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RESEARCH AND ANALYSIS

Critiques of the circular economy

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Abstract

This paper presents a reasoned account of the critiques addressed to the circular economy and circular business models. These critiques claim that the circular economy has diffused limits, unclear theoretical grounds, and that its implementation faces structural obstacles. Circular economy is based on an ideological agenda dominated by technical and economic accounts, which brings uncertain contributions to sustainability and depoliticizes sustainable growth. Bringing together these critiques demonstrates that the circular economy is far from being as promising as its advocates claim it to be. Circularity emerges instead as a theoretically, practically, and ideologically questionable notion. The paper concludes by proposing critical issues that need to be addressed if the circular economy and its business models are to open routes for more sustainable economic development.

KEYWORDS
circular economy, circular business models, critique, industrial ecology, review, sustainability

1 | INTRODUCTION

For the philosopher Michel Foucault, "[a] critique does not consist in saying that things are not good as they are. It consists in seeing what kinds of self-evidences [French: *évidences*], liberties, acquired and non-reflective modes of thought, the practices we accept rest on" (Foucault, 1982, p. 33). Critique is for him a creative tool for transforming ways of thinking, seeing, and acting. Because critique debunks incoherence, incompleteness, hidden assumptions, unthought-of consequences, and the like, it helps keep open for reassessment that which may otherwise slide into taken-for-grantedness regardless of its truth value and operational efficiency.

Inspired by this view of critique, as a means to point out issues that are otherwise considered problem free, in this paper we bring together the critiques addressed to the circular economy, with a focus on the academic critiques addressed to the European conception of the circular economy (see McDowall et al., 2017). In just a few years, the circular economy has emerged as a key principle for the industrial and environmental policies in China (Winans et al., 2017; Zhu et al., 2019), Africa (World Economic Forum (WEF), 2020), the European Union (EU) (Völker et al., 2020), and the United States (ReMade Institute, 2021), as well as for a growing list of corporations and local governments (see, for example, the strategic partners of the Ellen MacArthur Foundation, 2017). Its advocates tout it "as a regenerative system in which resource input and waste, emission, and energy leakage are minimized by slowing, closing, and narrowing material and energy loops thanks to long-lasting design, maintenance, repair, reuse, remanufacturing, refurbishing, and recycling" (Geissdoerfer et al., 2017, p. 759). The circular economy is to bring about perfect circles of slow material flows, to prompt a shift from consumer to user, and to enable a decoupling of resource use and environmental impact from economic growth (Lazarevic & Valve, 2017). Correspondingly, circular business models are to reduce costs, increase revenues, and manage risks, as well as provide possibilities for the finance sector to contribute to a transition to sustainability (Ellen MacArthur Foundation, 2020).

Yet, the European concept of the circular economy and circular business models are also widely questioned on their premises, practicality, and consequences. Critiques of the current infatuation with circularity are disparate and scattered over different academic fields, for example, ecological economics, management, and human geography. To do justice to the relevance of these critiques, we present here a reasoned account of the issues with circularity that are raised in the critiques. Based on a selection of nearly a hundred academic publications and a selection of reports, we show that the possibilities to develop circular material flows are questioned in their theoretical, practical, and ideological grounds, as well as in terms of social and environmental impacts.

In particular, these critiques suggest that policy advocacies of the circular economy appear to be "approbatory, uncritical, descriptive and deeply normative" (Gregson et al., 2015, p. 219), to support a deliberately vague, but principally uncontroversial circular economy (Lazarevic & Valve, 2017), and to feature a consensual win–win policy that is particularly difficult to criticize (Kovacic et al., 2020) despite the lack of any actual consensus on the magnitude of eventual economic, social, and environmental "win–win–win" benefits (Aguilar-Hernandez et al., 2021). While this vagueness might be perceived as a strength by policy-making actors, the win–win policies restrict the focus only to conflict-free solutions and strategies. Thereby, initiatives outside the win–win paradigm that address the conflicts, trade-offs, and problems of leaving the linear economy are overlooked (Völker et al., 2020), and this might result in circularity becoming naturalized with little space for critical and hesitative reflection (Lazarevic & Valve, 2017).

As this paper shows, the circular economy and circular business models are open to a wide range of critiques that go beyond mere declarations of principles about the necessity and possibility of a transition to circularity, and they delve into what a transition to circularity would actually require and offer and therefore provide a more realistic frame for such a transition. There are numerous circular economy reviews (recent examples include Acerbi & Taisch, 2020; Centobelli et al., 2020; Sarja et al., 2021; Schöggl et al., 2020), but none, to our knowledge, that specifically focus on the critiques of circularity. Our contribution in pragmatic terms is to bring together these critiques and let them point, often in terms that are near to how the critiques are formulated, at issues that need to be addressed if the circular economy and circular business models are to actually open routes for a more sustainable economic development.

