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Circular economy disclaimers: Rethinking property relations at the end of cheap nature

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Converging environmental crises have inspired a movement to shift dominant economic forms away from linear "take-make-waste" models and toward more circular forms that reimagine discarded materials as valuable resources. With the coming "end of cheap nature", this invitation to reimagine waste as something more than "the political other of capitalist value" is seen as both an environmental necessity and an opportunity for green growth. Less often discussed is that the circular economy, in its reconfiguration of value, also has the potential to reshape contemporary property relations and dismantle existing forms of circularity. In this paper, we explore potential shifts in property relations through an analysis of three strategies often imagined as key to facilitating the transition to circularity—extended producer responsibility, repair, and online resale. Each case synthesizes existing research, public discourse, and findings from a series of focus groups and interviews with circular economy professionals. While this research is preliminary and demands additional research, all three cases suggest caution given the possibility that some circular economy strategies can concentrate value and control of existing materials stocks, dispossess those most vulnerable, and alienate participants in existing reuse, recycling, and repair markets. Drawing on and adapting Luxemburg's concept of primitive accumulation, Tsing's ideas about salvage accumulation, Moore's work on commodity frontiers and recent research which encourages more attention to processes of commoning—we argue that without careful attention to relations of power and justice in conceptualizations of ownership and the collective actions necessary to transform our economic forms *in common*, transitions toward the circular economy have the potential to enclose the value of discards and exacerbate inequality.

KEYWORDS

property, enclosure, privatization, commoning, waste, environmental policy

1. Introduction

The concept of the circular economy (CE) has gained considerable momentum. Concerns about biodiversity loss, resource depletion, plastic pollution, and climate change are just a few of the contemporary problems that have inspired proposals to shift economic systems away from take-make-waste models and toward less wasteful, more efficient, and regenerative processes. The idea has made policy inroads at multiple levels. In the EU, for example, the circular economy is a lynchpin of the European Commissions' Green Deal and climate neutrality targets. These plans include provisions for improved product durability, green public procurement, extended producer responsibility, and enhanced materials recovery. The EU provides only one example, but CE policy and practices are now at the forefront of environmental policy around the world and across multiple scales, from Chile and Japan to Beijing and Cape Town.

The CE concept has become dominant, in part, because it is conceptualized as a highly rational, cost-effective, win-win strategy to reduce waste, pollution, and inefficiencies by reimagining discarded materials as resources. With the coming "end of cheap nature" as Moore (2015) calls it, this invitation to reimagine value as something more than "the political other of capitalist value" (Gidwani and Reddy, 2011, p. 1625) is seen not only as an environmental necessity, but as a promising scenario for green growth. This ecomodernist perspective, focused on sustainability through economic growth, is well represented in CE policy across scales (Genovese and Pansera, 2021) and makes sense given that the World Bank estimates that < 1/5th of all global waste is currently recycled (Kaza et al., 2018) which leads to the unnecessary disposal of valuable resources—as well as all of the time, labor, energy, water, and emissions associated with extraction, production, distribution, and consumption.

Despite its hopeful and highly rational vision for efficiency-driven sustainability transitions, the CE is also the focus of significant critique given its technical and corporate-centered approach to solving complex socio-environmental problems (Gutberlet et al., 2020; Bauwens, 2021). Researchers have empirically examined the claim that the circular economy can decouple economic growth from environmental harm, and have found that the efficiency- and technology-focused approaches that have dominated CE actions to date have fallen far short of reducing environmental impacts at the necessary scale (Jackson, 2009; Dauvergne, 2016; Alfredsson et al., 2018; Mathai et al., 2020). These findings have led many scholars to advocate for stronger forms of CE based in degrowth or steady-state approaches for affluent nations to slow resource loops, reduce economic activity and thus pollution (Valenzuela and Böhm, 2017; Hickel and Kallis, 2020).

Other critics have empirically demonstrated how some revisionist and eco-modernist approaches can shift environmental burdens to more vulnerable societies in highly unequal global markets (Isenhour, 2016; Martinez-Alier, 2021). Together, these analyses clearly illustrate that global citizens are differentially implied in relation to both chains of waste production and the places that become destinations of waste. But issues of equity and justice have "weak links" to dominant conceptualizations of the CE (Schröeder et al., 2019, p. 81) and there are several blind spots in the existing literature, including a focus on human development and worker rights (Padilla-Rivera et al., 2020; Carenzo et al., 2022). These gaps suggest the need for a reorientation of the CE concept to focus not just on resource efficiency and the revalorization of waste, but also on economic forms that ensure justice and improve social wellbeing and human development (Geissdoerfer et al., 2017; Schröeder et al., 2018; Berry et al., 2021).

This paper does not wade deeply into already crowded debates about the generalized merits ecomodernist and degrowth perspectives on the circular economy, given that others have already characterized contrasting perspective in great detail (Friant et al., 2020). Instead, we hope to contribute to the call to "rethink economic theory and practice for a sustainable circular economy" by focusing on a less explored dimension of the CE literature—what the implementation of CE strategies might mean for property relations and our collective prospects for creating a just and equitable circular economy.

A deficit of scholarly and popular attention to how the CE, in its reconfiguration of value, may reshape contemporary property relations is well noted (Hobson, 2019, 2020). If waste is the "new commodity frontier" (Moore, 2015; Schindler and Demaria, 2020) at the end of cheap nature—the associated shifts in valuation raise important questions about who owns or will own materials at various stages, as well as who has the ability to benefit from the residual values embedded in discards.

In this paper, we explore shifts in property relations through an analysis of three cases. Each case represents a practice often imagined as key to facilitating the transition to circularity. For the first case the paper focuses on the revaluation of discards. We illustrate how older debates about who owns and has access to waste are playing out again in the United States as Extended Producer Responsibility (Case I—EPR) for packaging legislation has recently gained traction. Our second case focuses on the importance of repair in the CE (Case II—Repair) and how existing practices may be challenged by CE policy like EPR and the diffusion of circular economy business models based on product services systems rather than ownership. We examine how new policies and novel business models threaten the right to repair and fundamentally shift ownership from consumers to producers, further deskilling and alienating citizen from important means of livelihood. Our third case, focused on resale platforms (Case III—Resale), asks how the revaluation of vintage

and designer clothing has not only reshaped producers' interest in maintaining ownership of their intellectual capital, but also how the movement of clothing to large resale platforms shifts value and ownership out of local communities.

