the ANTE authors do not offer a clear, evidence-based or theoretical description of how "clothes are designed, sold, and used" that would give shape or precision to this imperative. Instead, ANTE repeatedly problematizes the "linear system" (Ellen MacArthur Foundation, 2017, p. 3, 19, 20, 22, 26. 36, 38, 48) which ends with consumers "throwing away clothes that they could continue to wear" (Ellen MacArthur Foundation, 2017, p. 19, 36, 73). In this framing, underutilization and lack of recycling are the locus of problems:

> With its low rates of utilisation (leading to high levels of throughput) and low levels of recycling, the current wasteful, linear system is the root cause of this massive and ever-expanding pressure on resources (Ellen MacArthur Foundation, 2017, p. 20).

Underutilization encompasses consumption and consumer behavior; this is the cause, according to ANTE, of high throughput. Low recycling addresses after-use processing of discarded goods. This framing is adopted by other authors in the sample. The EU Strategy for Sustainable and Circular Textiles explains that adverse impacts "have their roots in a linear model that is characterized by low rates of use, reuse, repair and fiber-to-fiber recycling" (European Commission, 2022). The UK EAC attributes overconsumption to "a high throughput of garments […] based on a linear economy" (UK House of Commons Environmental Audit Committee, 2019, p. 10), and calls to change the "exploitative and linear business model" of fashion (European Commission, 2022, p. 11). Echoing the EMF's implication of consumers, the BFC points to "the disproportionate role of high intensity shoppers on the linear flow of fashion items" (British Fashion Council Institute for Positive Fashion, 2021, p. 17). Across the sample,

we found authors echoed ideas in ANTE, including the idea of "decoupling," and the problems of "underutilization" in a "linear system."

4.2.2 Concept of value of CE

Value is a key concept of CE, however, closer examination of how the concept is used in GL reveals no reliable connection between the use of the vocabulary and any concrete or theoretical concept. Authors frequently fail to offer definitions explaining what is meant or encompassed, with a minority attempting to specify their intentions. One author writes "in this report, the term value refers to economic, environmental and social values" (European Environment Agency: European Topic Centre on Waste and Materials in a Green Economy, 2021, p. 14), though it is not always clear which of these value types they are referring to, e.g., "a circular approach may therefore help businesses create value by disconnecting profit from production volume" (European Environment Agency: European Topic Centre on Waste and Materials in a Green Economy, 2021, p. 2). Authors refer to brand values, "brands with values and strong narratives" (European Commission (EC) European Apparel and Textiles Organisation, 2019, p. 14) and individual moral beliefs, "the value of living within the limits of available renewable resources" (Ellen MacArthur Foundation, 2013, p. 26). Others attach figures, allowing the reader to infer financial value, e.g., "clothing with a combined value of EUR 80 billion" (European Commission, 2022, p.13). Financial value can be inferred frequently, yet meanings remain slippery. The BFC refers variously to the sentimental and financial value of clothes, occasionally leading to ambiguous usage: "consumers must be empowered to […] value clothes more" (British Fashion Council Institute for Positive Fashion, 2021, p. 30). Whether customers should care more or pay more is unclear.

Value is frequently treated as an embedded or inherent property which resides in and can be extracted from products and materials. ANTE refers to "the value of the materials in clothes" and "the retained inherent value" of products and materials (Ellen MacArthur Foundation, 2017, p. 24, 95). One author claims that "the value of physical products diminishes during the use phase" (European Union Joint Research Council, 2021, p. 89), getting used up like a battery charge. Other authors discuss the "residual value" of products and materials (Ellen MacArthur Foundation, 2017, p. 71; European Environment Agency: European Topic Centre on Waste and Materials in a Green Economy, 2021, p. 47) that might remain in used goods. Circularity, they argue, embraces strategies to "retain the most embedded value" (Ellen MacArthur Foundation, 2021, p. 9), "preserve the product and material value of textiles" (European Environment Agency: European Topic Centre on Waste and Materials in a Green Economy, 2021, p. 37), "preserve the embedded value and functionality of products, and the materials within them" (European Environment Agency: European Topic Centre on Waste and Materials in a Green Economy, 2021, p. 10), and "ensure maximum value is extracted from materials" (British Fashion Council Institute for Positive Fashion, 2021, p. 60). These usages are also slippery. One author promotes raising "awareness of a product's material and emotional value" (Circle Economy, 2020, p. 6), conflating embedded value with phenomenological value.