Our paper begins by first reviewing and discussing the critique of circular economy practicalities related to its definition, implementation, and effects. Next, the ideological underpinnings of the concept will be interrogated and discussed. Lastly, the paper concludes by proposing critical issues that the emerging circular economy community needs to take much more seriously if it is to reach its radical promises.

2 | THEORETICAL, PRACTICAL, AND POLITICAL CRITIQUES

2.1 | Definitional quagmire

Although often presented as a revolutionary innovation, the circular economy is not a new idea.

> It is another rehearsal of how to imagine a reconciliation and compatibility of economic and environmental concerns that already was expressed by the terms 'sustainable growth', 'green growth' and 'sustainable development'; the 1990s and 2000s imaginaries of ephemeralization or dematerialization of the economy; and already with the Brundtland Commission's concept of (simultaneous) environmental, social and economic sustainability (…). (Völker et al., 2020 p. 116)

Circularity is viewed "as a refurbished rather than […] virgin concept" (Reike et al., 2018, p. 247). The various strategies aimed at prolonging resource use that are gathered together under the circular economy's banner are not new individually, and if the concept offers some newness, it is by offering a new framing of these strategies as well as an ability to connect them (Blomsma & Brennan, 2017).

The circular economy builds on a heterogeneous collection of scientific and semi-scientific concepts, for example, "ecological economics, industrial ecology, cradle-cradle design, […] performance economy, biomimicry, eco-efficiency, resilience science, natural capitalism, and cleaner production" (Korhonen et al., 2018b, p. 549). Over a hundred definitions of circularity have been inventoried, with the consequence that the term means different things to different people (Kirchherr et al., 2017). This could be because the concept and its application have almost exclusively been developed and driven by practitioners, that is, policy makers, businesses, business consultants, business associations, business foundations, and so on (Korhonen et al., 2018a). As the then chairman of the International Solid Waste Association (ISWA) noted "[t]here is no single commonly accepted definition of the term "circular economy", but different definitions share the basic concept of decoupling of natural resource extraction and use from economic output, having increased resource efficiency as a major outcome" (Mavropoulos & Nilsen, 2020, p.xxxiii).

Moreover, there are distinct differences, separations, and exclusions between research communities engaged in circular economic research, for example, between scholars in engineering and in business (Korhonen et al., 2018b). Hence, different definitions of circular economy are typically adopted for different theoretical uses (Kirchherr et al., 2017). As a result, the circular economy then becomes characterized by its conceptual fragmentation (Blomsma & Brennan, 2017; Korhonen et al., 2018b) and a perceived lack of paradigmatic strength (Inigo & Blok, 2019).

The upshot is the perception that the circular economy does not address ontological and epistemological questions, such as what is considered of ethical value, that underlie the complex and interrelated environmental, social, and economic issues that we face today (Temesgen et al., 2021). It is indeed easier to say what the circular economy is not than to say what it is (Kovacic et al., 2020). The circular economy "is not a theory but an emerging approach to industrial production and consumption" (Korhonen et al., 2018b, p. 551). It is rather a multiplicity (Corvellec et al., 2020), an umbrella concept that creates excitement and enthusiasm as it seemingly provides a new framing able to resolve many problems, but it comes under increased scrutiny when attempts at operationalization bring to the surface unresolved issues regarding its definition (Blomsma & Brennan, 2017). The diversity of meanings given to the circular economy may explain the appeal of the notion (Velis, 2018), but this also makes it hard to know what it is actually about.

This is why the circular economy has been referred to as different things, for example, as a patch adaptable to changing circumstances (Fitch-Roy et al., 2019), as a vague narrative (Niskanen et al., 2020), as a horizon (Lazarevic & Valve, 2017), and as a floating (Niskanen et al., 2020) or empty signifier (Valenzuela & Böhm, 2017) lacking any substance of its own.

2.2 | A neglect of established knowledge

A recurrent critique that is addressed to the circular economy literature is that it ignores much established knowledge. In particular, it neglects the thermodynamic teaching that one can neither create nor destroy matter; whatever resources are used up must end up in the environmental system somewhere, they cannot be destroyed but only converted and dissipated (Giampietro & Funtowicz, 2020; Pearce & Turner, 1990). A circular economy future where waste no longer exists, where material loops are closed, and the place products are recycled indefinitely is therefore, in any practical sense, impossible:

> Every loop around the circle creates dissipation and entropy, attributed to losses in quantity (physical material losses, by-products) and quality (mixing, downgrading). New materials and energy must be injected into any circular material loop, to overcome these dissipative losses. (Cullen, 2017, p. 483)

In other words even cyclical systems consume resources and create wastes and emissions (Korhonen et al., 2018a), and the energy required to operate a circular economy (Allwood, 2014) therefore calls for a shift to renewable energy (Haas et al., 2015) if a transition to circular material flows is to be realized. Congruently, the term "circular" can be misleading if it evokes industrial systems modeled according to an understanding of nature as a circular system that is stable, closed, and zero waste—a Spaceship Earth fantasy theorized by Boulding (1966) and reinforced in later works—whereas modern ecological theory tends to construct the planet as an evolving open system of resilience in dynamic equilibrium or non-equilibrium (Skene, 2018).