Ultimately, we use these three case studies to offer some circular economy disclaimers. While this research is preliminary and more research is necessary to fully understand how the transition toward more circular economic forms is shifting or might shift property relations—these three cases suggest caution given the potential for CE models to concentrate value and control of existing materials stocks while dispossessing and alienating participants in already existing networks of repair, reuse, and resale. To theorize these shifts in value and ownership we draw on and adapt Luxemburg's concept of primitive accumulation (Luxemburg, 2003), Tsing's ideas about salvage accumulation (Tsing, 2015), and Moore's work on commodity frontiers (Moore, 2015). However, we argue that to achieve a sustainable circular economy, we need to supplement these analyses of capture and privatization by highlighting and elevating the important work being done in communities throughout the world to become circular in common (Gibson-Graham et al., 2016; Nightingale, 2019), and which may be at risk as corporations increasingly move to retain ownership in a highly corporate-centric vision of the CE. We argue that without careful attention to issues of power, politics and justice in conceptualizations of ownership, transitions toward the circular economy have the potential to exacerbate inequalities and dismantle existing practices of circularity. By "staying with the trouble" (Haraway, 2016) and remaining attentive to the value of the circular practices that already exist, we might be able to improve CE policy such that circularity can enhance human development and wellbeing.

2. Data and methods

This paper draws on a multiple case study methodology (Stake, 1995) using three distinct, yet interrelated qualitative case studies to explore how circular economy programs and policies might shift contemporary property relations—and to ground theory as we think about economic alternatives. Case studies explore "bounded system[s] [...] through detailed, in-depth data collection involving multiple sources of information" (Creswell, 2007, p. 73). Here, our cases are bounded conceptually by facets of the circular economy—that is, we use practices imagined as critical to circularity. These cases are not meant to serve as comparisons—instead, our multiple case study methodology allows for "different perspectives on the issue" (Creswell, 2007, p. 74) and is appropriate "to expand…theories and not to extrapolate probabilities" (Yin, 2014, p. 21). Triangulation between multiple sources of information is a critical component of case study research, and allows for researchers to corroborate data (Yin, 2014). Each of our cases rely on existing academic literature from around the world to root our analysis in historical context. We complement our narrative literature review (Sovacool et al., 2018) with original methods including an analysis of US public discourse, focus groups, and interviews. We note here (see Table 1), that some methods yielded more relevant data, depending on the case. We have indicated those highly relevant methods for each case in bold.

2.1. Methods: Focus groups and interviews

Our cases also draw on a series of focus groups and interviews (10 groups and 7 interviews, $n = 58$ unique individual participants) with US-based circular economy professionals, convened to explore opportunities and barriers associated with circular economy transitions (IRB #20200902, NSF Award #1934426). Discussion topics focused on the core values of the CE, barriers to transition and justice-based implications (see Appendix A). To recruit for the study we developed a database of 204 US-based CE professionals identified based on their engagement in US CE discourse, including membership in professional networks, authorship of gray literature (business, organizational, and policy documents), as well as searches for sustainability-related titles at organizations making public efforts to build more circular economies (see Appendix B). We worked to ensure that our invitation lists represented a range of geographical, gendered and racial identities, though we note that many of our focus groups had poor Black, Indigenous, and People of Color (BiPOC) representation. We also draw on interviews with participants ($N = 7$), who could not attend a group event. Interview topics mirrored the focus group.

For the resale platform case study, we additionally draw on interviews with active online resellers ($n = 8$) who were recruited as part of another research project focused on second hand economies (IRB #20180108, NSF Award #1756933) (Authors, forthcoming).

Our research team transcribed the focus group and interview recordings using Trint. NVivo 12 software was used to analyze qualitative data through three rounds of coding (Miles et al., 2013). Our first round used thematic codes which mirrored the structure of the focus groups and interviews. The second round utilized inductive open coding to identify other relevant themes. Our final round utilized purposeful concept-driven coding focused on specific policy proposals. The concept of property and ownership as related to the circular economy was not a theme that our research group anticipated when we designed the focus groups. Rather, the theme emerged from the inductive coding, particularly with regard to EPR, prompting our team to pursue this line of research through public discourse analysis.

TABLE 1 Case study methods.

Case study	Methods (most relevant methods for each case in bold)
1. Extended producer responsibility	**CE focus groups**; CE interviews; literature review; **public discourse analysis**
2. Repair	CE focus groups; **CE interviews; literature review**; public discourse analysis
3. Resale	CE focus groups; CE interviews; literature review; **public discourse analysis; digital event ethnography; resale interviews**

2.2. Methods: Public discourse analysis

In places like the United States, where discussions of circularity are still nascent, the public discourse around CE offers a unique opportunity to view sites of contestation and tension. Since practices like extended producer responsibility for packaging, product service systems, and online fashion resale platforms are still emerging, they cannot yet be studied *in situ* in the US, but discussions about these practices are very much present in public discourse. As such, we utilized public discourse analysis (Pareschi and Lusiani, 2020) to help us understand emergent debates and claims-making related to circular economies in our case studies. This analysis of public discourse related to the Circular Economy in the United States includes news media (Leitch and Bohensky, 2014) and analysis of public events, as well as public testimony for legislation, and self-produced content (op-eds; blogs) designed for a public audience.

We used targeted keyword searches related to each case study[1] using a simple Google Search to begin our analysis of the public discourse as it related to property and the circular economy. All results were reviewed to ensure relevant content. Some returns were clearly not relevant (e.g., a publicly traded stock called EPR properties) but others returned peer reviewed articles, public policy documents, news articles as well as blogs and commentaries. Relevant results were searched for content related to the ownership of materials. These searches were complemented with an analysis of 348 public comments in the EPR case, coming from the public legislative records of three US states which recently considered EPR legislation: Maine, Colorado, and Oregon.

