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**Extractivism, Value and Waste: Organizational Mining of e-Waste in the United Kingdom**

**Abstract**

In this paper we critically evaluate the mining and extraction of e-waste – electronic waste – and the relationship with the emerging cleaner and greener economy. Drawing on ethnographic data, gathered from an e-waste management organization – e-WasteOrg, we show how e-waste and value are assembled, extracted and circulated within local, national and global contexts. To date little attention has been paid to interdependent systems of waste and value. We argue that e-WasteOrg operates polyphonically in order to secure, routinize and circulate the ongoing disposal of e-waste. Extracting waste becomes associated with a range of differentiated value systems, as sourcing and valuing waste is a continual concern for those in the waste management sector. As more waste is sought, we conclude that a cleaner and greener economy is both constricting in terms of new market entrants and expanding as waste management actors mine for materials across value systems.

**Keywords: e-waste, extractivism, mining, value, waste, green economy, circular economy**

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**Introduction**

The UK Government's commitment to invest in low carbon infrastructure, sustainable business, and create new jobs in the process, is part of their strategy for 'Clean Growth'. The target of 'zero waste by 2050' through 'resource value maximization' and reducing environmental impacts associated with the extraction, use and disposal has been set (BEIS, 2017, p.2). To realize such a vision, recognizing and extracting value from waste, and the associated disposal practices, plays an integral role, as this is how resources are captured and circulated. One contemporary solution proffered is 'urban mining', as it allows the recovery of materials from end-of-life goods (Gregson et al., 2015, p.236). Waste management organizations adopting extractive practices have the potential to become 'the mining industry of the future' (Corvellec and Hultman 2012, p.301) as they source value from waste. In this paper, we pose two interrelated questions. First, how are e-waste and value assembled, extracted and circulated in one of the largest UK e-waste management organizations – e-WasteOrg (a pseudonym)? Second, what does this tell us about e-waste management practices?

Drawing upon ethnographic data, we show the connections between interdependent systems for the disposal of waste and extraction of value**.** Inspired by Barbara Czarniawska's (2004) mobile ethnology, we follow the trajectory of discarded mobile telephones through e-WasteOrg to explore how waste and value are constituted. Following the object, in our case the mobile telephone, allows us to see 'waste beyond dumping' (Hetherington, 2004; Beisel and Tillmann, 2012). Moreover, understanding practices of disposal (i.e. the creation of waste) and extractivism (i.e. the creation of value) as interdependent systems provides insights into debates on consumption and the effectiveness of policy and change, particularly as to whether a

resource sufficient economy is a cleaner and greener economy. As proponents of resource efficient strategies, such as the UK Government and more recently the Circular Economy[1] followers (EMF, 2015, Circle Economy, 2018) advocate (BEIS, 2017). The e-waste sector in the UK—and the company that is the focus of our research—can be understood as a form of contemporary extractivism.

Extractivism typically refers to the physical removal of high-demand resources, such as rare metals, usually from non-human environments in as short as time as possible and with maximum value. Although extractivism has been central to capitalist development since the industrial revolution, until recently social scientists have paid little attention to extractive practices. By contrast, historians of both the Global North and South have been more attuned to such processes, particularly those interested in developing people's history and documenting the struggles of communities against powerful institutions and states.

Our contention is that the emerging concept of extraction transverses into the contemporary context of e-waste management and raises valuable conceptual and empirical issues about the ongoing nature of waste and value; particularly as organizations seek ways to extract economic remuneration from waste on a more continual basis. In order to become an extractive actor in organizational contexts and e-waste landscapes, e-WasteOrg oscillates across different value systems — from the economic, to the ecological, pedagogical and political. We argue that e-WasteOrg is

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[1] The Circular Economy is an economy premised on 'keeping products, material and resources in circulation for as long as possible', thereby reducing waste (European Commission, 2015:1), and working towards a self-sufficient production process (Gregson et al., 2015: 227)

able to act like an extractive actor by operating polyphonically[2] in order to secure and routinize the ongoing disposal of e-waste from businesses so that waste can be processed, repacked and circulated in local, national and global markets that are in search of working devices and raw materials. The organizational mining of waste becomes an ongoing challenge because the extraction, valuing and sourcing of waste is a major problem that has to be constantly revisited by organizations in the waste sector.

The contribution of this paper is threefold. First, at a conceptual level, we identify a range of value systems that can be used to discern a more nuanced understanding of extractive practices and their effects over time and in situated contexts. Second, from a more theoretical perspective, we extend the literature on the sociology of consumption, specifically that related to the notion of value, so as to take into consideration the question of extractivism. As Josh Lepawsky and Chris McNabb (2009, p. 189) remind us, «waste rarely, if ever, settles in one place […] it returns, not only as pollution and toxicity, but also as feedstock of new rounds of commodity production.» Lastly, we ground these reflections in an under-researched empirical context – that of the UK e-waste work sector – to offer insights into how value systems traverse institutional contexts.

