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*The Social Life of Digital Transparency*

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In *Sweetness and Power* (1985), anthropologist Sidney Mintz attempted to solve a perennial challenge in the study of commodity circulation: the ability to trace meaningful connections between global and local actors across different scales of production and consumption. In between slave labor in the colonies and proletarian consumption, Mintz suggested, the tastes, ideas, and material processes associated with sugar were rooted in productive processes taking place elsewhere. Where meaning and power intersect, it would be possible to reconstruct the political, ideological, and aesthetic force of sweetness within an industrially driven version of capitalist modernity. Sugar was, after all, the missing link between the colonial plantation system and the industrial factory, generating new forms of mercantile wealth, industrial work and consumption habits, and bureaucratic practices.

Mintz's work was soon accompanied by a vibrant literature on the "social life of things" (Appadurai 1986), detailing how certain objects and commodities become active constituents of social relations. The study of chains and networks connecting producers and consumers – either in lateral or vertical frameworks, respectively contextualizing interactions with the object or in sequential stages of its circulation – was met with growing business concerns over more ethical and less harmful production processes. One response led to the introduction of instruments such as certification schemes, "chains of custody" devices, and traceability mechanisms to make the trajectories of material objects more transparent by uncovering the physical imprint of commodity networks. And yet, the transformative value of tracing things in motion – and the more recent promise of unmediated transparency brought to the fore through digital means – remains to be assessed. What does the world look like from the perspective of a traceability initiative?

This chapter examines the challenges of implementing traceability to ensure that certain minerals and metals are deemed conflict-free. Based on research of responsible sourcing initiatives in the cobalt and

diamond industries, and the hopes pinned to the project of digital transparency, we consider how local producers respond to, or end up being excluded from, the growing adoption of monitoring and transparency devices in mineral supply chains. Attempts to make production legible and visible to consumers through digital technologies, we suggest, require attention to the “political geography of materials . . . associated with the production of information” (Barry 2013: 5). We document the ideological and material underpinnings of transparency supported by the adoption of digital instruments for tracing the extraction and circulation of minerals and metals. If these technologies of digital transparency primarily target downstream actors in an “unidirectional” (Mantz 2018: 34) account of commodity chains, they fail to deliver on the promise of addressing the gap between producers and consumers or trouble the underlying inequities and exclusionary practices of extractive production, when not reinforcing them.

Based on research in the Democratic Republic of Congo’s (DRC’s) cobalt mines of Kolwezi and in mining sites partnered with De Beers’s GemFair program in Sierra Leone, the chapter examines each resource in turn to understand how digital transparency permeates the “ethicality” of diamonds, an icon of hyper-consumption, and “conflict-free” cobalt, a critical component in the electrification and decarbonization of the global economy. Second, the chapter considers the implications of this digital turn in traceability mechanisms formerly reliant on third-party verification. We take stock of digital alternatives to paper-based certification, monitoring, and traceability by looking at the intersection of power and meaning in the social life of digital transparency, to follow Mintz (1985). Depending on what is made visible, to whom, and through what acts and artifacts of disclosure and calculation, these instruments – in their presumed rationality, objectivity, and neutrality – create the conditions for masking power relations and heightening the gap between different actors in this supply chain. If digital transparency operates through practices of concealment and suppression, even as it is represented as the technological pinnacle of accountability, these digital-based techno-regimes are increasingly confronted with the complex realities of the everyday life and labor of artisanal miners, who make up a significant share of global production. Artisanal mining pits in the DRC or Sierra Leone, one could say, reveal the pitfalls of “techno-fix” solutions to the problem of transparent supply chains.

Data were gathered between 2016 and 2020 in a variety of settings, including the Organisation for Economic Co-operation and Development's (OECD's) Responsible Mineral Supply Chains Forum, the Kimberley Process Certification Scheme (KPCS), and, between 2019 and 2020, in mining sites in the DRC (Kolwezi) and Sierra Leone. To develop a comparative framework between digital traceability solutions operationalized under the banner of responsible and ethical sourcing in the cobalt and diamond supply chain, interviews and field visits took place with actors in mining companies, NGOs, certification bodies, and standards development organizations. Against the backdrop of fragmented and siloed approaches to transparency mechanisms in increasingly complex supply chains, this critical examination of the workings of digital traceability reveals the deep and shared inequalities underpinning the extractive regime and the limits of a regime of techno-based transparency operated from afar.

### **From Paper to Digital: The Promise of Unmediated Transparency**

Most of the world's rough diamond production – upwards of 80 percent, according to some estimates – arrives in Antwerp, Belgium, in 500 high-security shipments per day. The majority of these shipments end up in the Diamond Office at Hoveniersstraat 22, next to the old Sephardic synagogue, where on any given day hundreds of sealed bags containing paper certificates issued by a Kimberley Process-recognized entity are processed. Once screened individually and before being sent out for export again, a new certificate is reproduced by a single copying machine on the ground floor, which prints out 30,000 out of the 60,000 certificates issued by the KPCS every year. As we peered at the copying machine across the room in the Diamond Office, the chair of the KPCS's Working Group of Diamond Experts conveyed his exasperation to the group of visitors attending the KPCS meeting in Antwerp in 2018: NGOs, he suggested, often mistake the KPCS's work of documenting diamonds for a certificate of origin. "It is not; it's a conflict-free certificate."