In the resale case, public discourse analysis was complemented with digital event ethnography (Coleman, 2010; Paoli and D'Auria, 2021) including field notes generated by attending a 2-day digital conference hosted by a large recommerce platform. All public discourse-related data (news stories, blog posts, field notes, public comment) was thematically coded using a manual inductive open coding technique to understand how a range of actors asserted claims to waste as property.

3. Results

3.1. Case study I: Extended producer responsibility and the ownership of discards

Extended Producer Responsibility (EPR) for packaging legislation has recently gained momentum across the United States—due to recycling market crashes following China's "National Sword" policy, rising costs for residential recycling, stagnating recovery rates, concerns about plastic pollution, and the shuttering of recycling services during the COVID-19 pandemic (SWANA, 2019; Staub, 2020; Tran et al., 2021). EPR, designed to hold producers accountable for the packaging waste they generate, is increasingly seen as a key strategy for circularity. By the summer of 2022, four US states had passed EPR for packaging legislation: Maine, Oregon, Colorado, and California.

The intention behind EPR for packaging is to shift some or all of the financial and/or administrative burden for "end-of-life" (EOL) management from municipalities and taxpayers to producers. The underlying assumption behind these programs is that when producers share the administrative and/or financial burden of post-consumer packaging waste management, they are financially incentivized to adopt more circular practices through sustainable design and "closed-looped" systems (Tojo, 2004).

In 2021, shortly after Maine and Oregon passed the first mandatory EPR for packaging bills in the United States, the Ellen MacArthur Foundation wrote that fee-based mandatory EPR schemes for packaging waste are "the only proven and likely pathway to ensure the required funding to scale (circular) systems to the extent required" (Ellen Macarthur Foundation, 2021).

However, listening to our focus group members and watching debates around various EPR for packaging legislation unfold in the United States, we found a more complex, contentious, and evolving story than the Ellen MacArthur Foundation declaration might suggest—one that ultimately hinges on who owns the waste and has the right to control its management.

1 For the EPR case key search terms "EPR" and "property" and "ownership". For the resale case keywords were "reuse" and "takedown notices". For the product service case we used "product service" and "right to repair".

Disputes about EPR for packaging in the US most often center on the relative merits of two contrasting models.[2] The first, which we'll call the state-centric, was adopted in Maine. It requires producers to take financial responsibility for end-of-life packaging management by paying fees based on the number and types of packages sold in the state. These funds are distributed to municipalities which continue to manage waste reduction, recovery, and recycling efforts. The second model, which we call market-centric was adopted in Colorado. It gives producers both fiscal and managerial responsibility. In this model producers typically fund a producer responsibility organization (PRO) controlled by the packaging industry which handles all financial matters as well as resource recovery and processing.[3]

The market-based model has significant international precedent in the EU and British Columbia. The West Coast Refuse & Recycling Coalition (WCRRC) released a report on the British Columbia model noting that, "Advocates of EPR programs for packaging and paper products in the U.S. point to (British Columbia) as the model for EPR in this country" (Miller, 2019, p. 4) in part because the model has significant support from the consumer goods, beverage, and packaging industries.

Our focus groups and public comments on EPR legislation make it clear that the producers of packaging overwhelmingly favor the market-centric model as a means to control the material stock, its management, and residual value of discards. Table 2 includes some exemplary quotes from public testimony, illustrating opposition to state-centric and support for market-centric models.

The theme most relevant to our analysis in this paper is the desire for the industry to take managerial control over the recovered materials which would allow them to control both the processes utilized for recycling and to benefit from any residual value. Their language often implies that existing infrastructure has failed and that the scaling up of resource recovery will require investments in new technologies. Of particular interest is the ability for industry-supported producer responsibility organizations (PROs) to include controversial "advanced recycling systems" such as gasification, incineration, and chemical recycling in the definition of recycling.

But the market-centric model has not gone uncontested. Oregon Senator Kim Thatcher remarked during debates in Oregon, "*Whenever a large number of giant, multi-national corporations, NGOs, European Investment Bankers, multiple governments and bureaucracies are pushing for a policy change: beware.*" Table 3 provides examples of testimony in favor of state-centric models and opposed to market-centric models. Several themes emerged from these comments including the desire for oversight to ensure environmental goals are achieved, opposition to chemical recycling, support for the polluter pays principle, investments in improved infrastructure, and—most important for our analysis of shifting property relations—concern about the exclusion of existing actors from recovery and recycling markets.

Many themes run through these public testimonies, but central to our argument here is who should control the management of discarded packaging and who has the opportunity to benefit from its recovery. Our research team gained additional insight into these debate through our interactions with several organizations skeptical of EPR. Not only do these organizations write frequent editorials about EPR for venues like *Waste Dive* and *Resource Recycling* but their representatives also participated in our focus groups. Speaking about EPR one skeptic said, "*I don't support EPR because the companies that get this stuff back through EPR, they crush it, they remove it from the U.S. market and it is never usable again … Great stuff, I hate EPR*" *(FG7 May 17, 2021).*

While not opposed to EPR in theory, the Institute for Local Self-Reliance has been warning the recycling industry for decades about the potential for corporate-controlled EPR to exclude local businesses and entrepreneurs who have made their living by salvaging the residual value of discards—reflecting the scholarly literature which suggests that CE transitions can have unintended consequences for people who rely on waste for their livelihoods (Schröeder et al., 2019). In their analysis of British Columbia's proposed EPR legislation in 2012 they wrote,

The replacement of already-operating source-separation collection systems with single-stream curbside collection of EPR means that opportunities for repair and reuse at the local level are bypassed, as items are at least meant to be shipped straight to steward-operated depots…focusing on end-of-life recycling. This obviously threatens local entrepreneurial activity… A truly sustainable approach to managing discards requires that resources be intercepted "at the source" and put toward economic development and job creation at the local level, not shipped to faraway processing centers (Souto et al., 2012).

Another organization, Urban Ore, warned recyclers directly in a 2012 blog post which read:

Gird your loins, recyclers, if you want to keep control of your industry or even the resources you personally harvest. Or get ready to say 'uncle,' and with a smile, too, if you want to stay in business (Entropy, 2012, p. 1).