The paper is structured in the following way. We begin by introducing the e-waste landscape before reviewing the constitutive pairing between waste and value to

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[2] We take inspiration from Niels Åkerstrøm Anderson's (1993) notion of a polyphonic organization, an organization that takes meaning from multiple value systems that extend beyond the boundaries of the organization and the environment. Whereas homophonic organizations have a singular form of value with which they are associated, polyphonic organizations connect to a range of value systems at the same time, for example economic, legal, educational, political, ecological and so on.

emphasize how previous studies have described categories as relational but distinct. We then consider waste in relation to disposal and extraction to show how they are bound together. We proceed to illustrate how different expressions of value, which emphasize ecological, pedagogical and political priorities, operate alongside economic concerns. We end by discussing the implications of our research in relation to e-waste recycling, clean and green growth, and point to an alternative way in which we can link production, consumption, disposal and extractive practices. We also conclude that a focus on extraction and contemporary extractive practices affords both conceptual and empirical opportunities to understand the dynamics of waste in advanced capitalism.

## 1. E-waste as a landscape to be opened and mined

Josh Lepawksy describes e-waste as «the material detritus of the Information Age» (2012, p.1194) in the way it comprises discarded technologies such as mobile telephones, computers, laptops, but also servers and photocopiers. This waste stream is reported to be one of the fastest growing waste streams worldwide at 3-5% per annum, which in 2015 was estimated to total 41.8 million tonnes (Baldé et al., 2015, p.44). E-waste has become a permanent feature of the world economy and this is partially attributed to our reliance on ICTs, software and hardware product design and design obsolescence, diminishing natural resources, landfill reaching its maximum capacity, and opportunities for current and future employment. Current estimates state that e-waste in the world contains 48 billion euros worth of recyclable materials (ibid.), thus promising lucrative returns. Given the rapid rate of global economic development, e-waste is forecast to grow exponentially across the Global North and South (Schleup et al., 2009; Pickren, 2014; Lewpasky, 2015). For example, the 2016

report from the International Telecommunication Union (ITU) highlights that 95% of the population now live in areas that are covered by a mobile telephone network. In fact, according to GSMA Intelligence there are more mobile phones in the world than people: over 8 billion of them in total (GSMA, 2017).

Mobile telephones are a core category of e-waste and contain non-renewable resources such as silver, copper, gold, iron and platinum and materials such as plastics, mercury and cadmium which without proper extraction techniques are potentially harmful both to those working with waste and to the natural environment (Grossman, 2006; Sarath et al., 2015). Given the legal regulations surrounding the hazardous elements in e-waste, the economic value contained within e-waste and the rise in its volume has raised concerns about the best way of extracting these materials from electronic devices (Raw Materials Initiative of European Commission, 2010, as cited in Gregson et al., 2015, p.236). The fact that the life expectancy of a mobile phone is two years in developed countries and 3 years in developing countries (ITU Report, 2016) makes this particular device a rich site for value extraction. The steady expansion of the e-waste landscape appears to provide fertile ground to exploit materials to input into new tradable goods and maintain contemporary consumer demands (Corvellec and Hultman, 2012; Gregson et al., 2015). Typically, these extractive practices in relation to waste take place within global, national and local governance practices and regulatory standards.

Globally, the governance of e-waste falls under the 1989 Basel Convention Treaty initially aimed at controlling the transboundary movement of hazardous waste from developed to developing countries. The 172 countries signed up to the treaty have to

seek 'informed consent' from the country that is destined to receive the exported goods. The previous trend that saw e-waste shipped from developed to developing nations (Pellow, 2007) has changed as emerging nations have started to generate as much e-waste as the established sources (Pickren, 2014; Lepawsky, 2015). The movement of waste is both intra-national and international as countries such as India and China are today both sources and destinations of e-waste.

National legislation in the UK focuses on take back, which was introduced across the European Union after e-waste was banned from landfill in 1999 (Landfill Directive, 1999; Hazardous Waste Directive, 1999). For example, the EU 2003 Waste and Electronic and Electrical Equipment (WEEE) Directive was introduced and transposed into UK law in 2006. WEEE aims to control electrical and electronic waste through the promotion of the waste hierarchy, in other words, prevention, preparation for reuse, recycling, recovery and disposal (Waste Framework Directive, 2008). The intentions of the legislation are to improve the environmental profile of those operating within the waste sector with the aim of protecting soil, water and air pollution and to turn waste into a resource that can be reused in the production process (WEEE Directive 2003, p. 26; 2012). However, e-waste regulation, for example, does not call for a reduced consumption of material goods (Science and Technology Committee, 2008). Waste policy appears to focus on resource maximization through the diversion from landfill (Pickren, 2014; Gregson et al., 2015), as opposed to the reduction of environmental impacts and thereby acts as a means by which we can consume more (Gregson et al., 2014). Similar to other environmental policies, the WEEE Directive is an example of take-back legislation that places the onus on the manufacturer to pay for the 'end-of-life' process and is

intended to incentivize producers to reduce resource use, and to design and produce greener products (Hieronymi et al., 2013).