The group visiting the Diamond Office on that occasion was eventually chaperoned to a local tender company two buildings down the road. This tender house is used by an elite and very exclusive group of buyers working for some of the largest diamond-mining companies in

the world: Alrosa, De Beers, Dominion, and Rio Tinto. It is one of 1,600 diamond businesses registered in Antwerp where diamonds are mixed and sorted before being sold again for clients expecting specific qualities and quantities. After going through security, a diamond trader received the group, spreading open bag after bag of rough diamonds of different sizes, colors, and qualities, some emblazoned with the supplying company's logo and weighing more than a kilo. As this expert trader described it, mines produce a typical "footprint" of stones. On the basis of a statistical probability, experts produce assessments on the source of diamonds before they are mixed with stones of other origins. In some cases, conflict-free compliance is ensured at a distance. As discussed in the KPCS meeting at the time, local producers in the Central African Republic had to submit rudimentary images to identify the footprint of the so-called "run of mine" over a given period of time, as it was impossible to ensure on-the-ground monitoring due to ongoing conflict. As seen in the images, the piled-up stones and overlaying date stamps precluded proper visual assessment from afar, even if the biggest technical hurdle was poor internet connectivity for uploading images, as the experts in the plenary session admitted.

This visit to the world's diamond capital is instructive in various ways. First, the KPCS is arguably the most successful arbiter and insurance standard against conflict-laden diamonds. Despite the KPCS's relative success in stemming the flow of conflict diamonds, it did not impede the flow of Russian diamond production in the aftermath of the war in Ukraine. Second, the elephant in the room continues to be artisanal mining, which lurks menacingly in the background of these initiatives. These miners are at once the target of ethical initiatives while being cast as a dangerous threat or a problem to be addressed. As one diplomat responsible for Switzerland's Sanctions Unit confided, as if letting us in on a secret, artisanal mining is the "Achilles' heel" of the KPCS. This inescapability is similar to the plight of artisanal miners in other sectors, including cobalt: as we were told by a local NGO staff member in Kolwezi, DRC – home to the richest high-ore cobalt grade surface veins in the world – "There is no future where there is no ASM [artisanal mining]." Lastly, the technical challenges of implementing the certificate – from the photocopying machine in Antwerp to limited internet connectivity – become artifacts legitimizing the commitment to overcome paper-based obsolescence or human error through new

digital technologies. Echoing the broader proliferation of traceability programs for minerals and metals, according to the 2016 mid-term KPCS report, state and corporate stakeholders began exploring the adoption of blockchain technology in its certification process to “eradicate false KPCS certificates and reduce the impact of human error while uploading data.”

This techno-optimistic belief in the perfectibility of digital transparency exists in the wake of more than two decades of transparency work. In the early 1990s, transparency emerged as a new concept to address development failures that were linked to corruption. Through transparency, it was argued, the public would be able to hold government bodies and companies accountable for their actions, hindering corruption and the embezzlement of public funds (Gaventa and McGee 2013: 4; Garsten and Jacobsson 2011). With the establishment of Transparency International in 1994, transparency manifested itself as an important international norm (David-Barrett and Okamura 2016: 228–229). The concept has also become part of the construction of ethical commodities since it offers consumers and network participants the chance to “see’ along the commodity chain” as well as assurance that the commodity was produced under ethical conditions (Mutersbaugh and Lyon 2010: 30).

Since the mid 2010s, the mining industry began rolling out digital-based traceability technologies across mineral supply chains, adding to a wide array of regulatory instruments and responsible sourcing initiatives. A UN report defines traceability as “the ability to identify and trace the history, distribution, location and application of products, parts and materials, to ensure the reliability of sustainability claims, in the areas of human rights, labour (including health and safety), the environment and anti-corruption” (UNGC and BSR 2014: 6). Tarnished by human rights violations, child labor, and minerals used to fund conflicts, these new digital solutions were meant to reassure consumers and produce accountability by removing the need for intermediaries or trusted partners to verify, audit, or certify supply chain information. Traceability schemes have been developed using QR codes and other technological devices to trace where and by whom the purchased commodity was produced as a marker of ethicality (e.g., Carrier 2012: 14; UNGC and BSR 2014: 15–18). If traceability has become the new ethical norm in the natural resource sector (Calvão and Gronwald 2019: 3), the emergence of blockchains – an advanced

version of distributed ledger technologies – effectively expands the scope and socioeconomic impact of existing traceability initiatives.

In what follows, we examine two competing approaches for digital transparency developed in the diamond and cobalt sector. Though differently designed to ethically engage with the artisanal mining sector – in the case of GemFair – and develop responsible sourcing practices *despite* artisanal mining – in the case of cobalt – they both share a concern with the transition from material to digital technologies of traceability and provenance. In common, they ultimately confer legitimacy to the corporate actors implementing them, rather than fundamentally address the key issues in both supply chains. But each in turn reveals distinct features of the growing economy of digital transparency.

### Making Diamonds Ethical

In 2018, De Beers declared its return to Sierra Leone with an ethical initiative for the artisanal diamond-mining sector called GemFair. For De Beers’s CEO Bruce Cleaver, the artisanal mining sector was crucial for many poverty-affected communities struggling for survival, but “informal” and “unregulated” practices had hindered miners from accessing “established international markets” and their “ability to derive fair value” (Mining Journal 2018). The De Beers initiative builds on the previous model of the Diamond Development Initiative (DDI), founded in 2005 by industry members, NGOs, and national governments to specifically address development challenges in the artisanal diamond-mining sector through a certification system for ethically sourced diamonds in Sierra Leone (Smillie 2014: 151).<sup>1</sup> A decade later, in 2016, DDI introduced the so-called “Maendeleo Diamond Standards” (MDS),<sup>2</sup> with a similar aim of shifting artisan-mined diamonds into the formal economy where they could be traced and taxed by the local government. In response, GemFair was

<sup>1</sup> These standards are often mentioned as a pioneering effort in making artisanal diamond mining more ethical (see, e.g., Blackmore and Holzman 2013: 12, 30; Engwicht and Grabek 2019: 192–193; Hilson et al. 2016: 238; IGF 2017: 45–6; McQuilken 2018; Van Bockstael 2018: 53–54). In this case, “ethical” refers to diamonds being mined conflict-free, the adherence to basic workers’ rights in the extraction process, and compliance with some environmental standards.