These debates about control over recyclables in the US and Canada echo earlier disputes about the ownership and value of waste from around the world. The waste studies

2 Please note there is certainly more nuance in the range of potential models available. For example, The Product Stewardship Institute released a graphic indicating a spectrum of alternatives (https://www.productstewardship.us/general/custom.asp?page=The-Spectrum-of-Approaches-to-US-Packaging-EPR). Here, we present these two "ideal types" to illustrate disputes about the ownership of discards.

3 Oregon has attempted to integrate these approaches with a "shared responsibility" model. California passed their bill just as this paper was being submitted so an analysis of that bill is not included here.

TABLE 2 Testimony in support of market-centric models or opposed to state-centric models.

Testimony	Legislation	Comments
Consumer Brands Association	Opposition to *ME 2104*	**Economic hardship:** *L.D. 2104 . . . creates an overly complicated cost-shift that would maintain the status quo for the state's municipal recycling systems. . . The extended producer responsibility (EPR) scheme outlined in L.D. 2104 puts all of the responsibility for cost on a single player, the consumer goods industry, which includes in-state businesses critical to Maine's economy and job-creation engine.*
Flexible Packaging Association	Opposition to *CO HB1355*	**Industry control of management and advanced recycling:** *FPA provides this testimony to improve HB1355, so that it provides the necessary elements for the improvement of collection and infrastructure investment and development of advanced recycling systems to allow for collection and recycling to a broader array of today's packaging materials.*
Flexible Packaging Association	Opposition to *OR SB582*	**Industry control of management:** *Developing end-of-life solutions for flexible packaging is a work in progress and FPA is partnering with other manufacturers, recyclers, retailers, waste management companies, brand owners, and other organizations to continue making strides toward total packaging recovery.*
Ameripen, Packaging Trade Association	Opposition to *ME LD154,* Support for *ME LD1471*	**Industry control of management, financial hardship:** *Additional collection services, frequency of collection and other collection factors have a clear nexus to municipally controlled decisions, constituent service and the ultimate costs of this area of a recycling program. The . . . producers, under LD 1541, will have no control over those collection factors, yet are responsible for 100% of the costs.*

TABLE 3 Testimony in support of state-based models or in opposition to market-based models.

Testimony	Legislation	Comments
US Public Interest Group	In support of OR BS582	**Oversight:** *Programs must ensure accountability, transparency, and oversight. Polluters should not be allowed to write their own rules to maintain the status quo*
Maine resident	In support of ME LD 1541 and in opposition of ME LD 1471	**Financial responsibility, oversight:** *When a company produces wasteful packaging, it's taxpayers that clean up the mess, subsidizing recycling to the tune of 16 million dollars a year in Maine. . . this bill would relieve that tax burden . . . and place it on the megacorporations responsible for the waste in the first place. Coincidentally, these companies also happen to be the same ones lobbying fiercely against this bill, and they even wrote their own bill to counter this one, LD 1471. . . writing their own bill. . . would be just like a drug enforcement bill written by Pablo Escobar.*
Institute of Scrap Recycling Industries	In opposition to ME 1471	**Potential exclusion of existing actors:** *ISRI does not support product stewardship policies that disrupt the current recycling infrastructure, such as extended producer responsibility programs that either target, include, or disrupt the recycling of materials or products that are being successfully recycled and consumed in existing markets*
Surfrider Foundation	In support of ME LD 1541	**In opposition to incineration and advanced recycling:** *The Surfrider Foundation is grateful that LD1541 would phaseout incineration as an allowable alternative collection method . . . We would recommend that §8 be lightly amended to also explicitly disallow the use of chemical conversion . . . The plastics industry is heavily promoting this conversion technology . . . referring to the practice as "advanced" or "chemical" recycling. Chemical conversion . . . leads to new air and water pollution problems while not reducing the production of single-use plastic packaging*

literature abounds with examples of informal waste workers—pickers, haulers, middlemen, repair people, resellers, logistics providers—who enact a critical piece of the conceptual circular economy in the absences of state or private investments or due to the absence of or failures in municipal waste services. Waste pickers are estimated to number as many as 15 million people in "developing countries" (Medina, 2007). Together they are estimated to collect between 10 and 30% of recyclable materials from global waste streams (Dias, 2016; Carenzo et al., 2022). Despite these strong positive contributions to circularity, significant growth in waste generation in rapidly developing economies has led many municipalities to privatize waste management systems in the name of circularity (Velis, 2017). But because many cities in the developing world lack infrastructure, as Schindler (2022, p. 1) writes, "this has often meant little more than transferring the ownership of waste—or granting the right to collect waste—to private firms." The exclusion of informal workers is often rationalized based on a "moral order of 'good' and 'bad' environmental behavior" that names informal forms

of waste labor illegitimate (Alexander and Reno, 2012). Those determinations of legitimacy are often highly racialized and classed (Resnick, 2021; Carenzo et al., 2022) and can result in the criminalization and harassment of the most vulnerable members of society (Gutberlet, 2016).

Indeed, recycling has moved away from an environmental social movement driven by committed local activists and entrepreneurs and increasingly toward an in a profit-oriented enterprise driven by large corporations (Pellow, 2004). But intensifying property claims by the state and private corporations have resulted in the exclusion and stigmatization of waste entrepreneurs, impoverishment, loss of collective labor power, and—as a result—significant contestations over waste (Dias, 2016; Schindler and Demaria, 2020).

As our case study on EPR for packaging in the US suggests, these examples of value enclosures and exclusion aren't limited to the developing world. A 2016 article in the New York Times highlighted disputes over trash among New York City scavengers and the city's Sanitation Department. Scavengers were gathering recyclables from public receptacles, sidewalks, and city parks. While they argued they were providing an essential public service, the city accused scavengers of "stealing recycling's future" and participating in a "sophisticated mob" that removes the most valuable resources from the waste stream (Nir, 2016).

In some cases, waste pickers have resisted the enclosure of the waste commons. In Australia workers were able to successfully claim ownership. In Columbia pickers organized to ensure their right to work in the waste commons (Lewis and Rauturier, 2019). Waste entrepreneurs typically view discarded materials as a common-pool resource and the services they offer as a positive service to the community and a public environmental good. However, they also see the need for governmental regulation to create a restricted access system that is fair and ensures the equitable allocation of resources (Lane, 2011). Scholars working with waste entrepreneurs throughout the global south have therefore advocated for circular economy policy that recognizes the value of existing practices, is inclusive, and ensures that all actors contributing to circularity are legitimate participants in the design and implementation of waste management policies (Carenzo et al., 2022).