Over the past twenty years, since the emergence of e-waste as a waste stream category (EU Commission, 2000), e-waste management companies have become increasingly visible, as they have sought economic returns from post-consumer waste (Baldé et al., 2015). The apparent abundance of discarded secondary materials and extractive opportunities raises questions about the relationship between waste and value, and about how waste and value are assembled and extracted.

## 2. Situating previous research on waste and value

Given that the focus of our research is to understand how value is constructed across value systems, the sociology of consumption literature surrounding waste and value is an appropriate place to start (Thompson, 1979; Douglas, 1992, Gille, 2010, Lepawksy and Mather, 2011; Corvellec and Hultman, 2014; Pickren, 2014; Gregson et al., 2015). According to Michael Thompson's foundational analysis in *Rubbish Theory* (1979), the idea of waste as a social phenomenon is connected to questions of affluence (i.e. social standing) and taste. Exploring the value divisions between transient (buy now, throw away later), durable (a treasure for life) and rubbish (something that has zero value) objects over time, Thompson argues that for something to be discarded it must already have been attributed value in order for it to be perceived as worthless. He provides us with insights into the changeable nature of value, as objects move from one category to another and that there are moments when value is found in rubbish. For Thompson, such value judgments were made by the upwardly mobile – social elites, as he refers to them – who could afford to consume

and waste. Waste (i.e. rubbish) is also linked to respectability in terms of the human desire not to 'dirty' oneself. The compulsion to quickly discard waste is to avoid the stigma associated with waste as something 'dirty' or 'polluting' (Reno, 2009; Gregson et al., 2014). While Thompson's work emphasizes the political connotations associated with valuing objects, his work does not take into account the spatial dimensions in which waste and value reside.

Mary Douglas' seminal work *Purity and Danger*, first published in 1966, instead considers waste as a spatial issue within a socially constructed context (Douglas, 1992). Through her exploration of western and non-Western religious traditions she argues that «dirt was matter out of place», and represented disorder in an ordered world. Dirt is identified and pushed to one side until it starts to rot or decay and vanishes from the social system. Dirt then becomes 'homeless' or a value that has momentarily been forgotten (Douglas, 1992; Thompson, 1979; Hetherington, 2004). We argue that waste and value are mutually constitutive: waste can be understood as disorganized value, and value as organized value, and in turn the two are co-assembled socially, culturally, materially and politically across time and space. Hence, when something is not assigned the value of waste it retains some form of order within a particular situated context.

Although Douglas provides rich insights into the place 'dirt' occupies within a given culture, as Martin O'Brien has observed (2008), what she does not discuss is how the impact of different types of dirt in religious and historic contexts compares with contemporary society.  Douglas' study dwells on organic waste understood to be static and controllable, rather than post-consumer waste such as mobile telephones or

clothes. Like Thompson, Douglas does not account for the current socio-economic context that engages with the 'ongoingness' of waste and value practices that traverse the globe, such as e-waste (Pellow, 2007; Lepawsky and Mather, 2011; Lepawsky, 2015). E-waste, like other forms of contemporary waste, has a historical legacy of being transported from affluent countries to socio-economically marginalized populations in the Global South (Pellow, 2007; Lepawsky and McNabb, 2009), who typically dismantle these objects by hand in insalubrious working environments. Within the global recycling economies, e-waste accrues value as the object is discarded, collected, transported and separated by different actors (Lepawsky and Mather, 2011).

So how might we understand the temporal and ongoing nature of waste and value? Zsuzsa Gille's research on Hungarian waste regimes shows how values attributed to waste are dynamic, circulate and can metamorphose into some other form, which indicates that waste and value co-exist (Corvellec and Hultman, 2014). She explores three waste management periods in the specific context of Hungary under communist and post-communist rule: the 'metallic regime' (1948-1974), the 'efficiency regime' (1975-1984) and the 'chemical regime' (1985 to present). In each epoch waste was viewed as value, for example, as free material, an inefficient overhead cost (surplus) or a toxic material. She argues that value over time does not change in a vacuum or as a succession to a previous period: rather there are residual characteristics that can impact upon future regimes, with intended or unintended consequences. According to Gille, «[a]s the production and circulation, and transformation of waste become increasingly complex materially, so too they do socially» (Gille, 2010, p. 1062). Value regimes subsequently extend beyond localized contexts and can displace and

disrupt organizational and social milieus. As such, we find waste and value co-existing and overlapping with one another.