Limitations in material properties and the manufacturing and reprocessing technologies constitute another hindrance to closing material loops that appears to be ignored (Velis & Vrancken, 2015, p. 774). Dissipation in the environment (Cullen, 2017), contamination (Baxter et al., 2017), and wearing down of materials (Parrique et al., 2019) all set limits on how circular any economy can become. In particular, the circular economy falls short of acknowledging and fully addressing the complexity of waste, for example, that discards are a changing reality with new waste streams appearing all the time (Mavropoulos & Nilsen, 2020). Critiques bring forth that waste perception has a strong impact on waste management and disposal (Korhonen et al., 2018a), that recycling markets are unpredictable and display high degrees of volatility (Traven, 2019), that toxic wastes cannot be recirculated (Johansson et al., 2020), that a substantial share of waste is processed by the informal sector (Luthra, 2019; Zapata Campos & Zapata, 2013), and that energetic waste dominates both economic and biological arenas but is not encompassed by recycling practices (Skene, 2018). The critiques consider that the circular economy also underestimates the practical difficulties of connecting waste streams to production and of substituting secondary goods for primary goods (Zink & Geyer, 2017). Considering waste as a resource may even, paradoxically, increase the demand for waste rather than reduce waste volumes (Greer et al., 2021). "To put it another way, the future waste is already here, so a real circular economy approach should take into consideration how we deal with massive stocks and the involved secondary materials" (Mavropoulos & Nilsen, 2020, p. 90).

This neglect of established knowledge extends to how specific organizational advocates of the circular economy understand consumption. Advocacies of the circular economy and circular business models have been found to adopt a simplified understanding of consumption reduced to purchasing and recycling (Casson & Welch, 2021) and of citizens as consumers and of consumers as users (Hobson, 2019) where citizens are given the role of "accept[ing] (or not) practices that have been formulated on their behalf by designers, engineers, economists and policy-makers" (Hobson, 2016, p. 99). Circular strategies also ignore the substantial amounts of consumed material and artefacts that are stocked in homes, companies, and infrastructures (Fellner et al., 2017; Moreau et al., 2017). The research and practices of circular economy focus on manufactured flows rather than stocks. And yet the potential rebound effect, also known as the Jevon's paradox, is one unresolved issue for the circular economy, where efficiency improvements at the level of individual products are offset by a growth in consumption and usage of materials (Schröder et al., 2019; Siderius & Poldner, 2021). Such eventual substitution effects might be particularly prominent in developing economies (Zink & Geyer, 2017). In addition, cir-

culation practices may retain hazardous substances in the economy that should really be phased out and thus increase the dispersion of hazardous elements (Johansson et al., 2020).

Finally, the critiques indicate that there is a lack of inclusion from indigenous discourses from the Global South even though these communities share the same ambitions of creating regenerative systems that sustain, restore, and are respectful of the Earth. This exclusion has the attendant danger of recreating "anthropocentric and ethnocentric ideas" that stem from "westernised environmental discourses" as opposed to the desire for ecocentricity that a circular economy proclaims (Calisto Friant et al., 2020, p. 6).

2.3 | Unclear implementability

Despite the broad endorsement that the circular economy enjoys, it has seen limited implementation so far (Kirchherr et al., 2018). The concept circulates widely as an idea and ideal, with stakeholders, scales, and different sectors identified; however, the "practicalities" (Holmes et al., 2021, p. 63) and actual enactments are limited and fragile (Gregson et al., 2015). Critiques explain this by pointing out implementation difficulties that take place at the three levels of policies, organizations, and individual consumers.

At the policy level, if one focuses on the EU, circular economic practices have been developed without any clear discussion or consideration of system boundary limits (Inigo & Blok, 2019; Korhonen et al., 2018a). For example, the EU's policy expresses clear material ambitions, while its ambitions in matters of social justice and environmental protection remain more diffuse (Flynn & Hacking, 2019; Kovacic et al., 2020; Schröder et al., 2020). Its technocentric perspective builds on a gap between a holistic discourse and end-of-pipe policies that focus on growth and competitiveness rather than on the socio-ecological challenges of the 21st century (Calisto Friant et al., 2021). Policy instruments are only suggested to promote circulation, rather than to obstruct the legacy of the linear economy. Likewise, implementation efforts in the waste sector follow a top-down approach that promotes a single, centralized, waste treatment technology, that does not take into consideration the low predictability of the waste sector, and that limits the possibilities to adapt to changing circumstances. For example, the Croatian Government's ambition to open large-scale waste administration centers equipped with mechanical biological treatment followed a decision-making process that did not allow for flexibility in dealing with the downturn in the economy, changes in waste legislation, and reduced demand that left the country with redundant waste-management centers (Traven, 2019). More generally, initial European efforts at circular economy implementation were characterized by an absence of stakeholder engagement and a fragmented vision and governance that prevented systematic implementation (Inigo & Blok, 2019; Winans et al., 2017). This combined incertitude on system boundary limits, unpredictability of the waste sector, and unclear governance all contribute to the difficulties in measuring, assessing, and improving the circularity of the economy (Haas et al., 2015; Schröder et al., 2019) and only add to the risk of developing sub-optimal practices (Webster, 2013) and make it hard to know what kind of circular future is being created in relation to the promised ideals (Völker et al., 2020).