In our case study, advocates for state-based EPR for packaging models are concerned about the possibility that circularity will lead to the privatization of waste such that access is limited to only corporate actors and producer responsibility organizations, jeopardizing the livelihoods of the all the people who operate current recycling systems. Without careful consideration of these concerns, it thus seems that the Circular Economy has the potential to enclose value within the corporate sector, give power over recycling operations to producer organizations alone, and exclude current practices of circularity and all the people who enact them.

3.2. Case study II: Repair

Proponents of the circular economy frequently advocate for increased opportunities for repair in more circular economic systems (Weetman, 2016)—as a means to displace demand for virgin production through the extension of product lifetimes.

However, there are several factors that threaten both existing and emergent forms of repair. Central to our argument here is that both existing and emergent practices have the potential to disempower waste entrepreneurs and consumers who are already practicing circularity. Here we review three challenges: planned obsolescence, EPR policy and Product Service Systems.

The first challenge to repair is simply the difficulty associated with repairing contemporary goods. Producers intentionally design for obsolescence or release products that are impossible to repair independently (Graziano and Trogal, 2019). In these cases, it is typically more convenient for consumers to replace rather than repair goods, contributing to growing waste streams (Zapata Campos et al., 2020). The circular economy concept is intended to address this problem by closing and slowing resources loops. One of our focus group participants lamented how many products are intentionally designed to be disposable such that they can't be repaired or recycled. He said,

When we talk with manufacturers that do the right thing, they say that they feel disadvantaged in the market because their competitors don't have to. Apple's air pods involve plastic and batteries. They're not - you can't recover the plastic from them because the battery is glued to the plastic. No electronics recycler that I know of wants to touch air pods in any way. You can't - you shouldn't stick them in solid waste and you shouldn't stick them in the blue bin and the electronics recyclers don't want them… So this is a problem. It's an unethical product. It should be illegal. It's not (FG 5a April 1, 2021).

Second, some circular economy proposals can have the, perhaps unintended, consequence of foreclosing independent opportunities for repair outside of corporate control. A 2018 Waste Dive article, for example, details how a California EPR program for mattresses allowed for shredding and burning, making it impossible for reuse entrepreneurs to access component materials for reuse. In contrast to the job-intensive process of deconstructing mattresses to access the cotton, foam rubber, steel frames and wood for reuse and recycling, this "circular strategy" of converting mattresses to energy foreclosed opportunities for local entrepreneurs (Seldman, 2018). Similarly, (Müller, 2021) documents the case of electronics EPR in Bolivia where multinationals require documentation for the "post-consumption" status of all components. While many recyclers are only interested in extracting valuable metals, they cannot sell other components or parts to repair workshops without violating traceability requirements. Müller (2021, p. 48) writes, "cutting the supply of original spare parts and reducing their usage in local refurbishing and remanufacturing is in the interest

of the multinationals, which aim at selling devices with ever-shorter product lifespans". In this arrangement, repeated across the world, EPR laws favor large producers and their contractors allowing them to monopolize access to components and reduce opportunities for independent repair.

Finally, in an intensification of these trends, product service systems internalize repair entirely, precluding the right to repair (Vellis and Vrancken, 2015; Bocken et al., 2016). In these alternative business models, the customer contracts with a business to purchase a service provided by a product, rather than the product itself. So, for example, rather than purchasing a television, the consumer contracts for the use of a television. In this model the customer is theoretically freed from the burdens of ownership and maintenance. Simultaneously, the producer is incentivized to provide a more durable, long-lasting product that does not need frequent maintenance or replacement. So, rather than engaging in a single purchase, the customer would enter into a long-term relationship with a product manufacturer.

Much like EPR for packaging, product service systems also extend the manufacturer's responsibility at the end of the product life. However, unlike EPR they ensure that producers maintain all rights to the good, its component parts and the intellectual property necessary for repair. As Vellis and Vrancken (2015, p. 773) write, while there is "nothing fundamentally wrong with such rights, it constitutes a fundamental change to the institutions of waste ownership… and it further extends on the previous waves of for-profit and value extraction processing of waste flows".

These new access-based business models are likely to have significant implications for consumers (Hobson, 2019) but the role and perspectives of the consumer in the circular economy has been largely assumed, rather than researched (Hobson and Lynch, 2016; Kirchherr et al., 2017; Hobson, 2019). Not only do service contracts bind the consumer to a specific company, shifting power relations away from the citizen-consumer and toward corporations, but they also have significant implications for ownership. Given that consumers will no longer own many of the goods they use, they would also no longer have the right to repair or modify them, to utilize parts, or to repurpose them at the end of their useful lives.

While the implications of these shifts might not be readily apparent, research on second hand markets suggests that the various pursuits that compose repair practices are associated with significant community and localized benefits which include flexible forms of labor, the redistribution of value within the community, local job generation, and economic multiplier effects (Millar, 2018; Berry, 2022; Isenhour and Berry, 2022). Small and independent repair entrepreneurs often do much more than pick value out of discards, repair iPhones, fix small appliances and mend clothing. They provide local employment and tax revenue and contribute to the community by turning donations into essential funding for a wide range of social causes.

We heard from several participants in our focus groups that corporations are increasingly taking an interest in product service systems as a means to capture the aftermarket revenues associated with repair. However, as Bradley and Persson (2022, p. 4) write, "relating this vision of the circular economy to social equity, an increasingly specialized and corporate-centered society runs the risk of people losing the means and skills to provide for themselves outside the corporate monetized sphere". Similarly, Niskanen et al. (2021, p. 9) suggest that in PSS, "rather than building relational engagement and skilled agency, repair is achieved by consumers relinquishing possession of goods to corporations, taking instead the role of service users or leasers. These enclosed systems of repair diminish existing repair and reuse work that provides local jobs and significant co-benefits at the local level".