Hervé Corvellec and Johan Hultman develop this line of argument further by introducing the notion that «value propositions are reciprocal communicative practices […] that take place in interactive networks» (2014, p.356). They illustrate this dynamic relationship between waste and value through their exploration of a Swedish municipally owned waste management company (NSR); highlighting how different actors, during the course of waste management, adopt multi-sided valuation practices. For example, NSR's value propositions speak to a broad range of stakeholders – local communities, municipalities, businesses, the environment and so forth. The relevance to our argument here is that value propositions are political, pluralistic, dynamic, ongoing and multi-vocal. This means that values can complement or compete against each other at the same time. Furthermore, value can be enacted into being, which occurs when each actor makes a value judgement that disassociates particular objects from value (Scanlan, 2005). An object can thus be given meaning and to some extent agency through the act of disposal.

**3. Disposal and extraction**

The creation of waste and the extraction of value are constitutively bound with the practices of consumption and disposal. When we discard an object, it is constructed as having no future use within its given context and as such is stripped of value (Thompson, 1979). Through the act of disposal waste is rendered invisible to its previous owner and becomes 'homeless'. The conduits of waste keep the object and its constituent parts on hold, waiting to be valued again, to become someone else's

property and to be connected to another context (Hetherington, 2004; Alexander and Reno, 2012), for example, by the waste industry that views 'waste' as a valuable tradable resource (Gregson and Crang, 2015). We could say that the act of disposal brings about a change in status from the formerly valued object into something which is waste, or put another way «value [that] is also performed into being» through the act of disposal and extraction (Gregson, Watkins and Calestani, 2012, p.5). It is at this moment that individuals and organizations are prepared to give up their property – insofar as it has become waste – and to pass it to others to take responsibility, care and ownership.

The ownership of an object *qua* waste is transferred at the point of disposal. Here waste, as organized dirt, awaits a new owner to extract value through different relational assemblages. What is apparent is that the new owner then has the responsibility and right to maintain, recover and resell the object: to decide whether and how the object has value (Thompson, 1979; Hawkins, 2006). The implication is that disposal is a recursive process that moves the waste into a space awaiting rediscovery through new forms of value extraction (Hetherington, 2004; Edensor, 2005). The act of disposal is both a conduit to transform something as waste and the trigger for creating a space for rediscovery allowing for new opportunities for the organization of value (Hetherington, 2004).

Having outlined these seminal contributions to understanding waste, we now introduce our research on e-WasteOrg to show how e-waste is not simply dumped or discarded (Hetherington, 2004; Beisel and Tillmann, 2012). Our concern is to demonstrate how contemporary waste management practices – the disposal of waste

and the extraction of value – around e-waste operates polyphonically across interdependent value systems.

## 4. E-waste and Value in e-WasteOrg

E-WasteOrg was established in the early 2000s by two telecommunication sales experts and is now one of the United Kingdom's largest e-waste enterprises. The enterprise started life operating out of a garage, but by the time of our research it had relocated to a large warehouse, operated in over 20 different countries and generated an average of £1.5 million pounds gross profit per annum. It employed 71 members of staff: four directors, 18 sales staff, 32 warehouse operatives, 15 administrators and two customer service employees. The workforce consisted of individuals from the North of England aged between 20 and 40, 85% of whom were male with mostly secondary education and few or no qualifications, apart from those who occupied the managerial and office-based positions. Service offerings included the reconditioning, reuse and recycling of mobile telephones, computers and laptops processing and the company was able to process around 100,000 electronic devices a month.

As noted above, the primary goals of the research were, first, to explore how e-waste and value were assembled, extracted and circulated in e-WasteOrg, and, second, to consider what this told us about e-waste management practices. It was therefore important to adopt an approach that enabled us to understand the process of disposal and extraction. Our idea was to follow the trajectory of a mobile phone through e-WasteOrg. The inspiration came from Czarniawska's (1998; 2004) mobile ethnology that follows 'action nets', which can be defined as «assemblages of collective actions, connected to one another because they are perceived within a given institutional

order, as requiring one another» (Corvellec and Czarniawska, 2015, p. 93). This point is relevant to our research, as waste and value have to coexist in order for extractvism to take place. A mobile ethnology attempts to enrich ethnographic studies by endeavouring to move beyond a focus on places, people, issues or events, to take into account the speed of organized activities, the messiness of institutional arrangements and events and the interconnectedness of relevant actors (Czarniawska, 1998; 2004). As we argue below, given that waste and value are interdependent systems, such an approach was deemed appropriate to gain exposure to connections that would otherwise be missed if the researcher stayed in one place. Drawing on social constructionism (Berger and Luckmann, 1966), this method begins by undertaking a series of interviews to find out about the event and these are used to produce standardized accounts of the working practices taking place. We then proceed to follow the trajectory of the object in question: the mobile telephone. By focusing on the 'action' rather than on the individual enables the researcher to move fluidly with the workers in order to build a collective account rather than an isolated story. It should be noted that following the action does not necessarily happen in a linear sequence and allows for a full exploration for the 'ongoingness' of waste, value and circulation (Lepawsky and Mather, 2011).