In a few instances, value is associated with some type of phenomenological customer experience or benefit. Examples include: "resale delivers value as household budgets are shrinking [and] consumers seek value" (Global Fashion Agenda, 2020, p. 14); "customers […] who put low value on the physical shopping experience" (Ellen MacArthur Foundation, 2017, p. 79); and, "allow customers to better judge the value of their purchases" (Ellen MacArthur Foundation, 2017, p. 84). In some instances, "value" is associated with utility or usefulness. For example, garments that possess "quality and durability can be of value even if there is only one or a few users" (Ellen MacArthur Foundation, 2017, p. 24) or "higher durability is only of value if customers actually wear the clothes they buy" (Ellen MacArthur Foundation, 2017, p. 85). Other commenters downplay customer perceptions, e.g., "young women [are gaining] pleasure from what they wear and expressing their identity through their clothing, but the actual value of the item is very low in real terms" (UK House of Commons Environmental Audit Committee, 2019, p. 10). What might be measured by "real terms" value is unclear, but it is not the pleasure and identity expression of young women.

Frequently, "value" is associated with some unspecified hierarchy or scale of benefits. Current textile re-use strategies are criticized because they involve "use in lower-value applications," in contrast to the CE proposal which would keep goods "at their highest value" (Ellen MacArthur Foundation, 2017, p. 20–22; also p. 3, 44, 50; Ellen MacArthur Foundation, 2021, p. 6, 8, 9). This key concept has been adopted by other authors:

> Circulation of clothing at its highest possible value (British Fashion Council Institute for Positive Fashion, 2021, p. 38, 36)
>
> Keep materials, products and components flowing at their highest value (European Environment Agency: European Topic Centre on Waste and Materials in a Green Economy, 2021, p. 2)
>
> Transformation of used and waste textiles into new textiles and products of equal or higher value (European Commission (EC) European Apparel and Textiles Organisation, 2019, p. 7)
>
> The common vision is to shift away from the traditional 'take-make-dispose' linear textile value chain [sic] towards a circular system, where materials are not lost after use but remain in the economy, circulating as long as possible at the highest possible value (United Nations Environment Programme, 2021, p. 10, 77)

The last quote clearly echoes words and arguments put forth in ANTE: criticism of the "take-make-dispose" model (Ellen MacArthur Foundation, 2017, p. 3, 36, 48), problematization of the "linear" system (discussed above), and a vision for circulating goods at their "highest value." Despite this apparent consensus, no explanation, scale or framework is offered to categorize, define or distinguish "low value" and "high value" applications.

"Value" is often used interchangeably with more accurate terms, conflating their meanings. In a few instances, "value" is used to mean cost or cost reductions, and sometimes price; it is often used to indicate material resources or physical matter. A frequently encountered inference is financial value, revenue or revenue potential. For example:

> By making it clear to customers that their clothes still have value, incentivise them to bring used clothes back (Ellen MacArthur Foundation, 2017, p. 87)
>
> The value of the ethical clothing market increased (UK House of Commons Environmental Audit Committee, 2019, p. 54)

> Transform a useless waste product into a material or product with new higher value (European Commission (EC) European Apparel and Textiles Organisation, 2019, p. 72)
>
> Currently no value in the recycling of textiles, [collectors seek] clean and re-wearable textiles (and footwear) that they can sell on global reuse markets (European Union Joint Research Council, 2021, p. 9)
>
> Premium brands [and] higher quality clothing are able to retain a higher proportion of value (PwC, 2024, p. 13)
>
> Reduce textile waste and ensure that it creates further value by boosting its preparation for reuse and recycling (European Commission, 2022, p. 8)
>
> Extending a product's value through remanufacturing, or by providing access and performance models (European Environment Agency: European Topic Centre on Waste and Materials in a Green Economy, 2021, p. 5)

In ANTE, "revenue potential" is a strong contender for instances where the meaning of "value" cannot be clearly attributed. For example, "recycling technologies for common materials need to drastically improve their economics and output quality to capture the full [revenue potential] of the materials in recovered clothing" (Ellen MacArthur Foundation, 2017, p. 25). Or "a new textiles economy captures the full [revenue potential] of clothing during and after use" (Ellen MacArthur Foundation, 2017, p. 36).

Across the sample "value chain" is used synonymously with other distinct concepts, such as "supply chain." ANTE discusses technology that would allow "fibers to be tracked and identified throughout the value chain" (Ellen MacArthur Foundation, 2017, p. 38). Another author explains that "the OECD Due Diligence Guidance for Responsible Supply Chains in the Garment and Footwear Sector [recommends actions] in their value chains" (United Nations Economic Commission for Europe, 2019, p. 29). In a few cases, the term is substituted for "industry": "concerns raised by NGOs, the public, policymakers, and across the textiles value chain itself" (Ellen MacArthur Foundation, 2017, p. 53); and, "fashion will have to radically transform as the entire value chain shifts toward sustainable and responsible practices" (British Fashion Council Institute for Positive Fashion, 2021, p. 21). The use of generic vocabulary conflates separate units of analysis, obscuring how and where value and adverse impacts are created. UNEP's conclusions illustrate the problem:

> UNEP research for textiles shows that 36% of the global apparel's climate impact comes from the bleaching/dyeing and finishing phase of the value chain, closely followed by the use phase, which accounts for 24%. This shows that the most effective actions to decrease the industry's climate impacts are extending the useful life of textiles and changing laundry practices (United Nations Environment Programme, 2021, p. 9)

Having blurred and expanded the boundaries of the "value chain" to encompass every associated actor across and beyond the entire life-cycle of textiles (United Nations Environment Programme, 2021, p. 67), UNEP concludes that the "most effective actions to decrease the industry's climate impacts" are those of the customer. The lack of precise language inhibits analysis of systemic problems, preventing a clear understanding of the scope of issues, the relationships between parties, and the location of causes and effects.