These concerns about the ability to repair products designed for obsolescence, corporate dispossession of repair entrepreneurs under EPR, and the prospect of deskilling and corporate dependency under product service systems have helped to strengthen the right to repair movement. Repair initiatives have emerged as a new form of collective organization in opposition to both unsustainable levels of production-consumption-disposal and shifts in ownership structures that make independent repair untenable. One focus group participant was vehement that discarded goods no longer belong to the producer, saying:

I think local control is important, but I think severing the relationship between the manufacturer sense of ownership is also important. Manufacturers have been objecting to us being able to fix our stuff on the theory that they control it… I resist the idea of control. Once you hand something back or you give it, or you donated to somebody, it no longer belongs to Dell. It doesn't belong to Apple, it doesn't belong to GE. So let's at least make sure that that is clear (FG7 May 17, 2021).

However, the politics of repair are contentious (Zapata Campos et al., 2020; Bradley and Persson, 2022). While the EU has provisions for repair in its Circular Economy Action plan and US President Joe Biden directed the Federal Trade Commission in the summer of 2021 to draft regulations which prohibit corporations from preventing repair by consumers and independent repair businesses—advocates argue these gestures are not enough (Seddon and West, 2021). More recently the Fair Repair Act was introduced into the US Senate and is currently under committee consideration. However, our participants tell us that lobbying against the impending legislation is intense. One participant who runs a non-profit dedicated to helping people fix their own electronics estimated that anti-right to repair lobbyists represent industries with over 10 trillion dollars in market capitalization. He said, "*the US government is probably the only size gorilla to go toe to toe with Godzilla*" (FG7 May 17, 2021).

The case of repair in the CE thus also suggests that without attention to issues of ownership and control over

materials, CE proposals like EPR and product service systems can risk alienating consumers from the right to repair goods, threaten existing repair infrastructure, and can create relations of dependency that make it difficult for people to operate outside the corporate sphere.

3.3. Case study III: Resale platforms

In recent years, growth in online secondhand markets—so called "recommerce"—has been exponential. Clothing resale was an $18 billion industry in 2017, and by 2021 it had doubled to $36 billion (ThredUp, 2021). The sector is projected to double again in the next 5 years (Kumar, 2021; Grant et al., 2022), which would signify a growth rate eleven times faster than new clothing retail growth (ThredUp, 2021, p. 4). Recommerce includes a number of redistributive arrangements, from auction sites like eBay, to consignment models like ThredUp, and peer-to-peer exchanges like Poshmark, Mercari, and Depop. While promising sustainable fashion through frictionless logistics, recommerce platforms have the potential to upend existing property relations with important consequences for those who make a living—or just get by—reselling online.

The legal right for individuals to sell used items comes from first sale doctrine in patent and copyright law, which includes "the ability to stock, display, and resell" used items "based on the principle that trademark owners should not be able to control downstream sales of their goods" (Liebesman and Wilson, 2012, p. 188). In short, first sale doctrine states that people have the right to sell used goods acquired legally once the original owner has sold the product (Sato, 2021). In the context of brick-and-mortar secondhand stores, the first sale doctrine has been largely unproblematic. The display and sale of used goods in physical stores has a limited reach, and it is difficult to argue that customers might mistake a secondhand store as the original manufacturer of the goods in question. Yet the movement to recommerce platforms has muddled property rights and relationships with regards to used goods. The scope and speed of recommerce mean that it can compete with online sales of first-order goods (Liebesman and Wilson, 2012; Sato, 2021), presenting opportunities for first-order retailers to exercise powerful advantages over small-scale resellers.

The largest recommerce platforms are what Srnicek (2016, p. 49–50) describes as "lean platforms," which "attempt to reduce their ownership of assets to a minimum and to profit by reducing costs as much as possible". These lean platforms include sites like Facebook Marketplace, eBay, Etsy, and emerging platforms like Poshmark, Mercari, and Depop (Roshitsh, 2021). Importantly, these sites do not own the products sold on their platforms—instead they match buyers with sellers in exchange for a percentage of the sale price (Yrjölä et al., 2021). Such "asset-light" platforms (Yrjölä et al., 2021, p. 762) facilitate sales but do not do the work of finding, purchasing, cleaning, and organizing used goods. Instead, the labor burdens and risks are placed on individual resellers, who must acquire stock, write descriptions, take photographs, and negotiate with buyers without promise of payment until a sale is made. Resellers use considerable knowledge to select sought-after goods from a variety of sources, and conduct research on "comps"—comparable items—to determine the nature and value of their finds. This time-intensive labor has become risky, however, as the growth of online secondhand markets has made used goods an increasingly lucrative resource frontier.

Online secondhand markets have become a space of contestation over property rights, as evidenced by reports of takedown notices (Sato, 2021) on digital resale platforms. In these disputes, trademark owners of used goods have refuted the rights of resellers to offer used goods for sale (Liebesman and Wilson, 2012; Sato, 2021). While often couched in a concern over counterfeit used goods (see, for example: Dunham, 2021; Kumar, 2021), trademark holders may also dispute sales based on the potential for buyers to be confused by whether or not the reseller is associated with the trademark holder (Liebesman and Wilson, 2012). Yet despite purported concerns over consumer safety and information, Liebesman and Wilson (2012, p. 161–162) argue that these takedown notices go "beyond trademark bullying and are more than merely stopping a merchant from using the owner's mark—the goal is to remove the reseller's goods from the market altogether". Indeed, the rapid rise of recommerce has led many brands to establish their own internal resale platforms, like Patagonia's Worn Wear, Eileen Fisher's "Renew," and Levi Strauss & Co.'s Secondhand. These platforms are discursively oriented toward sustainability and circularity, but are made profitable by a market that is growing exponentially (Siegal, 2019; Roshitsh, 2021; Grant et al., 2022).

Because platforms can be held liable for trademark infringement if they continue to host counterfeit and illegally-obtained goods (Liebesman and Wilson, 2012), they have developed reporting procedures for trademark holders to register complaints. Lean platforms operate using a "hyper-outsourced" model (Srnicek, 2016, p. 76) where costs and risks are placed on—in the case of secondhand markets—resellers. In the context of contested property, lean platforms "want to ensure that they are viewed merely as 'conduits' between the buyer and seller with no direct control over the listed goods, and will usually remove listings based on any accusation by the mark owner" (Liebesman and Wilson, 2012, p. 180). Platforms like eBay (2022) and Poshmark (2022) have dedicated copyright policies that assure trademark holders of their rights to dispute the sale of material. Yet while reporting a trademark violation is a simple process for powerful companies, small-scale resellers face enormous hurdles in trying to dispute these claims (Liebesman and Wilson, 2012; Chen, 2020; Sato, 2021). Further, for many of the individuals who make a living, or simply get by, reselling used goods online, the losses associated with removed listings can be devastating

(Liebesman and Wilson, 2012). Without mechanisms to assert their rights to property, and to the redistribution of used goods, resellers are left with a stock of goods they cannot sell.