With the above in mind, we followed the mobile telephone over a thirteen-month period between May 2012 and June 2013. In total we made nine visits to the organization where we observed different processes and formally and informally interviewed 20 people. Their job positions ranged from senior executives, departmental heads of compliance, sales and charitable partnerships to warehouse workers and administration staff. Interviews ranged from fifty minutes to one and half

hours and when allowed were recorded and transcribed or reconstructed from notes. During the interviews we found that some individuals were willing to share their experiences. Others, particularly in the sales department and warehouse operations, were under constant surveillance as part of their work and our presence as researchers was not noticeably commented on. Everyone, we engaged with seemed at ease and had a certain willingness to discuss their work. Furthermore, we believe surveillance would not be unusual in companies working with discarded technologies where data security is typically very important (Stowell, 2012).

In addition, detailed notes were made of observations during field visits, discussions in meetings, informal conversations with workers and managers, and site tours. Furthermore, photographs, archival materials relating to the company's operations and working practices, and publicly available texts were collected and collated. It is worth noting that since 2011 Author 2 had a close familiarity with e-WasteOrg due to a previous collaboration and this sped up the rapport-building process as trust had already been built. Through each visit the researchers were able to witness the assembling and disassembling of waste and value in virtual and real timeframes as the mobile telephone went on its journey. The sets of data were coded and then examined for reoccurring themes and organized using Atlas.ti software.

As indicated above, when the mobile telephone enters e-WasteOrg, the object is viewed as waste and value at the same time. As waste, the mobile telephone is about to be discarded from a client as it is devoid of use in its existing function, but it has economic value waiting to be exploited through extractive practices. As we will show, in our three vignettes – waste and value happen polyphonically. The symphony of

value systems occurs in conjunction with an economic system. We would be naive to imply that this is surprising as businesses are required to make profit: however, and as we explain later, having these competing value systems not only encourages the circulation of waste, it increases demand for further supplies and new buyers to sell onto. If this demand is not monitored closely, there is an attendant danger to move away from clean growth as resource maximization encourages the further circulation of waste. This leads us to our first main question: so how is waste and value created in e-WasteOrg?

4.1. Economic extractivism

E-WasteOrg operates in the business-to-business asset recovery market. Take back legislation stipulates that private enterprises are required to 'finance the costs of collection, treatment, recovery and environmentally sound disposal of WEEE' and negotiate 'an agreement with a third party' (UK WEEE Regulation, 2013, p.34). E-WasteOrg has to pay for relevant licences and handling fees to operate in the e-waste management sector.  As the Chief Operations Officer told us in interview 'we have to achieve £350,000 a month in order to meet our overheads'.

The company devotes a considerable amount of its efforts to sales and marketing activities: there is an in-house call centre for 'cold calling' with dash-boards of individuals' performance on screens for all to see, chasing up leads and speaking with existing clients. At first we thought this was an expression of the sales background of the two partners, but as we continued to visit the workplace it became clear the company had to work hard to keep existing clients and secure new customers. There is a sustained focus on the part of the e-waste sector in maintaining its market: e-WasteOrg, in fact, exists only if there is a constant stream of waste entering the

warehouse.

E-WasteOrg's market is relatively new: it is, in a sense, a market under construction. It is uncertain how much waste will be available in the future for companies despite there being more mobile phones in the world than people (GSMA, 2017). But there are also known markets and known prices for particular products and materials. Decisions about what is waste and what is value have a knock-on effect on the company's economic activities, as alluded to by the Head of Systems.

> '…[regarding] the phones, we have a buyback guide which is based on the reconditioned sale price… there is a set fee and then the Account Manager informs our client that it costs so much per device… here is your start price, this is what we are offering you… here is the market value…' (Interview with e-WasteOrg Head of Systems, 24 August 2012)

The mobile telephone is transported from the client site to e-WasteOrg's depot where consignments are weighed and each device is registered on the bespoke computer system. Each telephone is given a unique reference number by a warehouse operative who then allocates the consignment to the refurbishment and repair. The repair workers make visual and diagnostics assessments of the telephone and its component parts to check against 'live' pricing databases. Mobile phone serial numbers are checked against crime databases to ensure the legitimacy of the new acquisitions.

Refurbishment or repair is a relatively straightforward process, during which personal data is removed and screens, keyboards and/or cases are swapped with previously acquired component parts. This is illustrated in the following extract from field notes:

The Warehouse Manager explained 'The main value in our businesses is returning non-working stuff to working'. The same man showed me the dingy fluorescent-lit refurbish and repair work areas… We stopped near J., who was putting a new screen on a Samsung phone, and the man said 'look we have got this smashed screen… we can put a new screen in it, a new key pad or whatever and then sell that as a working unit, you have bought it for a couple of quid and you would be able to sell it for £100' (Field Diary Notes, 30 August 2012)

Once fixed, the mobile telephone is ready for redeployment back into the client organization or sale through online auction sites. The profits, minus e-WasteOrg's fee, are returned to their prospective client or sent to a charity of their choice.