<sup>2</sup> *Maendeleo* is the Swahili for “development.”

established in 2018 with the twin goals of ensuring fair prices and introducing a “digital solution” for traceability. The project was initially implemented in sixteen mining sites that complied with DDI’s MDS standards; by the time of this research, it had expanded to ninety-four mines. Though similar to MDS standards, GemFair included provisions regarding environmental regulations, the absence of serious human rights abuses, basic workers’ rights, and conflict- and violence-free extraction, as well as traceability (GemFair 2019a).

According to text on its website in 2019, GemFair is designed to “connect artisanal and small-scale miners to the global market through digital technology and assurance of ethical working standards,” based on three core principles of traceability, empowerment, and fair value. De Beers’s initiative explicitly mobilizes transparency and traceability as part of its efforts to render the ethical qualities of its diamonds visible to consumers – and, by extension, the ethical qualities of the company itself. The irony of describing De Beers as transparent should not escape us: De Beers has historically been notorious about its secretive operations (Epstein 1982; Hart 2001), and the company is extremely cautious over this pilot program for fears of it being replicated elsewhere and for potentially disclosing a return to its historical role of buyer of artisan-mined diamonds on a broader scale. Unsurprisingly, a local NGO representative described GemFair staff as shrouded in an aura of “secrecy”.

One of the central tenets of GemFair’s ethical approach to artisanal mining is provision for fair wages and revenues. Almost all mines visited, including those that were part of GemFair, employed a mix of “permanent” and daily wage laborers, the latter commonly referred to as “kosovo.”<sup>3</sup> The daily wage of permanent workers was usually between \$0.50 - \$1.00 based on the exchange rate during the research; in mines participating in a financial scheme led by GemFair, these miners could receive the minimum wage of 600,000 leones per month.

<sup>3</sup> At most, one mining site enrolled up to twenty permanent workers. These were usually divided into gangs of about three workers. Different supporters can support different gangs of workers employed in one pit. Permanent workers are employed for almost the entire year, working during the extraction as well as the washing process (see GoSL 2018: 25). These “full-time” workers are often experienced diggers who work with license holders or supporters over several years. In theory, they are officially employed by the miner or supporter via a contract that details the percentage-sharing arrangement.

In addition, provided certain conditions were met, miners were also entitled to a share of the sale price.<sup>4</sup> More broadly, GemFair justifies its ethical initiative by granting privileged access to markets and more transparent rough diamond evaluations.<sup>5</sup> Interviews and observations during fieldwork seem to support this claim, particularly a general satisfaction with prices paid by GemFair and clear evaluation procedures.

The initiative is not without its challenges. For one, GemFair aimed to tackle the tributor–supporter system prevalent in the country, and the latter’s dependence on the former. It did so by providing direct access to diamond markets and acting as both dealer and exporter for miners associated with the initiative. Commonly, in well-established tributor–supporter relationships (D’Angelo 2015; Zack-Williams 1995), supporters finance a mining operation through the provision of materials, wages, food, and, in some cases, medical treatment as well as accommodation for miners, who in turn receive a daily payment of around 7,000–10,000 leones and one or two cups of rice per day (Maconachie and Hilson 2011: 295). However, miners enrolled in the GemFair program in many cases still had to procure outside supporters and were themselves financed by established dealers or exporters (e.g., GemFair 2019b: 8). The maintenance of the tributor–supporter arrangement under the GemFair initiative raised questions about who would ultimately stand to benefit from the higher prices offered by GemFair and the initiative’s ability to channel diamond production to its sales office. Thus, to be able to control the extractive process and the sale of diamonds, GemFair soon realized that it needed to provide direct monetary support for miners, and it selected around twenty member sites to be part of the pilot project.

Access to this pilot finance program works as a loan agreement, and mining sites supported financially by GemFair need to channel their diamond production to GemFair. Prior to this program, GemFair did not directly fund mining license holders, leveraging instead their direct

<sup>4</sup> In some cases, miners were also given two meals a day, while in other mines the daily payment rate was meant to cover food, which meant that no additional money was paid.

<sup>5</sup> Rough diamonds are evaluated based on their potential to produce polished diamonds. This includes an assessment of several key characteristics, including shape, size, carat weight, clarity, and color.

access to the market to recruit members and capture more rough diamonds.