The property relations at play in online resale are muddled further by the competition for used items that are "new with tags." These items retain the markers of new goods (tags, stickers) despite their availability through secondhand markets, and they are coveted by resellers eager for high profit margins. A featured speaker at an online re-commerce conference described chasing a woman through a parking lot to obtain a stock of used goods that had been rejected by a brick-and-mortar resale shop:

> a woman had brought like 10 black contractor trash bags full of clothes into the store, and they bought two items for $11 from her. And we're standing in the store and she's a little frustrated, like audibly frustrated with the staff there because she's like, these are all new with tags, designer things. The store was packed full, so they were just not buying because of inventory levels. And so she starts hauling the stuff out and [my friend] turns to me and she's like, 'we've got to go get her.' And so we proceeded to run out in the parking lot and chase her down and say, 'hey, can I sell your clothes?' And so that day I wrote her a check. I wrote her a check for $600. And I took 10 black contractor trash bags home with me in my little Kia Soul. It was like busting out the roof. And it was all new with tags. Eileen Fisher. It was all new with tags Spanx. A lot of those types of brands (Re-commerce Conference, 10/8/21).

For sellers active on re-commerce platforms, items that are "new with tags" are "definite, easy sells" (Resale interview 176, 8/10/21) that are increasingly common to find (Resale interview 125, 8/12/21). One avid reseller described purchasing another reseller's inventory, noting with satisfaction:

> there was new with tags Lululemon, new Athleta. I mean, really nice high end brands. So I went down there and I mean, it was... I think I spent three hundred fifty dollars total, but I'm pretty sure I got 18 - maybe 18 huge black garbage bags completely chock full (Resale interview 143, 8/11/21).

The drive to find and resell items that are new with tags comes from the significant mark-up that resellers can earn from such goods. Re-commerce platforms allow resellers to indicate items that are new with tags, providing an avenue for consumers to search for and purchase these new goods at discounted prices. This boon for resellers, however, presents new challenges for trademark holders, who risk losing business to these increasingly lucrative re-commerce marketplaces.

These issues with resale platforms are in line with Tsing (2015, p. 63) description of "salvage accumulation," where "lead firms amass capital without controlling the conditions under which commodities are produced". Tsing (2015, p. 63) describes sites of salvage accumulation as located both inside and outside of capitalism—in what she calls "pericapitalist spaces". Resellers move from spaces that stretch our understandings of capitalist relations, like yard sales and the Goodwill "Bins", where goods change hands for little or no money, and under conditions that often don't resemble shopping (Herrmann, 1997). Lean platforms profit from the labor of resellers finding, fixing, cleaning, photographing, and describing used goods. These acts of scavenging and digging for used goods are a kind of foraging—a wild harvest of "abject capital" (Giles, 2021) abandoned by markets and rendered valuable again through the work of resellers. Yet as online resale markets grow and transform, they are becoming domesticated by the logic of capital. Recent US legislative efforts have targeted online markets to ensure that the goods sold are legible to consumers, firms, and markets. The SHOP SAFE Act of 2021, for example, requires individuals to provide the manufacture location of goods sold, other important details, as well as personally identifying information about sellers. Similarly, the INFORM Consumers Act seeks to "collect, verify, and disclose certain information regarding high-volume third-party sellers of consumer products to inform consumers" (Coons and Tillis, 2021). These legislative efforts are framed in terms of consumer safety, yet they represent a subtle shift in ideas about who can claim (and resell) property. An underlying assumption of these efforts is that consumers can be best served by products coming directly through manufacturers rather than through third parties. This third case study thus also suggests that circular economy proposals to promote resale should be carefully evaluated to consider how the politics of resale might shape property relations and the right to resell used goods.

4. Discussion: Retheorizing property to create a circular society in common

As we hope these three case studies make clear, the process of waste revalorization for a more circular economy is a highly political process that has motivated more actors to collect and capture waste (Ravasio and Moreau, 2017; Schindler and Demaria, 2020). In that process, powerful actors are often able to capture value through property contests. Schindler and Demaria outline how these conflicts reconfigure socio-metabolic systems and all their attendant flows of energy, emissions, labor and materials—all too often resulting in the dispossession of those who are exposed to waste and labor to extract its value. They write, "put simply, powerful actors must typically impose new institutions (e.g., waste ownership) and/or introduce waste management technology (e.g., incinerators) which reworks material flows" (Schindler and Demaria, 2020, p. 54). The environmental justice atlas lists more than 200 waste related conflicts around the world. Co-founder Martinez-Alier (2021) has argued that circularity is not likely and resource conflicts will certainly continue in an entropic system that extracts resources from commodity frontiers.

Several scholars critical of the circular economy concept and its potential to exacerbate social and economic inequalities have been inspired by the work of Moore (2015) who has written persuasively about the end of Cheap Nature—which he imagines will constitute the final crisis of capitalism. Moore (2015, p. 217) understands capital as a continuous process of expansion, constantly seeking new commodity frontiers or new forms of Cheap Nature to, as he says, "extend the domain of appropriation faster than the zone of exploitation".