If beyond repair, a mobile telephone is then disassembled into its component parts. Warehouse operatives reassemble value from extracting usable screens, key pads, circuit boards and casing which are all stockpiled for future use or again auctioned off in bulk.  The circuit boards and/or any precious metals are placed into a container awaiting shipment on a slow boat destined for Asia. The telephone plugs and cables are moved on through auction, or sent offsite to a local penitentiary for copper extraction after removal of the plastic casing. Anything that follows the recycling route is profit for e-WasteOrg and is not returned to the client.

The company has a contractual partnership with a UK commodity trader and also has a trading network across Europe, America, Dubai and Australia. Recovery of financial value associated with e-waste enables us to begin to understand how e-waste links into wider capitalist systems. In the past two years e-WasteOrg has removed all

associations with discarded products, secondhandedness and recycling and rebranded itself as a blue/green chip service provider. E-WasteOrg's main profit comes from what is commonly referred to as gate or service fees (typically 25% of the value of the assets). The economic value is in the services connected with discarded telephones as opposed to the objects themselves.  In order to maintain a supply of e-waste, the company has to also be active in secondary markets. Secondary markets are considered markets under construction, which involves, importantly, not only the creation of demand, but also the transposition of institutional frameworks, norms and rules from other value systems. From this perspective, companies are not only economic actors: they also draw on other waste and value distinctions from other systems to foster the formation of economic value. This will now be the focus of our attention in the following sub-sections.

4.2. Ecological extractivism

As already mentioned, in the past two years e-WasteOrg has rebranded itself by removing words associated with waste.  Promotional material advertises the company's green credentials, asserting it to be at the heart of 'the new green economy' of tech startups and active in the greening of business practice and, as such, part of a 'new business paradigm'. For example, a 2012 e-WasteOrg brochure stated:

> 'To ensure total environmental compliance, we hold a full environmental waste permit… Our job is to make your WEEE compliance and recycling as rewarding and environmentally friendly as possible'

E-WasteOrg bases its decision-making in relation to products and raw materials upon 'the best price' that can be achieved in a particular market transaction. This represents

the economic value system in action, which raises the question: how can e-WasteOrg's discourse of green business practice be understood? Our findings suggest that the discourse of sustainability and the greening of business can be analysed as an interdependent yet differentiated ecological system concerned with creating a common future.

Waste and value are revisioned as a potential source of new jobs and an inevitable part of future life (Minter, 2013). The following extracts, the first from an interview and the second from field notes, provide insights into this reimagined and shared future.

It cost approximately 10% of the carbon to recycle, reuse, refurbish [a mobile telephone]... as it would do to make a new phone…there are huge environmental benefits of reusing an item. I mean even in something like a battery you have got cadmium, nickel, lithium… all these heavy metals that regardless of the actual pollutant side of it, if it is thrown away you create huge amounts of environmental damage or potential environmental damage. Huge amounts of carbon you take by their actual mining and, yeah, their creation so by reusing an item like that you have got, such a great, great carbon saving…' (Interview with Compliance Manager, 29 August 2012)

The operatives were unloading the recent delivery… J shares stories of where the phones had come from and on this occasion they were from the local area… 'We really try to support our local community… although we have customers all around the world, we try to minimize the transportation where possible'. The Chief Operations Officer joined us: 'we should have the local contracts for recycling as we are a local business offering local carbon service'. He then went on to explain how

infuriated he was with [x organization] as they had refused to give them the contract, 'they should be supporting local enterprise, jobs and reduce their carbon food print'. He was so passionate in his belief that he threatened to go to the local papers' (Field Diary Notes, 19 February 2013)

On numerous occasions, when we visited the company, one of the directors spoke forcefully about a local organization and how it had a contract with another company for its e-waste. We initially thought of this as a kind of lobbying activity, which in many respects it was, but analytically we can understand this to be an ecological value system as well as a characteristic of companies that operate polyphonically: extractivism is conceived as a form of environmental sustainability in order to secure ongoing economic extraction. According to e-WasteOrg senior managers, a large local institution should support a local company to 'keep things local', rather than working with another company located elsewhere. The notion of 'local community' that was described to us was one that supported a local business and enabled it not to travel as far as a competitor to pick up e-waste. For this imagined community, 'acting local' is a reasonable method of organization, even if e-WasteOrg's business practices are premised on distributing its e-waste on a worldwide scale. To persuade local clientele, such as the organization used in the extract above, the company developed a discourse of what local responsibility should look like in the future, a future that supported the local economy by employing locally and using local businesses.

4.3. Pedagogical extractivism

E-WasteOrg puts considerable effort into educating its clients, such as teaching companies secure disposal practices, as the following 2016 promotional document makes clear:

'We understand that WEEE disposal cannot always be straight forward […] We aim
to make waste electronic recycling and IT disposal as straightforward as possible.
We provide advice to help you comply […] and safely manage your electronic waste
lifecycle through dedicated managers.'