As in tributor–supporter arrangements, GemFair has risk assurance built into the scheme, whereby half of the amount invested by GemFair needs to be paid back with interest or “risk assurance.”<sup>6</sup> GemFair states that this risk premium is to mitigate potential setbacks in the event that some sites are not economically viable and to cover the capital invested. Until this loan is paid back in full, GemFair adopts the same percentage-sharing model prevalent in tributor–supporter arrangements (GemFair keeps 70 percent of the sale price while the miner gets the remaining 30 percent). It is only once miners finish paying back the entire loan, including the “risk assurance,” that they are allowed to keep the profits from the sale. While presumably paying higher prices for diamonds, GemFair risks becoming just another supporter in the eyes of miners enrolled in the GemFair program, whose practices are often labeled as exploitative and opportunistic. By the time of our research, GemFair had managed to capture a significant part of the rough diamond production in the country, successfully re-establishing De Beers in the Sierra Leonean diamond market twenty years after its involvement in the trade of “conflict diamonds.” This return to the country follows the effective assumption of control over sites previously under the purview of DDI’s standards program.

### **Working Transparently**

In theory, the project operates as follows: “certified” miners are provided with a toolkit, which includes a tablet with the GemFair app, a ruler, tamper-proof bags with QR codes, and a scale to measure the weight of diamonds. Once a diamond is found, miners take two pictures with the tablet: one of themselves with the diamond and one of the diamond against the ruler. They then weigh the diamond on the scale, record information on weight, color, shape, and quality of the diamond in the GemFair app, then seal the stone in the bag with a unique QR code for each site. No internet access is needed for “logging” the stone in the GemFair app. Only diamonds logged in the app

<sup>6</sup> For instance, if GemFair invests \$5,000 in a mining site, the license holder needs to pay back \$7,500.

and sealed in the bags can be taken to and sold in GemFair's office in Koidu (GemFair n.d.). Only once miners "have achieved certain milestones in their progress" are they provided with the toolkit. Others who have yet to reach these milestones and who work without the toolkit need to call the GemFair office for each diamond they find, regardless of size and quality. GemFair staff then come to the mining site and log the diamond for them (GemFair 2019c: 14). Before being exported, the diamonds need to be valued by the Precious Mineral Trading Unit (PMTU) of the National Minerals Agency. The PMTU removes the stones from the bag to better sort and value them. The work of transparently logging, geotagging, and photographing the stones through the app is rendered as emotional value through the individual portrait of the miner.

Publicly, GemFair argues that it is open to all mining sites as long as they are licensed and meet the OECD requirements. The GemFair Manual (2019b: 10) explains how members can apply and how their application is assessed. Despite this public transparency, GemFair relies on other data sources such as gravel samples to assess mining sites' potential productivity before enrollment in the program.<sup>7</sup> By calculating the potential productivity of sites, GemFair maximizes the chance of profit while minimizing the risk of an unproductive site being included in the program. This pre-selection process is rather opaque, and miners do not take part in it. While miners continue to rely on "guesswork," GemFair bases its operations on geological data in order to minimize risk and ensure a good return of diamonds. Already marginalized miners who might not have close links to the chiefdom authorities and are allocated potentially less productive sites are likely not reached by GemFair. Being able to participate in and profit from this ethical mineral scheme is hence predetermined by access to potentially productive sites, rendering the power imbalance between buyers and producers more visible.

Since its inception, GemFair has "developed a digital solution to enable traceability and source artisanal diamonds responsibly" (GemFair n.d.), and the use of digital technologies is central to this initiative. Technically speaking, GemFair does not provide stone-by-

<sup>7</sup> There has not been a systematic geophysical survey of Sierra Leone's resources or alluvial diamond deposits in the Kono district since the 1970s (BGS 2018: 4), and reliable data are scarce.

stone traceability back to the mine but ensures that the stones leaving the country through its channels originate from mines enrolled in the program (GemFair 2019c: 18).<sup>8</sup> Thus, “traceability” ends at the point when the stones enter De Beers’s marketing channels, where they are sold to the company’s sightholders.<sup>9</sup> And yet only a handful of toolkits, including tablets, had been handed out to miners at the time of research, and not all of the sixteen sites included in the project from its inception in 2018 had access to tablets. One miner who had been working with GemFair for two years stated that GemFair staff come to the sites to log the diamonds and seal them in bags, given the high levels of illiteracy of miners. Although he was literate and had completed all the training offered by GemFair, he was unsure if he would ever receive the toolkit. This is true of most sites currently enrolled in the GemFair initiative and most miners have yet to complete all the required training.

Miners commonly hold more than one mining license and operate several mining sites at the same time. This is also the case with miners operating under GemFair. Thus, there is a possibility that stones from a mining site operating outside the program’s purview find their way into the GemFair supply chain, threatening one of the underlying principles of the ethical initiative. Different stories circulated in the field that some miners would take stones home instead of logging them on site, mixing them with stones from other mining sites. Once an audit highlighted this possibility, GemFair promised to increase its risk management system by conducting due diligence on “all key individuals involved on the site” and the “extent to which they may be involved in or have access to other mining sites” (GemFair 2019d: 3), although the risk remains of mixing diamonds from different sources if the bags are not sealed on the spot. For miners, once a

<sup>8</sup> An obligation to show that the diamond was mined in the country is not unique to GemFair’s initiative; it is required under the KPCS for any diamond that is exported. GemFair also seeks to ensure transparency by making its standards, progress reports, and audit results publicly available as a window into its operations, providing an evidence checklist and procedures to monitor conformity with its standards (GemFair 2019b: 14). Transparency can be applied selectively, highlighting certain aspects while not reporting on others.

<sup>9</sup> Around 90 percent of De Beers Group’s rough diamonds are sold to customers known as sightholders. These customers are among the world’s leading diamantaires and are active in the major diamond centers (see [www.debeersgroup.com/our-business/diamond-trading](http://www.debeersgroup.com/our-business/diamond-trading)).

diamond is logged in the app, they are effectively locked in with GemFair; GemFair thus extends a form of control through digital means.