Similar issues appear at the organizational level of circular business models. First, there are a great variety of circular business models with different approaches to circularity (Geissdoerfer et al., 2018), with companies making claims to promote circularity but actually limiting their efforts to only certain parts of their activities (Stål & Corvellec, 2018). Moreover, whereas linear business models are validated as soon as a certain number of products or services have been sold, a circular business model is not validated until recirculated products have been sold (Linder & Williander, 2017), even if one ambition is to recirculate materials as little as a single time. Second, there are numerous barriers to circular business model developments, including "technical barriers such as an inappropriate technology, or lack of technical support and training; economic barriers such as capital requirements, high initial costs, or uncertain return and profit; institutional and regulatory barriers such as a lack of a conducive legal system, or a deficient institutional framework; and social and cultural barriers such as a rigidity of consumer behaviour and businesses routines" (de Jesus & Mendonça, 2018, p. 78). Companies also lack capabilities to implement circular economy business model innovation (Pieroni et al., 2021), and as a result "to date, most firms are failing in translating the [Circular Economy] concept into their business operations" (Khan et al., 2021, p. 1). Third, there is a lack of means to measure the actual circularity of a business model (Veleva et al., 2017).

Some circular business models can only work under very specific conditions, for example, the spatial proximity between entities (Winans et al., 2017); in some models companies retain ownership of products, which increases "the magnitude of invested resources at risk" against the time it takes to validate the business model (Linder & Williander, 2017, p. 193); and for all models unresolved questions remain about how to avoid linear lock-ins and how to deal with trade-offs (Schröder et al., 2019). This is explained as follows:

> Although there are few but often cited case examples of companies that successfully integrate offerings like selling long-lasting products with repair-services (e.g., Miele, Rolex, or Patagonia); reselling used, repaired, refurbished, and remanufactured products (e.g., Arrow Value Recovery or Interface); or providing access and/or performance- and results-based solutions (e.g., Xerox or Philips), they tend to be premium and luxury brands, niche players, or companies that implement [business models] to slow resource flows down to improve their reputation and image while ensuring a long existence and competitiveness with linear [business models] targeted for growth (e.g., H&M's clothing return initiatives or automobile manufacturers' car sharing initiatives). (Hofmann, 2019, p. 369)

Linear technologies retain their market position despite their inefficiency (Korhonen et al., 2018a), and circular innovations are hard to scale up (Brandão et al., 2020). Circular business models thus end up being not as radical as one might imagine; in particular, they fail to address the roots of the persistent resource problems that they are supposed to solve, in particular in globally fragmented and dispersed value creation networks (Hofmann, 2019).

Considering the "supply limitations, and price volatility" (Babbitt et al., 2018, p. 1), inferior quality (Zink & Geyer, 2017), contamination (Baxter et al., 2017), legacy substances (Goldberg, 2017), and other inherent uncertainties (Linder & Williander, 2017) in secondary resources, it is difficult to see why anyone at the firm-level "would be interested in using waste as a resource in a circular economy instead of the well-functioning value chains with primary resources" (Johansson & Krook, 2021, p. 1).

At the individual level of consumers, the circular economy meets similar structural challenges. Within the critiques, there is a view that not much attention has been paid to what customers value in circular business models and how they respond (Hobson & Lynch, 2016), with the indication that they are lacking awareness of and interest in circular offerings (Kirchherr et al., 2018).