E-WasteOrg also offers to help companies decide when to upgrade equipment and
devices. We analyse this as a form of pedagogy that focuses on clients and customers'
lack of knowledge of the economic value of their e-waste. Educating companies and
individuals to dispose of their property in a timely and proper manner was described
as 'doing the right thing'. This option represented an alternative to the renunciation of
property rights to e-waste. It denotes how pedagogy, as a value system, is an
important feature of the company's work with others. The extract below provides an
illustration of the commitment e-WasteOrg has to educating their clients about
philanthropic opportunities.

'Some of our clients don't realize they can donate to charity, corporate supporters can
guarantee £50,000 worth of support… we can give them the option to use [money
gained from] recycling as part of that allocated fundraising pledge...we will collect
them again, they get recycled obviously, and the money [made] from [the sale] … is
reported back to the Charity… our clients have helped over 200 charities…it is a
good thing to do' (Interview with Charity Manager, 30 August 2013)

Some companies bargain and negotiate with e-WasteOrg over removal costs of e-
waste as they understand, but usually cannot access, the economic value of the e-
waste.  Working mainly with companies' who produce e-waste, is a strong indicator

as to why e-WasteOrg are concerned with educating clients/future clients about the 'right thing to do' with regard to 'unwanted' equipment and devices. At a corporate level, e-WasteOrg provides documented evidence on how much e-waste has been collected and how it has been securely disposed and this feeds into Corporate Social Responsibility and the sustainability reporting of companies. This too provides a form of pedagogy for the up-stream company, which is informed by e-WasteOrg about good practices in waste management.

Discussion and controversy about the economic value that can be extracted from e-waste through chains and networks of traders is minimized by this interaction. Helping companies learn about their responsibilities is an effort to ensure that organizations and individuals voluntarily relinquish property rights to something that they own and has economic value (Alexander and Reno, 2012); value that can be realized only through extractive networks that stretch across the globe and which e-WasteOrg can access (see Crang et al., 2013).

4.4. Political extractivism

The WEEE Directive is a political instrument designed to foster a market for e-waste. The EU cannot, however, control markets directly, but it can coordinate secondary markets by setting regulations for how e-waste is handled and disposed.  There also exists a political value system in terms of the authority to establish and coordinate a market for e-waste. E-WasteOrg's premise for operating is, of course, based on the belief that there is a market for e-waste. For e-WasteOrg, this market cannot be accessed until there is certainty of standards regarding how waste management companies organize themselves and discharge their responsibilities. The following

extract is from e-WasteOrg marketing material of 2015:

> We simply cannot afford to supply services and advice that does not meet the relevant legislation […] We strive to be at the forefront of the latest legislation to give you guarantee and peace of mind […] [W]ith [our] in-house lawyer… you're in safe hands.

Graham Pickren notes that obtaining e-waste 'certification [is] a potential way to win assessment management contracts' (Pickren, 2014, p. 34) and something that e-WasteOrg pays to do. As the Compliance Manager explained:

> You are looking at around £4000 for each [renewal] …The independent body needs paying, the company that is providing the information and providing you with the badge [certification] and backing you up to say that you [meet the required standards]… obviously wants to make a profit.  I would say, it probably costs, £20-30 grand a year." (Interview with Compliance Manager, 29 August 2013)

In its attempt to become a representative voice for the sector, e-WasteOrg participates in standard-setting activities and meetings. For instance, the company regularly hosts meetings at its workplace for industry bodies and competitors. There are a range of companies offering e-waste services, many of which, we were informed, did not meet the high levels of documentation or the secure transport and storage offered by e-WasteOrg (Director of Operations Interview, 31 July 2012).

The efforts of e-WasteOrg were focused on making it as hard as possible for 'cowboys' (a term often used to describe their competitors or scrap metal) to operate in a serious way. E-WasteOrg is concerned to build and secure a long-term future for

the waste management industry and to do this it mobilizes politics as a value system in order to create a particular type of market for e-waste.

**5. The implications for e-waste management practices**

What we have shown above is that e-WasteOrg operates polyphonically to assemble e-waste and extract value across economic, ecological, pedagogical and political systems. It is through these different value systems that e-WasteOrg mine the emerging landscape of waste. From exploring the interdependent distinctions between waste and value, we can make the following observations.

First, it is important to underline the 'ongoingness' of waste and value that has been neglected in previous studies of waste. The mobile phone is assembled and disassembled physically and in relation to competing and conflicting value propositions. E-WasteOrg finds economic value by default, but when we followed the mobile telephone's trajectory we saw that the decisions surrounding waste and value happened repeatedly. E-waste was circulated in secondary materials markets as e-scrap and this was an ongoing process. E-WasteOrg has to continually relearn waste and value through the certifications and updated legislation as they expand into the e-waste landscape. The implications for e-waste management at a general level are that waste and value circulate at the same time and are exposed to multiple extractive actors. The ongoingness of waste and the polyphony of values appeared to reinforce traditional neo-liberal economic growth focused on extracting financial value. For example, as we have shown above, the ability to ship waste and value anywhere in the world seems at odds with creating a low carbon or circular economy as waste is generated in another form.