It should be mentioned that GemFair staff were aware of some of these limitations and demonstrated a genuine intention to “do good.” Despite this awareness, “ethically mined” initiatives are part of a highly unequal system of extraction and may, inadvertently, contribute to it while seeking to redress its underlying unfairness. Ultimately, digital transparency has a social life of its own, adapted to local contexts, often in contradiction to the implementation envisioned by its designers, in ways similar to the localization of foreign norms described by Engwicht (2018) for the implementation of the KPCS in Sierra Leone. What is more, and despite plans announced in 2019 (GemFair 2019c: 18) and a recent media statement opening up to the entire industry De Beers’s “first fully distributed diamond blockchain platform that starts at the source and operates at scale,”<sup>10</sup> the GemFair model has not been integrated into “Tracr,” a blockchain project developed by De Beers to ensure stone-by-stone traceability back to the mine. As we will see with the case of digital traceability and blockchain-based solutions for cobalt, this exclusion is not a problem of design but is built into the very logic driving these initiatives.

### **Conflict-Free Cobalt**

In the frenzy to feed the electric-powered green transition and to power “clean” renewable energy infrastructures, the DRC has become the world’s largest supplier of cobalt, most of which comes from the provinces of Lualaba and Haut Katanga. If cobalt was once considered a by-product metal in the extraction of copper or nickel, it has now been elevated to a strategic mineral in its own right (Olivetti et al. 2017: 229) and a key component of lithium-ion battery cell chemistries.<sup>11</sup> Cobalt extraction is planned to increase exponentially over the next decades to satisfy growing demands for electronic products and electric batteries, putting immense pressure on cobalt supplies. Unlike

<sup>10</sup> Quoted from a press release dated June 1, 2023.

<sup>11</sup> Other components are nickel, manganese, and lithium. Aside from the less-used cathodes built out of lithium titanium oxide (LTO) and lithium iron phosphate (LFP), anywhere between 10 and 15 kilograms of cobalt are required to produce most electric vehicle batteries.

other critical minerals and metals necessary for “clean” energy technologies, cobalt stands apart due to the conditions under which it is sourced – a significant share by artisanal miners, easily accessible without industrial or mechanized methods – and the attention it has received in policy, industry, advocacy, and investment circles in the aftermath of accounts of child labor exploitation and human rights abuses.

As has been amply documented, the implementation of the OECD guidelines (2016), the Dodd–Frank Act (2010), or the European Union’s more recent Conflict Minerals Regulation (2021) represented a watershed moment in the effort to ensure safer and conflict-free supply chains. These regulations and guidelines, coupled with the lobbying support of the International Council on Mining and Metals (ICMM), opened up new avenues for formalizing artisanal mining by promoting new forms of corporate engagement with the sector at risk of “outsourcing” responsibility by shifting the burden of extraction onto miners themselves through unwaged labor regimes in mixed or hybrid extractive spaces (Calvão et al. 2021). The release of an Amnesty International report and a subsequent lawsuit against tech companies over instances of child labor in cobalt mines brought further attention to the cobalt industry’s supply chain, highlighting forced labor, human rights abuses, and inadequate working conditions. Downstream companies were pressured to investigate their suppliers in the hope of avoiding any further reputational risks; this led to the creation of “model mines” where artisanal miners were given the opportunity to mine within corporate concessions.

For the cobalt industry, the opportunity to develop new models of engagement with artisanal mining turned the DRC into the poster child for the promotion of conflict-free minerals schemes. Although cobalt is not classified as a conflict mineral according to most regulations and standards, it is taken up pre-emptively in broader initiatives aiming to improve human rights and avoid conflict, child labor, and labor exploitation. These efforts build upon a decade of concerted efforts across the extractive industry toward the formalization of artisanal mining and sustainable sourcing, including the standards developed by the umbrella organization of the Responsible Minerals Initiative (RMI), to differentiate legitimate and illegitimate, “risk-prone” and “safe,” “clean” and “contaminated” cobalt sources, and, inherently, the legitimacy of the companies mining it. This technocratic model for

human rights due diligence, in Raphael Deberdt's study of responsible cobalt sourcing (2023), is turned into a tool of corporate legitimacy, rather than one of accountability.

These attempts to make everything "transparently visible" (Smith 2021: 42) can have dire consequences, including effectively rendering invisible miners of the so-called 3Ts (tin, tungsten, and tantalum), which happen to fall outside the limited scope of monitoring and certification programs. In James Smith's account, not having the coveted barcoded tag often entails new forms of violence, confiscation, and restrictions on movement. It mattered little that talk of "blood" minerals in the postwar context seemed anachronistic to those directly involved in mining, or that the miners' own "ethics of invisibility" – escaping the predatory gaze and exclusionary rule of authorities – was not taken into consideration by the advocates of this transparency apparatus (Smith 2021: 42). For Le Billon and Spiegel (2022), certification and transparency "fixes" to promote conflict-free mineral supply chains come with "hidden costs," including human rights abuses, devaluation of livelihoods and non-certified minerals, and other forms of petty criminality and corruption.

In Kolwezi, these initiatives also face quiet opposition from local elected representatives who perceive the burden of transparency as an added cost for state authorities, as it was relayed to us by an agent working for a responsible sourcing initiative. Paradoxically, given their position as a key protagonist of a traceability-based program for supply chain transparency, they suggested that cobalt "is not a conflict mineral, so there's no need to do it." Similarly, a minister in Lualaba Province complained to us that the costs of reporting and third-party auditing would entail a loss in competitiveness.<sup>12</sup> In the case of digital monitoring and certification, these costs are often displaced to the miners themselves as prices are established by mining companies and their trading offices; as seen in the case of GemFair, these digital technologies may also lock miners into a corporate-run sourcing system.