The lack of consumer interest is a common problem for green offerings. However, in difference to, for example, switching fuels from fossil oil to biofuels, the circular economy requires a radical reformulation of the consumer role — from consumer to user (Lazarevic & Valve, 2017). Hence, replacing traditional ownership with dematerialized services may neither appeal to consumers nor always be feasible (Hobson, 2019), and with so many information commodities consumers might not be willing to spend the time to read, scroll, and share (Vonk, 2018). The circular economy premise that the current complex and overdetermined systems can be redesigned and reconstructed "*en masse* and *in toto*" (Hobson, 2016, p. 93) may be flawed. This flaw can be all the truer when a transition to circularity is supposed to personify the economic pathway to sustainability:

> When the feeling of an iPhone turning 'old and slow' is combined with the feeling of an iPhone being circular or 'green by design', any critical, politicizing impulse in the environment-wary consumer gets repressed by the intense want for the newest iProduct. (Valenzuela & Böhm, 2017, pp. 25–26)

Circular consumption puts consumers in front of hard to solve choices and trade-offs, whereas the basic technological fix orientation of the circular economy approach, and its ecological modernist idea of gradually adapting the current production system to the limitations of the material resource, tends to leave aside the temporality and spatiality in which consumption occurs (Holmes et al., 2021), the sociopolitical aspects of consumption, and the possible need for adequacy-oriented lifestyles (Schulz et al., 2019). The circular economy assumes the emergence of a new consumption culture, but again without a clear link to scientific research (Korhonen et al., 2018a). Repairing toasters and articles of clothing one at a time can change everyday material relations from use and disposal to care and stewardship (Hobson, 2019), but issues of ownership (Ghisellini et al., 2016; Velis & Vrancken, 2015) and power (for example, who gains the most from circularization) (Korhonen et al., 2018a) remain systematically underplayed.

2.4 | Unclear contributions to environmental and social sustainability

The circular economy comes with a promise of green growth and thus a decoupling of economic growth from its environmental impact. However, this potential decoupling effect is brought into question, and building circular material flows is seen by some as a means whereby decoupling takes place, but should not be an end in itself (Blum et al., 2020).

The differences between circular economy and sustainability are often blurred despite the fact that the latter is more holistic. Underpinned by a broader variety of institutional commitments, and as a synonym for a more extensive set of risks and opportunities (Geissdoerfer et al., 2017), the questionable conceptual relationship between the two ideas has yet to be thoroughly characterized (Millar et al., 2019). For instance, it focuses on the resource base and waste sink functions and omits the amenity base and life-support features of the surrounding environment (Inigo & Block, 2019). It addresses neither the "critical importance of land as the basic source of biomass, energy, and mineral reserves" (Winans et al., 2017, p. 829) nor the issue of the "physical flows of materials and energy cross organizational, administrative and geographical boundaries" (Korhonen et al., 2018a, p. 42), whereas it should encompass "the complex network of primary flows required to sustain the functionality of the biosphere within which the economy is operating" (Giampietro & Funtowicz, 2020, p. 66).

The circular economy is presented as the practical solution to the sustainability challenge, but it underestimates the challenge (Müller-Christ, 2011; Murray et al., 2017). For example, it revolves around a relatively small fraction of materials in the global throughput (Åkerman et al., 2020), the short-term and long-term environmental impacts remain unknown when designing reuse, remanufacturing, and recycling projects (Korhonen et al., 2018a), it is uncertain on what level circular products can actually substitute for conventional linear products (Hart & Pomponi, 2021; Zink & Geyer, 2017), and whether circular business models can deliver sustainable value needs to be assessed on a case by case basis through a systematic approach taking into account all stakeholders (Manninen et al., 2018). This is problematic because the environmental benefit of the circular economy rests largely on this premise. Moreover, in today's global market, few products are manufactured, purchased, disposed of, and recycled in the same geographic location, thus leading to vast transfers of resources across the globe (Skene, 2018). The reuse of waste in new activities

would therefore require a challenging global reorganization of consumption and production (Savini, 2019). Therefore, it is not clear how a circular economy can deliver a globally sustainable satisfaction of human needs within the planetary boundaries (Schröder et al., 2019).

Consequently, some consider that the only difference between a linear and a circular economy is that the negative environmental impact will take longer to occur in a circular economy (Millar et al., 2019). A circular economy might even exacerbate rather than alleviate the effects of climate change due to its inability to displace primary production (Zink & Geyer, 2017). It is therefore important to dispel the myth that circular systems are necessarily more environmentally sustainable than linear systems (Brandão et al., 2020).

It has been argued that because engineering and natural sciences lay the ground for most knowledge behind the circular economy (Korhonen et al., 2018b), the circular economy shows a neglect of the social pillar (Blomsma & Brennan, 2017; Murray et al., 2017; Sauvé et al., 2016) from business routines, consumption patterns, and alternative approaches to circularity (Schulz et al., 2019) to socio-ethical issues (Inigo & Blok, 2019):

> It is unclear how the concept of the Circular Economy will lead to greater social equality, in terms of inter- and intra-generational equity, gender, racial and religious equality and other diversity, financial equality, or in terms of equality of social opportunity. These are important moral and ethical issues which are missing from the construct. (Murray et al., 2017)

The circular economy side steps its own socio-economic pre-requisites and implications, being all but silent on what a circular economic society might look like: "What form then could and should circular socio-economic institutions, norms and shared practices take, and what processes, values and actors will get us there?" (Hobson & Lynch, 2016, p. 16). A circular economy can bring with it prosperity and a socially positive footprint, but also make life worse for many: "…even by hiding or graying that there will be winners and losers… circular economy is not a neutral system, it will be materialized through a broader social-political framework, and there is no guarantee that the final results will be positive for societies" (Mavropoulos & Nilsen, 2020, p. 4).