Across the sample, understandings of "value capture" are mixed. Only three reports refer to meanings from innovation management literature. One author explains that resale "captures economic value by gathering revenues from selling second-hand goods, but it also generates environmental value" (European Environment Agency: European Topic Centre on Waste and Materials in a Green Economy, 2021, p. 14). Another focusses solely on profits: "reselling products offers fashion brands and retailers a great opportunity to capture value from already existing products" (Global Fashion Agenda, 2020, p. 13). Other authors are less clear about when value is captured vs. when it is generated. In ANTE, "value capture" is associated with a variety of benefits. It might refer to reducing adverse impacts and externalized costs: "opportunity exists for the industry to capture value by creating safe material cycles while addressing the devastating health and pollution impacts" (Ellen MacArthur Foundation, 2017, p. 53). It might mean access to a strategic resource: "improving recycling to allow the industry to capture the value of materials" (Ellen MacArthur Foundation, 2017, p. 24). Or it might carry the conventional meaning, a profit: "the manufacturer or retailer can capture more value, the longer the clothes lasts" (Ellen MacArthur Foundation, 2017, p. 84). "Value capture" is also used to describe benefits which customers might experience. ANTE implies that customers can capture value by purchasing: "ensuring that customers recognize the value they can capture by buying longer-lasting items" (Ellen MacArthur Foundation, 2017, p. 84). The BFC suggests they may do so by reselling used clothes: "value for resold garments can be captured either by the customer or by resellers or reprocessors" (British Fashion Council Institute for Positive Fashion, 2021, p. 24). In some cases, beneficiaries are implied but not explicitly identified: "in a new textiles economy clothes are used more often, allowing their value to be captured fully" (Ellen MacArthur Foundation, 2017, p. 44); "increasing the number of times clothes are worn could be the most powerful way to capture value" (Ellen MacArthur Foundation, 2017, p. 73). In these cases, who is capturing value and how is unclear.

In this analysis, we have encountered a range of different understandings of "value"—across the sample, in individual documents, and sometimes in the same sentence. The vagary and confusion over who is benefitting and how obscures a vital and unsubstantiated assumption. An important claim in ANTE is that "underutilization of clothing presents a significant opportunity to capture value. Globally, customers miss out on USD 460 billion of value each year by throwing away clothes that they could continue to wear" (p. 36). In this crucial instance, it is not explicitly clear what value is being captured or by whom. It may be customers who "miss out." Or it could be a firm positioned to realize the "significant opportunity" mentioned. The claim is examined further below, where we show it is neither.

4.2.3 A $500 billion opportunity

The ANTE authors claim that "money is being left on the table: more than USD 500 billion in value is lost from the system every year due to underutilized clothes and the lack of recycling" (Ellen MacArthur Foundation, 2017, p. 36). The argument the authors appear to be making is that this is potential revenue available to

be realized by firms adopting circular practices. Ellen MacArthur herself pitched the opportunity to industry in the influential trade report The State of Fashion 2018, co-authored by The Business of Fashion and McKinsey & Co. (2017), saying:

> The vision of a new textiles economy [is] an invitation for the industry to explore new materials, pioneer new business models, harness design and put technology to work. […] And it'll be worth it: it's a $500 billion opportunity (The Business of Fashion and McKinsey & Co., 2017, p. 34)

This idea—that a CF system can create $500 billion of economic growth through reuse and recycling of clothing and textiles—has been accepted and cited by influential actors and organizations. Waste and Resources Action Programme (2020) recommends that companies should "assess options for capturing a portion of an estimated US$500 billion" because "the economic "size of the prize" is clear" (p. 6). The BFC uses the figure twice to support the recommendations of its report on the future of the British fashion industry (British Fashion Council Institute for Positive Fashion, 2021). The UK Environmental Audit Committee cites the $500 billion in lost value as a "key fact" in the introduction to its most recent policy report on the fashion industry (UK House of Commons Environmental Audit Committee, 2019, p. 5). However, closer examination of the assumptions and calculations underpinning this claim reveal it is erroneous.