<sup>12</sup> The minister's observation was made at the point when the Congolese state was preparing the creation of the *Entreprise Générale du Cobalt* (EGC), a monopolizing buffer between artisanal cooperatives and foreign companies that builds on the previous experience of state-led cooperatives EMAK and NOUCO (Bolay and Calvão 2022; Deberdt 2021), although it still awaits full implementation.

## Digital Traceability: Cobalt on the Block

The commitment to digital transparency, alongside or as an alternative to third-party certification and audit practices, represents an important transformation in ethical standards. As cobalt is a critical component of electronic products and is sourced from a conflict-prone region, there has been an accelerated adoption of new technologies capable of reassuring consumers, investors, and regulators. As we have argued elsewhere (Calvão and Archer 2021), digital technologies of traceability are not neutral instruments for managing natural resource extraction; they have the capacity to actively impact livelihoods, mobility, and spatial practices through new forms of control and intermediation. Here, we examine two of the most prominent digital technologies for monitoring and end-to-end traceability in mineral supply chains: digital auditing and blockchain-based solutions.

Digital auditing techniques are part of a plethora of new responsible sourcing services aiming to comprehensively offer transparency solutions for different multinational companies. This coterie of new service providers has mushroomed in recent years along the supply chain to instill a semblance of “responsible” governance and by forcefully competing over who is better positioned to engage with artisanal cobalt miners. By “governing at a distance” in a regime of “technocratic morality,” Deberdt suggests (2023), these initiatives and their protagonists end up peripheralizing the agency of artisanal miners and selectively bracket their activities between moral and immoral narratives, with the miners made disposable by the conditions of their own erasure.

Despite the multiplication of digital solutions and blockchain-ready initiatives in the cobalt sector, these programs are limited in scope and implementation. One key initiative for responsible cobalt sourcing, meant to ensure due diligence for mining companies engaging with the artisanal sector in the Kolwezi region, operates under a subscription service contracted by mining companies and other “downstream” corporations requiring cobalt. It is meant to audit and monitor participating mining sites, and to offer “digital product traceability” services primarily for the benefit of an international audience. And yet, as we were told locally, the responsible sourcing initiative “doesn’t officially do traceability” as much as “documentary traceability.” In other words, field agents in each participating mine conducted a “mining

site assessment” to verify and report data on incidents, potential violations, and general demographic data on the composition of the artisanal workforce. Despite the promised immediacy of digital solutions, human input is unavoidable – as was the case in Sierra Leone’s GemFair program. A field agent is required to upload information in an app, attribute a score on the basis of a predefined standard developed by the service provider, and have it eventually reviewed by an external regional officer. Once the reported information is checked for potential inconsistencies and inaccuracies, a country manager based outside the country gives it a final screening. Although this service provider does not effectively trace the extracted ore or avoid the risk of unmonitored cobalt entering the supply chain, the final report is made available on a platform where it can be freely utilized to legitimize its funding and supporting partners – including auto-makers, electronics manufacturers, mining companies, and development agencies. And yet, these attempts to digitally track and record cobalt transactions have failed to convincingly persuade the main targets of these interventions, not *in spite of* but *because of* their own conditions of possibility for design and implementation.<sup>13</sup>

Blockchain-based solutions, on the other hand, have gained prominence more recently as the definitive technological “fix” to certify that cobalt is “free” of conflict and child labor violations, and in every other way responsibly mined. For its proponents, this technology increases efficiency, prevents fraud, and ensures that ethical certification processes are more credible by practically removing all semblance of human mediation. In coming up with a technology-based solution for enforcing due diligence mechanisms, blockchains would address the limitations and inconsistencies of other digital-based solutions by embracing the principle of decentralized consensus-based protocols capable of avoiding record tampering, such as those defined by the RMI’s *Blockchain Guidelines* (2020). These guidelines flout common practice in industry-led blockchain initiatives operated through privately run and permissioned self-standing platforms where

<sup>13</sup> Artisanal miners surveyed in 2019 demonstrated widespread skepticism and suspicion regarding the use of instruments to measure the grade quality and quantity of cobalt ore. The survey was conducted among miners operating in so-called “hybrid mines,” with only 2.47 percent claiming to trust these instruments (see Calvão and Archer 2021).

data is stored centrally. The technological rhetoric associated with blockchains creates an illusion of disintermediation and the purported absence of institutional mediation, as blockchains end up creating new intermediations (Çalışkan 2020).

Despite the hype and promise surrounding the adoption of blockchain solutions for traceability purposes, they rest upon a principle of “asset” management and not on the transformative potential of responsible and embedded extractive practices. As we were told rather candidly by a monitoring agent working for an organization exploring blockchain-enabled solutions in the cobalt sector, such solutions do not solve the problem: if “corruption at the base remains,” or until the information is “100 percent reliable,” the problem of upstream traceability will remain. In other words, without third-party assessment, or if blockchain solutions are not developed alongside “reasonable” due diligence, once the tracked stone moves up the supply chain, its origins are disentangled from the extractive site and no longer recorded. As is the case with other digital transparency solutions, these initiatives work on the basis of formalized settings and exclude those who fall outside them, thus perpetuating existing logics of value extraction.