This means caring for things, and people can work in concert or in opposition (Isenhour & Reno, 2019). There is therefore a need "to ensure that the actual and perceived societal benefits of a new circular model are established in a more fundamental and sound manner than just traditional cost-benefit analysis, which is an insufficient tool to describe transformation at a systems level" (Velis, 2018, p. 3). Otherwise, there is an overwhelming risk that priorities will ignore social concerns.

3 | AN IDEOLOGICAL AGENDA DOMINATED BY TECHNICAL AND ECONOMIC CONSIDERATIONS

3.1 | The circle as an enticing metaphor

Coming from industrial ecology, the metaphor of the circular economy is enticing but remains unclear. Mythologized as being circular, waste free, and sustainable (Valenzuela & Böhm, 2017), the concept raises questions as to what it is that shall be circular? Or can an economy become a perfect circle? There is an enticing promise of perfection, wholeness, and eternity, but the simplicity of its grounding metaphor is misleading as it evokes a modernist variant of the myth of eternal return (Corvellec et al., 2020). When scrutinized, the reality of this idealized circular economy model (Kama, 2015) reveals that "these visions of circular economy are just that," with limited insights into how industries are to reorder their activities to realize the ideal (Gregson et al., 2015, p. 224).

The circle metaphor should not be discounted because it is certainly popular and powerful (Fitch-Roy et al., 2019) and may trigger creative thinking. However, visions of the circular economy may also give promises that cannot be reached, and "without careful explanation of limits and the circumstances in which it can succeed, the [Circular Economy] repackages [Industrial Ecology] principles in a reductive manner, potentially misleading industry stakeholders and consumers" (Cullen, 2017, p. 485).

3.2 | A corporate-led model

As a reformist agenda, the circular economy has appeal to policy makers because it promises a win–win outcome, shifting attention away from "trade-offs and constraints" to "synergies and opportunities" under the guise of a suitable policy framework (Völker et al., 2020, p. 116), in which many policy buzz words becomes circularized (rather than greenified), for example, "circular business," "circular innovation," and "circular entrepreneurship". If the circular economy is intended to create radical system transformation, then despite the revolutionary language, it thus far has failed to do so and has yet to "disrupt the status quo in terms of power, norms and politics" (Hobson & Lynch, 2016, p. 17). For example, EU institutions adopted the closed-loop economy in the 1970s, and this has been reformulated numerous times allowing the development of new policies, such as the EU circular economy package, without critical reflection on the success and implementation of previous policies (Fitch-Roy et al., 2019).

Addressing the political ambitions associated with the circular economy, critiques emphasize the drawbacks of policies that rest on markets and corporations as driving forces, with public authorities as scene builders (Hobson & Lynch, 2016; Völker et al., 2020). The circular economy narrative

is viewed to be wedded to the neo-classical and conventional economics' trust in the efficiency of markets (Bimpizas-Pinis et al., 2021; Corvellec et al., 2020; Skene, 2018) and to ignore concerns raised by "industrial ecologists and environmentalists that a selective focus on recycling will not be enough to solve" large-scale production and consumption challenges (Temesgen et al., 2021, p. 14). In seeking to maintaining a growth-based economy, critics argue, the circular economy "tinkers with the current modus operandi" (Skene, 2018, p. 484) of "consumerism, extractivism and (liberal) capitalism" (Niskanen et al., 2020, p. 8), while bearing the unrealistic expectation that the individual consumer will be able to mobilize large-scale change (Hobson, 2019, p. 4). The circular economy is considered to encourage a reboot for capitalism (Hobson & Lynch, 2016; Kębłowski et al., 2020) that requires no radical change to institutions, infrastructures, and markets (Lazarevic & Valve, 2017).

At the corporate level, the circular economy gives entrepreneurs the opportunity to increase their control over resources (Lazarevic & Valve, 2017; Niskanen et al., 2020). For example, it opens for a strategic command of what was previously understood as waste but is now understood as resources (Corvellec, 2019). Research on Apple Inc. highlights this:

> The circular economy narrative is an important way in which Apple obscures the practises that have led to vast amounts of digitized junk, opens the opportunity to regain control of value in the post-consumer phase, and simultaneously further drive consumption of their products. (Vonk, 2018 p. 748)

Due to the rise of consumer concerns regarding the waste crisis and climate change, Apple Inc.'s preemptive action absolves them from some responsibility for past extractive practices (Laser & Stowell, 2020a; Laser & Stowell, 2020b). Circularization makes it possible to move reuse or repair activities — which have traditionally been undertaken in the civic sector, households, or peer to peer — inside the economy. Second-hand products are retargeted to the middle classes raising important questions about "the shifting relationality of reuse to capitalist markets" (Isenhour & Reno, 2019, p. 4). Finally, the recycling industry sees in the circular economy a business opportunity to rebrand itself from dirty waste to clean resources (Burgman & Wallsten, 2021).