The bulk of the "$500 billion opportunity" is "$460 billion of value" (Ellen MacArthur Foundation, 2017, p. 19, 36, 73) which is "lost" through underutilization by customers who are prematurely disposing of garments. An estimated $100 billion attributed to lack of recycling (Ellen MacArthur Foundation, 2017, p. 20, 24, 36, 91) is added, pushing the total to over $500 billion. The endnotes to ANTE explain how the $460 billion is calculated:

> In 2015, 46% (in mass) of collected garments were reused. If 100% of discarded clothing were collected, 22.2 million tonnes would be reused instead of 5.6 million tonnes as at present, meaning 16.6 million tonnes of new garment sales would be avoided, with a value of USD 460 billion (Ellen MacArthur Foundation, 2017, p. 132)

The $460 billion figure is the monetary value or aggregate *price* of 16.6 million tons of new garments, set in the market by paying customers—"new garment sales […] with a value of USD 460 billion" (Ellen MacArthur Foundation, 2017). If keeping those discarded garments in use displaced the sale of new garments—"new garment sales would be *avoided*" [emphasis added] (Ellen MacArthur Foundation, 2017, p. 132)—the $460 billion figure represents *lost revenue* from those forfeited sales. Nowhere is it proposed that consumers would be better off by consuming less thereby leaving this $460 billion available to other sectors of the economy. It is presented as "money […] left on the table" (Ellen MacArthur Foundation, 2017, p. 36) and a "$500 billion opportunity" which can be realized by the fashion industry through new technology and business models (The Business of Fashion and McKinsey & Co., 2017, p. 34). However, equal quantities of new and discarded garments will not achieve equal market prices. Supplementary Table S5 shows the price of used textiles, as recorded by various observers (Charity Retail Association, 2018; letsrecycle.com, 2025), converted into USD per ton and multiplied by the EMF's 16.6 million tons to calculate the market price of that quantity of used textiles. Based on prices observed in the market, the realizable financial value of 16.6 million tons of used textiles is $10–17 billion, roughly 3% of the posited $460 billion. Based on ANTE's estimate of an industry worth $1.3 trillion, this would amount to a 34% contraction in annual revenue for the global fashion industry (see Supplementary Figure S3). The calculation underlying the $100 billion of lost materials is based on the price of new yarns, suggesting a similar error in valuation.

A rosier picture of resale is presented by PwC (2024) who find that garments might retain up to 40% of their original sale-price value. However, their data has been collected from resale websites and London charity shops (PwC, 2024, p. 13) meaning the prices observed are for the best quality of used clothing. This "cream" accounts for 10–15% of collected textiles—a fraction that is falling as consumers make use of peer-to-peer resale services to sell their best used clothes and collection of non-reusable textiles increases (European Union Joint Research Council, 2021). This trend toward a decreasing reusable fraction calls the 16.6 million ton figure into question. Using the 10–15% figure (European Union Joint Research Council, 2021) to calculate the reusable fraction of a total 48 million tons collected (Ellen MacArthur Foundation, 2017, p. 124) yields an estimate of 4.8–7.2 million tons of cream. This suggests that the 5.6 million tons of existing reuse cited in ANTE represents 77–100% of potential reuse. Indeed, the EU JRC report predicts the majority of textiles not collected at present "are likely to be non-rewearable or at least to have no value on second-hand markets" (European Union Joint Research Council, 2021, pp. 8–9). Highlighting the sensitivity of resale models to margins, PwC (2024) concludes that resale is only viable for premium and luxury brands or the charity sector where labor and acquisition costs are negligible (PwC, 2024). Overall, these figures and calculations suggest that significant expansion of resale may not be financially desirable or practically viable.

One of the few authors to acknowledge that in a CE "retail market for new garments would likely shrink" suggests that "innovative and genuinely sustainable brands may adapt by switching revenue streams to circular offers" (British Fashion Council Institute for Positive Fashion, 2021, p. 25). Yet, margins are a pressing issue for rental and leasing models, in which reverse logistics, cleaning and maintenance costs raise the costs of servicing transactions. Despite higher costs for firms, there is an expectation that retail prices for customers will be lower than purchasing. The combination of higher costs and lower prices means much tighter margins. ANTE suggests that firms can profit from repeated transactions; a proposition whose basic logic is accepted by authors across the sample.

Rather than aggregate data demonstrating the viability of rental, ANTE offers a handful of case studies to support the claim that "economic opportunities already exist for many of these models" (Ellen MacArthur Foundation, 2017, p. 73). The financial case for rental CBMs is implied by statements such as "Rent the Runway is a notable example in the US, renting more than USD 800 million in retail value of clothing in 2014" (p. 80; also Vasan, 2015). "Value" is here assumed to mean "revenue potential," i.e., if these clothes were sold at full retail they would have realized $800 million in revenue. Vasan, whose article is cited here and in ANTE, does not explain how the figure is reached. However, Rent the Runway's actual revenues from rental in 2014 were estimated to be a fraction of this amount—under $100 million (Greenfield, 2014; Pinnock, 2019; Amed et al.,

2019). If such exemplary cases are to provide a model for the rest of the industry, rental revenue would not replace the "avoided sales" revenue discussed above (see Supplementary Figure S3), though the overall market contraction might be reduced a small amount to 31%. Contextualizing the evidence supplied in ANTE gives a very different picture of the CF "opportunity."