Most pilot projects are in testing and exploration stages, with few examples of actual implementation. One of the first companies to offer a distributed ledger for ensuring ethically sourced cobalt, Canada-based Cobalt Blockchain Inc., had been developing two joint supply agreements in the Kolwezi and Lubumbashi region since 2018. Despite these agreements and pending license approvals, the company announced a name change in 2021 along with a broader range of action to include other digital minerals, including tin, tantalum, and tungsten. It seems that “blockchain” worked in this instance to lure in investors in successive fundraising rounds, harnessing the clout of sustainable development and ethical sourcing for consumer-centered performances of social responsibility.

The Responsible Sourcing Blockchain Network (RSBN) is perhaps the most anticipated blockchain solution currently being developed on IBM’s blockchain platform in collaboration with audit and responsible sourcing service provider RCS Global. Promising to deliver “sustainability through responsible sourcing,” IBM’s blockchain solution counts automakers, battery manufacturers, and cobalt suppliers among its founding members. “Companies that take sustainability and social justice seriously,” according to its mission statement online,

“work to keep cobalt mined by hand out of their supply chains,” putting to rest any doubts regarding the inclusionary goals of artisanal mining. As in other similar blockchain projects, its distributed ledger is meant to “track production from mine to battery to end product,” draping in technical language the usual truisms of transparency, trust, and security. Here again, the benefit of responsible sourcing accrues primarily to corporate shareholders and the audit providers who verify the quality of the data and the implementation of regulatory frameworks, despite the promise of the “digitization of a paper process.”

ReSource is the other leading blockchain provider in the cobalt sector, offering a digital platform for the traceability of minerals and metals required for electric batteries on the basis of standards provided by the RMI and the ICMM. Designed “by the industry for the industry,” it has tentatively enrolled mining companies in partnership with the RMI and car companies. As a joint consortium with leading companies in the sector, it is still pending anti-trust approvals before its platform is implemented. Offering a technical solution for traceability and due diligence compliance that cannot easily be manipulated, this solution again benefits those who can monitor, report, and make use of provenance and sustainability data.

For all the “unprecedented” and “revolutionary” potential with which these solutions are presented, blockchain-based traceability initiatives still rest on a principle of unequal access that fosters new forms of exclusion and control, or is otherwise limited by the everyday reality of social life. The foundational principles of a digital ledger – openness, transparency, security – fall short of delivering on their promise, driven as they are by the economic and moralizing impetus to “clean” supply chains of potentially nefarious evidence. What is more, data collection is limited to areas with ongoing formalized artisanal mining, often under the auspices of large-scale industrial mines. As a corporate-sponsored digital program for traceability, it seeks to avoid the reputational risks of unregulated mining, de facto rendering the underlying objective of responsible sourcing increasingly moot and creating new exclusionary boundaries through the self-ascribed limits of its own program. Toward that end, mining companies, due diligence entities, and digital traceability providers enter a symbiotic business relationship based on competing subcontracting services in the name of transparency.

## Conclusion

The promotion of more transparent and ethical initiatives to mitigate the environmental and reputational risks associated with mining has become an integral part of a broader turn toward responsible sourcing. It is not uncommon to come across industry publications and consumer ads featuring glossy images of artisanal producers and the social and environmental benefits of improved traceability. The recent adoption of digital transparency tools and advanced blockchain-based traceability promise a techno-optimistic and digitally enabled future rooted in the idea that more data is an end in and of itself toward more transparency. Ultimately, the immediacy of digital transparency – as a project of disintermediation – fails to grapple with the concrete challenges of its social life, where it takes shape, is contested, and is given new meaning.

As we have shown, these solutions are also fragmented and siloed, and potentially foster new forms of exclusion and dispossession. The digital project of making everything transparent can be applied selectively, leaving some things unreported or unsaid (e.g., Babidge 2015: 79–80), or can produce so much data that it creates what the Extractive Industries Transparency Initiative board member Daniel Kaufmann calls “zombie transparency,” or data that is hard to understand, irrelevant, or hard to access. As AI scholar Kate Crawford put it, “complete transparency . . . is an impossible goal” (2021: 12) and more attention should be given to how these models engage “with its material architectures, contextual environments, and prevailing politics and by tracing how they are connected.” Until then, the project of digital transparency may end up replicating what Milton Mueller (2015: 1) calls the “fallacy of displaced control” of hyper-transparency, where revelations of “aberrant behavior” generate “pressures to regulate the intermediaries, instead of identifying and punishing the individuals responsible for the bad acts.”

In other words, the digital instruments designed to optimize supply chain management and address consumer anxieties about “contamination” may implicitly reproduce neocolonial narratives that seek to shed light on the darker corners of the world’s supply of raw materials. Some of these initiatives, as in the case of De Beers’s return to Sierra Leone, may inadvertently evoke the bygone era of corporate paternalism, where the instruments for producing transparency – and

empowerment, by extension – are supplied only sparingly, if ever, to the miners themselves. Unlike De Beers’s dominant position in Sierra Leone, the scramble for control over cobalt sources in the DRC and the reputational risks of mining a key resource for “clean” energy in the region have led to a complex subcontracting economy. Competitively bidding for the most transparent and responsible services, mining companies, due diligence agents, and digital traceability providers enter a symbiotic and mutually beneficial relationship.