Companies use circular initiatives to preempt material and environmental policies and make them amenable to corporate interests (Corvellec & Stål, 2019; Mah, 2021). Many examples include circular economy as a zero waste economy (Valenzuela & Böhm, 2017), adoption of green technology and digital infrastructures (Hobson & Lynch, 2016), take-back systems in the fashion sector (Corvellec & Stål, 2019), and "investments in infrastructure… carried out by air-cargo providers, airports, waste and water companies, industrial consortia in chemistry, freight transporters, storage facilities providers, and network providers" (Savini, 2019, p. 680). Each of these examples illustrates how circularity assists with obfuscating the challenges with waste accumulation and resource scarcity.

What is clear from the critiques is the need for further dialogue and how the circular economy agenda needs to include civic society and must reclaim ownership from business and policy if it is to drive the new transition (Hobson, 2019; Holmes et al., 2021):

> Due to the interlinkages of global production and consumption systems, as well as the comprehensive nature of the concept, there is a need for civil society and consumers, the private sector, as well as the policy framework within which it operates, to align their goals. Without this synchrony, there may be a danger that the circular economy will only be implemented partially or, worse, in ways that do not mitigate environmental and social impacts due to burden shifting. (Brandão et al., 2020, p. 506)

Without this transition, the new economy will simply maintain the current status quo (Niskanen et al., 2020).

3.3 | Techno-depoliticization of sustainable growth

A wide range of critiques accentuate how circular economy discourses act to depolitize policy and industry interventions (Niskanen et al., 2020) and the roles ascribed to consumers (Hobson & Lynch, 2016), waste practices (Valenzuela & Böhm, 2017), and recycling (Vonk, 2018). Why this depolitization occurs is attributed to the circular economy being "presented as [a] managerial and technocratic, matter-of-fact issue" (Niskanen et al., 2020, p. 7). This technocratic or technoscientific representation reinforces the circular economy as an eco-modernist agenda (Fitch-Roy et al., 2019, p. 2) that excludes potential solutions that could challenge the current capitalist order (Gregson et al., 2015; Hobson & Lynch, 2016). While it appears to be a positive take over of the sustainability agenda (Corvellec & Stål, 2019; Hobson, 2020), this technocentric appeal (Calisto Friant et al., 2020) to drive and solve the challenges of a circular economy results in problem displacement across time and space rather than actually solving the problem (Hobson & Lynch, 2016).

With a management and technocentric bias driving the circular economy agenda, a growing body of research has criticized the noticeable absence of socio-cultural and political issues (Zwiers et al., 2020), and this is illustrated in concerns with the social dimension of circular economy business models (Hofmann, 2019). Consideration is required not only for assessing the types of jobs created, but for:

> … the role people perform at both sides, production and consumption, as well as at households supporting the market economy. That is to say, although the assessment of enterprises focuses on the micro level there are crucial interconnections with the macro level. (Pla-Julián & Guevara, 2019, p. 74)

The failure to recognize these connections results in labor practices (Laser & Stowell, 2020b), working conditions, power asymmetries, interdependencies, political and economic constraints (Schulz et al., 2019), and issues of equity and inclusion being overlooked (Inigo & Blok, 2019; Niskanen et al., 2020). Illustrations of this include occupations in salvaging, saving, repairing, and reuse undertaken by socially marginalized groups (Isenhour & Reno, 2019), shifting organizational values to becoming inclusive of gender and care for people (Pla-Julián & Guevara, 2019), and forethought for everyday norms, lifestyles, and cultures (Temesgen et al., 2021). Some see in circular economy policies a moral project built on the dual motives of subscribing to the common but unfair misperception of global recycling networks as dirty and illegal, while featuring circular EU policy frames as being able to keep waste and resources within Europe and away from these networks (Gregson et al., 2015). One commonality these critiques share is the call for sociopolitical issues to be taken seriously and for circular economy frameworks to be strengthened in this regard.

To summarize, by retaining an agenda focused on circular resource and waste recapture, the circular economy retains its economic growth project status that underplays the demand for continuous consumption (Schröder et al., 2019), but with limited empirical evidence for reducing environmental pressures (Kovacic et al., 2020; Parrique et al., 2019). Because materials will be recycled, consumption is treated as a sustainable activity and thus becomes unproblematic. The upshot is the triggering of a rebound effect as the marketing of secondary products increases (Ghisellini et al., 2016; Zink & Geyer, 2017) and circles widen as demand for recycled materials and waste expands between cities, states, and countries (Savini, 2019). All potential gains from recycling are then eaten up by increased consumption. Ironically, "circles can also never deliver growth. You need ever-increasing spirals for that" (Skene, 2018, p. 489).