4.2.4 Markets and people

Despite apparently dismal financial prospects for resale and rental, many authors across the sample agree that adopting CBMs is necessary and desirable offering opportunities for enterprise and job creation. Authors generally do not address the poor underlying cost and revenue structures of these models in the fashion industry. An exception to this general finding is the European Union Joint Research Council (2021) report which discusses "squeezing of economic conditions" (European Union Joint Research Council, 2021, p. 70) due to the changing regulatory and business environment for used textiles collectors in the EU. Some authors appear aware of this situation, while maintaining the incongruent position that there are opportunities for new entrants adopting CBMs. The UK EAC report cites evidence that "a glut of second hand clothing swamping the market is depressing prices for used textiles" (UK House of Commons Environmental Audit Committee, 2019, p. 7), yet also presses the case for CBMs arguing that "retailers could look to implement these, boosting the second hand market" (UK House of Commons Environmental Audit Committee, 2019, p. 54). The BFC observes that "the global market for used clothing is becoming increasingly crowded" (British Fashion Council Institute for Positive Fashion, 2021, p. 20), while also arguing that "the secondary markets are thriving and ready to be tapped into" (British Fashion Council Institute for Positive Fashion, 2021, p. 32). Another report simultaneously observes that "demand for pre-owned clothing globally lags behind the continuous increase of supply" (European Commission (EC) European Apparel and Textiles Organisation, 2019, p. 16) while claiming that "new business models for reuse, collective use, rental and prolonged life of clothes [indicate] a growth in the market for pre-owned clothing" (European Commission (EC) European Apparel and Textiles Organisation, 2019, p. 7).

Recycling technologies also receive attention with authors acknowledging that the outputs are not comparable to virgin fibers, the market for recycled fibers is limited, and textile-to-textile recyclers are not competitive or operating at scale. The UK EAC cites evidence that "the ability to recycle textiles into high value new products is limited. […] Demand from existing markets is low and hence the value that can be achieved for recycled textiles are low" (UK House of Commons Environmental Audit Committee, 2019, p. 36). The European Environment Agency notes that "textile recycling technologies are not yet fully developed, […] they still only service niche markets and need larger market uptake" (European Environment Agency: European Topic Centre on Waste and Materials in a Green Economy, 2021, p. 53). Nevertheless, the authors describe ambitions to expand opportunities for suppliers by "stimulating market demand for upcycled and recycled fibers and yarns" (European Environment Agency: European Topic Centre on Waste and Materials in a Green Economy, 2021, p. 53). The mechanisms proposed include a variety of tax incentives and subsidies for firms, as well as "inspirational media campaigns, television shows or the engagement of popular artists […] highlighting their uniqueness in order to reinforce the feeling of distinctiveness among customers" (European Environment Agency: European Topic Centre on Waste and Materials in a Green Economy, 2021, p. 53).

Overproduction and overconsumption in fashion are widely recognized problems. ANTE does not address overproduction, incorrectly attributing only 3% to liquidated overstock. The word overproduction is used twice in the EU textiles strategy, which fails to describe the problem, and offers inadequate solutions including "strongly [encouraging firms] to internalize circularity principles and business models" and a social media hashtag (European Commission, 2022, p. 8). Authors attributed overproduction and accompanying overconsumption to the "fast fashion" business model, arguing that "the primary mechanism […] to tackle this problem is the introduction and scaling of circular business models such as the repair, resale, and recycling of existing products" (PwC, 2024, p. 5; also European Commission, 2022; UK House of Commons Environmental Audit Committee, 2019). Only one author framed overconsumption as a logical complement of overproduction, as "consumers [respond] to lower prices and a greater variety by buying more items of clothing" (United Nations Economic Commission for Europe, 2019, p. 5).

Publications promoting the case for rental and resale often rely on extremely narrow participant samples. One study targeted the 4–14% of the population who are highly engaged with the current system and "love shopping" to "clearly [demonstrate] the potential mass market demand" (Waste and Resources Action Programme, 2020, p. 4). They cite market research claiming "confident fashion-forward shoppers" in the UK would spend "£200 or more per month on unlimited clothing rental" (Westfield, 2016). Official government data finds the highest spending 10% of households, comprised of multiple individuals, allocate £234 per month to all apparel (ONS, 2019) suggesting that the percentage of individuals likely to reallocate over £200 of expenditure to rental or subscription is a small fraction of the population. Authors employing larger data sets report numerous challenges for firms employing CBMs including "increasing market demand, convincing customers of product quality and competitive product pricing" (European Environment Agency: European Topic Centre on Waste and Materials in a Green Economy, 2021, p. 36).