Second, the polyphonic value systems bring and reinforce the interdependent systems associated with waste and value, reinforcing traditional ways of thinking (e.g. waste as an abject matter). E-WasteOrg refers to waste and value interchangeably: in the economic system, the mobile telephone is regarded as an asset, but in the ecological and pedagogical systems, they remind their clients that e-waste contains hazardous parts and requires specialist treatment and responsible disposal. Moreover, it is deemed so dangerous as to have its own legislation. The implication of confirming existing definitions is twofold: first, when an object is classified as waste, the desire is to dispose of it (Thompson, 1979; Douglas, 1992), and second, upwardly mobile actors (such as e-WasteOrg and their clients) get to then dictate when something can be disposed, which reinforces certain power relationships. The upshot is that we are creating specific waste management systems, based on specific power relations and differentiated societal values. For instance, working with e-waste is seen as unskilled, yet working with an asset is seen as requiring some skill (Minter, 2013; Bozkurt and Stowell, 2016).

Third, exploring waste and value highlights how resource maximization both constricts and expands at the same time. That is to say, the component parts and material by-products are captured, circulated and reused in the production process. The expansion of the economy occurs as extractive actors mine for more materials. Technological waste is steadily increasing, but the sources are further afield as China, Ghana and India become sources and destinations of their own waste and value production (Pickren 2014; Lepawsky 2015). Companies like e-WasteOrg need to travel further to source e-waste in order to stay in business. Unless localized

operations are set up, to manufacture and de-manufacture products, it is unlikely that true zero waste can be achieved. To some extent having the ability to extract value from waste extends the observations made by Gregson et al. (2015) about the circular economy simultaneously turning into a moral economy. It is not just about diversion from landfill or secondary material extraction, data security and caring for the environment, it also becomes a question about who is invited into the circle.

Fourth, the ongoingness of waste over time also presages an expanded concept of extractivism particularly in relation to value systems. We have shown that extraction at e-WasteOrg revolves around the interdependence of differentiated value systems. Our findings suggest that extraction, historically focused around mining for economic value, can be expanded with contemporary waste management practices to encompass other forms of extraction that create value. As our research has shown, it is also possible to talk in terms of ecological, pedagogical and political forms of extracted value. With this expanded concept of extraction it becomes possible to study ecological value as something mined for its potential by organizational and institutional actors. Similarly, pedagogical value becomes something that can be mined and realized over time in a range of ways. Expanding the range of value systems associated with extractivism highlights how these systems can be both an organizing logic for companies such as e-WasteOrg and the site of potential contestation as the interdependence and alignment of differentiated value systems is made visible through extraction.

**Conclusion**

E-WasteOrg oscillates across economic, ecological, pedagogical and political systems

of value in order to secure, routinize and circulate e-waste. They routinely draw on a range of value systems in an extractive way and this has helped us expand the concept of extractivism beyond an economic realm. Following the trajectory of the mobile telephone through e-WasteOrg has given us exposure to extractive practices that could have been missed if we stayed in one place within the organization. It has allowed us to witness how waste and value were assembled and disassembled internally, virtually and externally in relation to the company. From adopting such an approach we have been able to demonstrate that systems of value are formed relationally and interdependently and yet at the same time have their own different kinds of logics. Each set of extractive actors adopts competing value systems to identify and legitimize their choice of disposal and extractive practices.

E-WasteOrg is widening its e-waste excavation site in order to reaffirm its status in the market sector. At a local level this could be argued to be a good thing as new jobs could be created as their client base expands. For instance, they have expanded operations into a new warehouse and rebranded themselves by removing terms associated with discarded goods. It is important to note that we are not trying to argue that e-WasteOrg are greenwashing or uncommitted to pursuing a low carbon future, because they keep mobile telephones in operation for longer periods. Rather, what we hope to have shown is that 'true' waste reduction is especially challenging.

We argue that viewing waste and value as interdependent systems of value provides us with insights into the competing voices and practices that emerge or are at play as we make sense of the complexity of strategies in the drive towards a low carbon or circular economy. In order to develop this discussion we suggest that an expanded

concept of extractivism is very useful because it provides an analytical connection to the ongoingness of waste and value and also widens the scope of analysis to include a range of distinct value systems. Listening to the polyphony of values might help us to encourage the entry of more actors into the market place and the expansion of material flows. At a wider level, emphasis should perhaps be placed on reinvesting in repair work and encouraging further product leasing, as these options would make an important contribution to serious waste reduction. Finally, we hope that the concepts and questions raised in this paper are of are interest to other researchers who seek to further develop an understanding of the dynamics of twenty-first century waste management.

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