Marxist inspired theorists have long helped to illustrate the various means by which value can be appropriated in capitalist systems. Beginning with Marx's outline of how the capitalist class extracts value by appropriating the surplus labor of workers (the unpaid labor expended beyond the sale price of the good) and then utilizes that capital to enclose and legally capture common property through primitive accumultation (1992)—scholars have outlined a wide range of mechanism that seem potentially relevant to the circular economy case studies presented in this paper (Marx, 1992). In The Accumulation of Capital, Luxemburg (2003) posited that the expansion of capital would depend on the ability of the system to expropriate resources, not just the surplus labor of domestic workers reinvested to expand production, but also through the creation of new frontiers of exploitation in the developing world. Luxemburg's conceptualization of accumulation thus hinged on the ability of capitalist systems to set up parasitic relationships between capitalist and non-capitalist spheres, extracting resources and creating relations of dependency, often rationalized with racist and colonial logics. Dependency and World Systems theories further developed our understanding of the mechanisms of appropriation, dispossession and accumulation (Frank, 1966; Wallerstein, 1974). More recently (Harvey, 2006) concept of accumulation by dispossession and De Angelis (2004) work on "the new enclosures" has enjoyed considerable attention, highlighting the dual character of capitalism that at once exploits by alienating people from productive resources beyond their own labor at the same time that it expropriates by producing a moral order of differentiation based on racialized, classed and gendered notions of legitimate and illegitimate resource access and utilization (Wang, 2018).

Schindler and Demaria argue that without a new commodity frontier to exploit —which might fuel the next expansionary phase of capitalism—attention has turned toward making existing systems more efficient by capturing lost value. We have suggested that we may indeed be moving increasingly toward a time when accumulation is tied not only to the appropriation of surplus labor, the exportation of surplus production or the accumulation of nature, but increasingly the very detritus of a failing system (Isenhour and Berry, 2021). Unfortunately, as our case studies illustrate, this new focus on improving the efficiency of the system is often at the expense of people who have long been practicing circularity as discards are increasingly claimed as corporate property, essentially excluding informal workers—resellers, repairers, cleaners, waste pickers—whose livelihoods often depend on this work and whose labor creates significant local social, economic and ecological value (Anantharaman, 2017; Millar, 2018; Berry, 2022).

Here we argue that it is certainly important to study and bring light to these processes of accumulation, expropriation and exploitation through shifting property relations and reconfigurations of socio-metabolic systems. However, we also urge caution. Limiting our understanding of these shifting property relations at the end of cheap nature also has the potential to consolidate the power of capitalism and create a deficit framing of the important work that is already being done to create a circular future in common. Scholars like Tsing (2015) and Gibson-Graham et al. (2016) have challenged the capitalocentrism present in much of the critical scholarship, arguing that there is a danger in attributing theoretical primacy to the power of a singular capitalist system. When capital is the only lens through which to understand our socio-economic systems or the potential for a politics of transformation, we neglect a wide range of economic practices or find ourselves forced to define them relative to capitalism (as either within it, or outside it). In reality, empirical work makes clear that there are a wide range of economic practices and commoning efforts that deserve our analytical attention which may not conform to predictions based solely on analyses of commodity frontiers and capitalist capture. Some practices are clearly capitalist, others are clearly non-capitalist and there are a wide range of practices that we might consider peri-capitalist—existing in the spaces in between (Tsing, 2015). But Gibson-Graham et al. argue that defining all economic forms relative to capitalism may limit the potential for transformative politics. They write, "A politics grounded in capitalocentrism seems to offer little in the way of helping us to reposition ourselves for living on a climate changing planet. Might thinking about the commons and a politics of the commons outside the confines and strictures of capitalocentrism help us reimagine our ways of living on this planetary home?" (Gibson-Graham et al., 2016, p. 32).

Anna Tsing's concept of salvage accumulation is useful, recognizing not only the tendencies of capital to commodify, appropriate and alienate, but also to understand how the process of capitalization may also inspire non-capitalist spaces when it creates the "capitalist other of value"—places, spaces and people seen as wasted. But these sites of ruination are also sites of value generation as our cases make clear. The question is, can they, in the movement toward a more circular economic system be kept open to the commons, to those who saw value long before discussions about materials efficiency and circular economy? JK Gibson-Graham's sustained interventions encourage us to not only focus on the hegemony of capital, but to valorize the affirmative, experimental, and enabling practices that abound in the waste commons in communities around the world.

If we follow this logic, it opens up space for understanding that attempts to shift our collective livelihood strategies toward more circular forms can take place under a variety of property regimes. The capitalist capture of value through privatization is not the only route to realizing a circular economy. Beyond the legalistic conceptualization of property that creates a false dichotomy between private property and collective ownership, it is important to recognize that property is much more than a human's rights to things. Ultimately, property relations are essentially about the rights of people in relation to one another. Ownership cannot be disentangled from concepts of distribution which is ultimately determined by status hierarches that establish social orders of power and control (Gluckman, 2012). Property is thus ultimately about these social assignments of rights and entitlements between people.

Scholars of property have long problematized the idealized dichotomy between the commons and private property but recent scholarship suggests that the enhancing research on the process of commoning, in this case through repair and resale as a political practice and potential transition agent (Niskanen et al., 2021) may be exactly what is necessary to understand how to prevent corporate capture of the latest commodity frontier. Contrary to the claim that a large government may be the only force strong enough to counter the Goliath-like industrial lobby, several scholars suggest that additional research on processes of communing—the process by which people work together to share resources and provide mutual aid—may be a more promising relational approach that "transgresses the boundaries of different forms of property" (Gibson-Graham et al., 2016).

The circular economy disclaimers we have presented in this paper suggest that economic theory for creating a sustainable circular economy must certainly include an understanding of capitalist capture. However, we also suggest that future research should help to improve recognition of the value generated through forms of circularity that already exist or are emerging in response to privatization and exclusion—all over the world. While both perspectives are clearly important, coming to better understand processes of commoning may have more potential—moving beyond now well-rehearsed critiques of capitalism—to inform an inclusive politics of circularity that can enhance human development and ensure equitable access to livability in the Anthropocene.

Data availability statement

The datasets presented in this study can be found in online repositories. The names of the repository/repositories and accession number(s) can be found here: University of Maine Dataverse http://dataverse.acg.maine.edu/dvn/dv/Isenhour_Research/faces/study/StudyPage.xhtml?studyId=169&versionNumber=1.

Ethics statement

This study involving human subjects was reviewed and approved by the University of Maine Institutional Review Board. All participants provided informed consent.

Author contributions

All authors listed have made a substantial, direct, and intellectual contribution to the work and approved it for publication.

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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.

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Supplementary material

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/frsus.2022.1007802/full#supplementary-material

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