Authors appear to share an aspiration for total system change: "a paradigm shift, that is reflected in the implementation of a different demand and consumption model, is crucial for the market" (European Commission (EC) European Apparel and Textiles Organisation, 2019, p. 66). Yet, they recommend employing existing marketing strategies, messages and capabilities of fashion firms to influence consumers. Customer groups that may "need convincing" to adopt rental or subscription models can be persuaded to do so by brands using "their vast marketing experience and capacity" (Ellen MacArthur Foundation, 2017, p. 33, 79–80). Authors encourage firms to "be bold in experimenting with new marketing and business models" (British Fashion Council Institute for Positive Fashion, 2021, p. 19) that will "make consumers feel good about actively taking part in a new system that provides sustainable solutions" (European Union Joint Research Council, 2021, p. 94). The value proposition and relationship to the customer is unchanged: make new models appear to be the "attractive and fashionable option" which "signals your membership as a smart, digitally-savvy type of person" (Ellen MacArthur Foundation, 2017, p. 33, 79–80). Recycled fibers are promoted using aspirational advertising (European Environment Agency: European Topic Centre on Waste and Materials in a Green Economy, 2021). CBMs should be "convenient and accessible," presented "in an attractive way"

through "the usual channels for shopping" (European Environment Agency: European Topic Centre on Waste and Materials in a Green Economy, 2021, p. 86–87). The "usual channels for shopping" are not examined. Rather, authors recommend reproducing existing practices: "replicating the retail models used for new clothing to resell second-hand clothes could be a viable growth model" (European Commission (EC) European Apparel and Textiles Organisation, 2019, p. 16). The vision of the circular fashion marketplace is one both radically different and remarkably similar to the existing fashion marketplace, in which the practices and culture of consumption remain unchanged.

4.2.5 Labor and technology

Across the sample, there is limited discussion of labor markets, or how textile workers might be impacted by a widespread shift to circularity. ANTE describes the vague ambition for a global apparel system that is "distributive by design, meaning value is circulated among enterprises of all sizes in the industry so that all parts of the value chain [sic] can pay workers well and provide them with good working conditions" (Ellen MacArthur Foundation, 2017, p. 22), but offers absolutely no detail on how this would be achieved. Labor issues are frequently siloed from discussion of business models. One report deems "social justice issues […] beyond the subject of enquiry" (European Commission (EC) European Apparel and Textiles Organisation, 2019, p.4). Another observes that labor issues are a blind spot for CBMs which could "reduce the need for sourcing and manufacturing activities" in exploitative conditions (Circle Economy, 2020, p. 12) by "putting millions of workers at risk" (p. 18) of unemployment.

Authors express concerns over abusive labor practices, yet only a minority discuss labor organizing at any length. The UK EAC report identifies "the limitations to technology-led productivity in an industry which requires manual labor" (UK House of Commons Environmental Audit Committee, 2019, p. 24) as a contributor to labor abuse, as firms pursue ever cheaper labor to prop up profits (also International Labour Organisation, 2019). It is unclear how circularity changes this dynamic. PwC advises that resellers can boost profitability by optimizing labor costs, a "core capabilit[y] within the fashion retail industry" (2024, p. 20). Others point to the use of unremunerated volunteer labor as a core component of successful circular textiles system (European Union Joint Research Council, 2021). Observers argue deployment of novel digital solutions like QR codes and RFID tags will aid management of used textiles (Ellen MacArthur Foundation, 2017; PwC, 2024) while textile collectors disagree, with under 20% considering uptake of these technologies (British Fashion Council Institute for Positive Fashion, 2022, p. 28). Used textile processing remains labor intensive with skilled manual sorting an "essential first step" (European Union Joint Research Council, 2021, p. 82). Shifting jobs into the "global waste management and recycling system [which] hinges on an informal labor force, without social protection, fair wages and working in unhealthy and unsafe conditions" (Circle Economy, 2020, p. 16) may not reduce dependence on exploited labor.

5 Discussion

5.1 Meanings and markets

The study demonstrates that the language and problem framing presented in ANTE have proved influential, shaping approaches to sustainable fashion across industry, national and international government. Authors agreed that circularity was an indivisible component of a sustainable fashion system. There is a clear and consistent emphasis on recycling, resale and rental business models attended by consumer behavior change. We found authors across the sample echoing phrases such as "highest value," "highest utility" and "underutilization," implicitly accepting the assumptions that attend their use.

We found that GL lacks a clear and consistent foundation of knowledge or even shared definitions to support these key concepts. Both the citation and content analyses showed that academic literature and validated knowledge models have limited penetration in the sample surveyed. A systems approach is advocated by many authors who never refer to the concepts of systems thinking literature or theory. Policy prescriptions invariably target low leverage points, including parameters and material flows, while neglecting high leverage points like system rules and power structures (Meadows, 1999). The system retains its structure, with outflow redirected to inflow (Six, 2016).

The study found that specific definitions of key concepts were rarely offered and there was no consistent connection between vocabulary and concepts. We observed that vague and generic usage of the term "value chain" obscured clear units of analysis. Slapdash use of "value capture" failed to differentiate between the roles of distinct actors. The lack of any consistently identified unit (s) of analysis and sloppy use of business jargon shifts focus to an easily identified unit in the fragmented and shifting landscape of value—the product.