4 | CONCLUSIONS: FOR A MODEST, CONCRETE, INCLUSIVE, AND TRANSPARENT CIRCULAR ECONOMY

This paper brings together the critiques addressed to the circular economy, with a focus on the European conception of the circular economy and corresponding circular business models by researchers in various academic fields, as well as some practitioners, in order to bring forth the unaddressed assumptions, blind spots, tensions, contradictions, unthought-of consequences, and taken-for-granted advantages of a circular transition. The purpose is to make it less easy to make ungrounded claims about the circular economy to bring actual issues raised by a transition to the circular economy and to be at the core of this transition.

Praised by policy makers and many companies who have been instrumental in its recognition as a model for material and sustainable policies, the circular economy is also subject to many critiques in academic and professional circles. The present systematic presentation of these critiques shows that despite their strong imaginary appeal, pleas for the circular economy tend to ignore basic principles of biophysics (Kovacic et al., 2020), for example, the tensions between biophysical limits and progress and growth. Therefore, using the circular economy as a buzzword for sustainable development is considered problematic (Kirchherr et al., 2017).

Vague and uncontroversial (Lazarevic & Valve, 2017), critiques see in the circular economy a reassuring discourse for policy makers (Hobson, 2016) about futures made of planned circularity, circular modernism, bottom-up sufficiency, and peer-to-peer circularity (Bauwens et al., 2020). However, despite the revolutionary language, the circular future is not mapped out. In the shadow remain unanswered questions of how to disrupt orthodox social institutions attached with modernity and the connections and dependencies these create (Lazarevic & Valve, 2017). Equally, wider sustainability concerns such as care or gender equality are lacking (Pla-Julián & Guevara, 2019), and so too are the impacts of the circular economy that can be beneficial for some but come at a cost to others (Vonk, 2018).

If the desire is for an equitable and truly sustainable economy that is circular, the critiques stress that a radical shift is essential to confront conventional neoliberal governance regimes (Flynn & Hacking, 2019, p. 1566). There is a danger to the myths surrounding the circular economy because if they become normalized the space for critical reflection will decrease (Lazarevic & Valve, 2017). Examples include the "risk of increased polarization between city and country and that the countryside is left out with poorer access to welfare services as a result" (Hagbert et al., 2018, p. 32) and the lack of a global approach encouraging neo-colonialism by either side stepping developing countries, not giving agency to people to problems outside of the Global North, or engaging with the informal sectors (Genovese and Pansera, 2020; Velis, 2018). To put it briefly, the circular economy stands as a discourse that focuses on the economy, excludes social dimensions, and simplifies its environmental consequences (Geissdoerfer et al., 2017).

As suggested in Foucault's quote used in the opening to this text, these critiques are more than simply denouncing flaws in a fashionable concept. They also point at the need for questioning how the circular economy is currently conceived, consented, and implemented. The presentation of the critiques above shows there is a need for a renewed, enlarged, and transdisciplinary research agenda on the circular economy in order to support the policy process.

Each area of the critiques above points at an issue in need of research, policy, and managerial attention. And as academics, let us conclude with a plea for coherence and transdisciplinarity. Before the circular economy becomes mainstream and moves beyond sustainability and circular economy

professionals, there is clearly a need for conceptual coherence about definitions, plans, implementations, and modes of evaluation, because without coherence the expansion of new knowledge could be obstructed by deadlocked debates or can collapse entirely (Kirchherr et al., 2017). Given the scope, speed, and transformation the circular economy agenda is attempting to address, research also needs to come out of disciplinary silos (Brandão et al., 2020), otherwise solutions will engender weak circularity premised on notions of no limits, secondary resources complementing primary supplies, and governments handing over responsibility to businesses and consumers.

We believe that it is time for producers and the state to reclaim the idea of circularity and to create "a closed, material loop limited in size and space, based on the principle of fair distribution of resources" (Johansson & Henriksson, 2020, p. 148). Drawing on the critiques listed above, a pathway toward circularity would be a circular economy that is modest, not a panacea but an actual solution to actual problems; concrete, in the sense of being clear about which kind of circularity it sets up and the goal conflicts that it entails; inclusive, in that it takes energy, people, and waste on a global scale into consideration; and transparent, in the sense of being accountable for its achievements and shortcomings, not the least when it comes to economic, social, and environmental changes. Otherwise, the circular economy risks turning into a hypothetico-normative (but self-serving) utopia that derails actual and well-intended efforts to reorganize production, consumption, and more generally material flows in ways that are more respectful of planetary boundaries and that work in favor of sustainability.

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DATA AVAILABILITY STATEMENT

Data sharing is not applicable to this article as no datasets were generated or analyzed during the current study.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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