Across the sample, we found an implicit shared understanding of value as a property embedded in materials and products. From this perspective "value" is added to materials through production processes occurring along the "value chain," before being used up by the customer (who may do so partially, leaving "residual value" to be "extracted"). The visual metaphor of adding value as links to a chain is concrete, intuitive and wrong. Scholars broadly agree that the locus of value is not in products but the phenomenological experience of the beneficiary or customer (Porter, 1985; Holbrook, 1999; Vargo and Lusch, 2004, 2016, 2017; Vargo, 2021). We found that in embracing the idea of value as embedded in products to be consumed by beneficiaries, authors across the sample displayed an understanding of value and value creation that is incompatible with existing knowledge and theory.

The research demonstrates that the CF proposal simultaneously ignores the role of the market in setting prices while placing existing consumer marketing practices at the heart of its solution. Addicted to revenue growth and cheap inputs, the promise of new revenue streams from resale and rental is alluring for retailers and brands. However, we show that displacing high-margin sales of new garments with lower-margin rental or resale at the scale proposed would result in negative revenue growth. The calculations suggest that the more successful CBMs are in displacing new production, the larger the resulting contraction in revenues would be. The possibility of adding resale and rental to existing revenues is dismissed, because existing production with its numerous adverse impacts would not be reduced in this scenario.

What of the $460 billion of "lost value"? Let us be blunt about what this represents: it is revenue currently received by fashion firms for selling customers clothing they do not need. We did not find the customer directly addressed in the GL surveyed, and their perspectives are largely absent. Authors described a need to "empower" consumers yet advocated the market-making mechanisms, messages and hashtags that brands and retailers use to drive consumption as the preferred levers for consumer behavior change. Rooted in low-priced access to

status signaling, speed, convenience and aspirational hedonism, these customer value propositions uphold the ideals of the current system.

The study revealed a problem framing which implicates customers in unsustainable practices, while ignoring the accountability of industry actors. We found this problem framing was implicitly adopted by authors across the sample with its attendant solution of CBMs. While few could dispute that customers do discard useable clothing, when vast quantities of new, unused, unsold apparel are routinely liquidated, landfilled, incinerated or simply dumped in the open landscape (Wijnia, 2016; Cobbing and Vicaire, 2017; Changing Markets Foundation, 2023), it does not follow that high throughput is the result of underutilization by customers. It appears that supply is outpacing customer demand. Overproduction is rampant in the fashion industry, yet we found no discussion of the problem or its underlying causes. Overwhelmingly, GL authors simply assumed that uptake of CBMs would end overproduction. References to systemic approaches, such as degrowth or sufficiency, were absent.

We found that CBMs, the proposed solution to overproduction, are generating feedback loops (Meadows, 1999) in secondary textiles markets. GL authors insist, against their own evidence, that there are opportunities in rising demand for second-hand clothes. But supply is rising even faster. The basic feedback mechanisms and ultimate outcome of supply outstripping demand in commodity markets have long been recognized by economists: price goes down. These are precisely the conditions observed in global markets saturated with both new and used textiles in which demand has plateaued. We argue that this an example of a market failure with attendant loss of social welfare. Further, the CF proposal relies on expansion into longstanding secondary markets to resolve the failure of the primary market, thereby creating new failures in the secondary market. Without a coherent foundation of knowledge, valid premises, or understanding of system dynamics the CF "solution" is creating new problems. Where other authors suggest the CE is constrained by neoliberal, market or growth logics (Siderius and Zink, 2023; Schröder et al., 2019; Fletcher and Tham, 2019; Niessen, 2022), we argue that the CF proposal is untethered from such logics.

The study found issues of labor exploitation and organizing are treated separately to discussion of other proposed changes to the system. We argue that firms operating on tighter margins and lower profits are unlikely to change exploitative labor practices or invest in technology. A widespread shift to CBMs could see employment prospects for garment workers worsen. Rather than sew cheap clothes for poverty pay, exploited workers will sort the soiled laundry.

5.2 Narratives

The CE is often discussed in terms of a paradigmatic change to production and consumption. Globalized and largely deregulated, fashion provides an archetypal neoliberal market. New entrants frequently disrupt the market, employing technology, innovation and new business models to provide low-end goods at lower prices (Bower and Christensen, 1995). Consumer choice appears unlimited in our algorithmically personalized malls of infinite scroll. Proponents of CF argue that this ideal neoliberal market is failing to produce public good. We found GL authors arguing for a range of regulations, incentives, subsidies and tax breaks intended to create asymmetrical benefits or protections for a subset of firms. These are not neoliberal "free market" policies. These policies specify a fashion marketplace that is regulated and intentionally picking winners. When the prevailing economic paradigm appears to be failing, we argue for understanding CF as one of many potential new models for a future fashion system (Kuhn, 2012). Such a proposal can only survive as a functional model if its premises can be validated against available observations.

Our findings suggest there has been a widespread failure of scrutiny and basic due diligence on the CF proposal. The prices of used textiles and Rent the Runway's revenues were available to journalists, the public and the authors of ANTE in 2017. Yet, in place of robust, contextualized evidence, the report uses cherry-picked data and anecdotal evidence to support its proposal. It employs faulty reasoning, reversing causation of high throughput and underutilization. These findings raise vital questions about the role—and competence—of advocacy organizations in the policy-making process, and how their recommendations are taken up by governments and firms. As examples, McKinsey & Co are credited with conducting the analysis underpinning the $500 billion "opportunity," and the Boston Consulting Group supports Global Fashion Agenda. In CF, advocacy appears to provide under-scrutinized consulting firms and their conflicting interests (Mazzucato and Collington, 2023) with a vector to penetrate and shape public policy-making.

We argue that GL has controlled the narrative and research agenda of sustainable fashion, diverting attention and resources away from alternative potentialities. Advocacy organizations publishing GL can cultivate the appearance of neutrality, while advocating for the powerful in a contested policy space, disseminating "destructive knowledge" that delays effective policy-making and regulation (Plehwe, 2015). We argue that CF allows resources and attention to be directed toward maintaining the status quo position of brands and retailers, upholding actors and structures of power. This is confirmed by academic literature reviews which subsequently find it is "internal fashion stakeholders, who design, manufacture, distribute, and sell fashion products that can enable the acceleration of CF the most" (Ki et al., 2020, p. 2419). For "internal fashion stakeholders" to control the pace of change is the purpose of CF and its discourse coalition. It is unclear how long industry will pursue the mirage of circular revenues. If profits do not materialize, investment in new technologies will not be forthcoming. We suggest that firms will continue on their path of lucrative exploitation, selling customers clothing they do not need, as long as it is profitable.

Academic researchers have lent their credibility to GL by citing these reports as cogent and authoritative sources, when they might have critically scrutinized their plausibility and validity. It appears that the system of evidence-based policy-making has been inverted to provide evidence and theory to support policy prescriptions developed in the absence of evidence-based models or validated knowledge. Rather than generating knowledge, researchers "contribute to the generation of socially constructed ignorance by legitimizing the claims of the circular business model" (Giampietro and Funtowicz, 2020, p. 68). Alternative proposals for production-consumption models are needed (e.g., Fletcher and Tham, 2019), but are not sought, supported through research funding, or informing policy.

5.3 The train that wasn't there at all

We argue that economic growth is an extremely unlikely outcome of implementing the proposed shift to CF. The study shows

that the posited growth opportunity is based on faulty reasoning, invalid premises and mistaken mathematical modeling. Nor does the GL conceptualization of CF align with stronger sustainability proposals. The failure to address the elephant of overproduction demonstrates the concept's opposing alignment to degrowth or sufficiency approaches which demand the end of unnecessary production. Like the Emperor's superlative suit in Andersen's fable, we argue the transformative opportunity described in GL is a legend comprised of fine words with no substance (Giampietro and Funtowicz, 2020).

6 Conclusion

We recognize there are many, serious, wicked problems arising from the current fashion system. However, we argue that effective solution proposals must be based on verifiable knowledge and/or observable reality. The idea that CF offers a significant opportunity to solve problems while achieving revenue growth does not meet this test. The CF proposal fails to identify observable problems, fails to offer adequate solutions, and fails on its own terms of producing economic growth. In CF, the process of evidence-based policy-making appears to be running in reverse, with research co-opted to provide support for a policy developed in the absence of evidence, established knowledge or validated models. A new fashion paradigm is needed, however, we argue that CF should be understood as one proposal among many that have not been promoted, funded, supported or yet developed to meet that need.

This paper is limited by the space available to elaborate a more detailed and wide-ranging critique of the CF concept. The concepts of waste and design are central to CE but are not addressed here. Other perspectives might be emphasized, such as conceptualizations of labor and technology, which are not treated in depth. Reference to specific theorists who engage deeply with the issues raised could develop more pointed critiques. A different sample of GL might rebalance the weight of issues raised. A more careful distinction between the publications of policy-making and policy-influencing organizations, or comparison with academic proposals for the fashion system could yield new insights.

Future academic research in this and similar areas should include critical appraisal of GL. Alternative discourses and complementary concepts, such as "degrowth-oriented" and "sufficiency-oriented" approaches to CE represent potential further avenues of research, which are outside of the scope of this study. A wide variety of alternative proposals and validated models for change are urgently needed and should be prioritized for funding. To those researchers who care about solving the many observable problems in the fashion industry: let us all stop pretending we can see an opportunity that does not exist. We need not carry the Emperor's train.

Author contributions

TH: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Visualization, Writing – original draft. KK: Funding acquisition, Supervision, Writing – review & editing. MK: Supervision, Writing – review & editing.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

Supplementary material

The Supplementary material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/frsus.2025.1499273/full#supplementary-material

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