Be it with diamonds from Sierra Leone or cobalt from the DRC, as in many other sites across the world, the work of collecting data to ensure transparent and responsible sources is limited by design to areas with ongoing formalized artisanal mining or similar standards mechanisms, often under the auspices of large-scale industrial mines. Corporate-sponsored digital programs for traceability are meant to allow companies to pivot away from the reputational risks of unregulated mining. However, this renders moot the underlying objective of responsible sourcing programs, while potentially generating new exclusionary boundaries due to those programs’ self-ascribed limits. Making the world digitally transparent may grant legitimacy to the various extractive actors, but it does not fundamentally change the world around us or improve the circumstances in which others experience the world.

## Bibliography

- Appadurai, Arjun. 1986. “Introduction: Commodities and the Politics of Value.” In *The Social Life of Things: Commodities in Cultural Perspective*, edited by Arjun Appadurai, pp. 3–63. New York: Cambridge University Press.
- Babidge, Sally. 2015. “The Problem with ‘Transparency’: Moral Contest and Ethical Possibilities in Mining Impact Reporting.” *Focaal: Journal of Global and Historical Anthropology* 73: 70–83. <https://doi.org/10.3167/fcl.2015.730106>
- Barry, Andrew. 2013. *Material Politics: Disputes Along the Pipeline*. Chichester: Wiley-Blackwell.
- BGS. 2018. *Geological Mapping of Sierra Leone: Baseline Assessment and Next Steps*. Keyworth, Nottingham: British Geological Survey (BGS). <https://nora.nerc.ac.uk/id/eprint/519869/> (accessed September 1, 2023).
- Blackmore, Emma and Caren Holzman. 2013. “Scaling Up Certification in Artisanal and Small-Scale Mining.” IIED Linking Worlds Working

- Paper 2. London: International Institute for Environment and Development (IIED).
- Bolay, Matthieu and Filipe Calvão. 2022. "Labour, Incorporated: Dependent Contracting and Wageless Work in Africa's 'Responsible' Mines." *Cahiers d'Études Africaines* 245–246: 123–151. <https://doi.org/10.4000/etudesafricaines.36190>
- Çalışkan, Koray. 2020. "Data Money: The Socio-Technical Infrastructure of Cryptocurrency Blockchains." *Economy and Society* 49 (4): 540–561. <https://doi.org/10.1080/03085147.2020.1774258>
- Calvão, Filipe and Matthew Archer. 2021. "Digital Extraction: Blockchain Traceability in Mineral Supply Chains." *Political Geography* 87: 102381. <https://doi.org/10.1016/j.polgeo.2021.102381>
- Calvão, Filipe and Victoria Gronwald. 2019. "Blockchain in the Mining Industry: Implications for Sustainable Development in Africa." Policy Insights 74. Johannesburg: South African Institute of International Affairs.
- Calvão, Filipe, Catherine E. A. McDonald, and Matthieu Bolay. 2021. "Cobalt Mining and the Corporate Outsourcing of Responsibility in the Democratic Republic of Congo." *Extractive Industries and Society* 8 (4): 100884. <https://doi.org/10.1016/j.exis.2021.02.004>
- Carrier, James. 2012. "Introduction." In *Ethical Consumption: Social Values and Economic Practice*, edited by James G. Carrier and Peter G. Luetchford, pp. 1–36. Oxford: Berghahn Books.
- Crawford, Kate. 2021. *Atlas of AI: Power, Politics, and the Planetary Costs of Artificial Intelligence*. New Haven, CT: Yale University Press.
- D'Angelo, Lorenzo. 2015. "'Diamond Mining Is a Chain': Luck, Blessing, and Gambling in Sierra Leone's Artisanal Mines." *Critical African Studies* 7 (3): 243–261. <https://doi.org/10.1080/21681392.2015.1077467>
- David-Barrett, Elizabeth and Ken Okamura. 2016. "Norm Diffusion and Reputation: The Rise of the Extractive Industries Transparency Initiative." *Governance: An International Journal of Policy, Administration, and Institutions* 29 (2): 227–246. <https://doi.org/10.1111/gove.12163>
- Deberdt, Raphael. 2021. "The Democratic Republic of the Congo (DRC)'s Response to Artisanal Cobalt Mining: The Entreprise Générale du Cobalt (EGC)." *Extractive Industries and Society* 8 (4): 101013. <https://doi.org/10.1016/j.exis.2021.101013>
2023. "Responsible Sourcing and the (In)visibilization of Congo's Artisanal Cobalt Miners in the Age of the Green Energy Transition." PhD thesis, University of British Columbia.
- Engwicht, Nina. 2018. "The Local Translation of Global Norms: The Sierra Leonean Diamond Market." *Conflict, Security and Development* 18 (6): 463–492. <https://doi.org/10.1080/14678802.2018.1532639>

- Engwicht, Nina and Jan Grabek. 2019. "A Human Security Perspective on Natural Resource Governance: What Makes Reforms Effective?" *South African Journal of International Affairs* 26 (2): 185–207. <https://doi.org/10.1080/10220461.2019.1607545>
- Epstein, Edward J. 1982. *The Rise and Fall of Diamonds: The Shattering of a Brilliant Illusion*. New York: Simon and Schuster.
- Garsten, Christina and Kerstin Jacobsson. 2011. "Transparency and Legibility in International Institutions: The UN Global Compact and Post-Political Global Ethics." *Social Anthropology/Anthropologie Sociale* 19 (4): 378–393. <https://doi.org/10.1111/j.1469-8676.2011.00171.x>
- Gaventa, John and Rosemary McGee. 2013. "The Impact of Transparency Initiatives." *Development Policy Review* 31 (1): 3–28. <https://doi.org/10.1111/dpr.12017>
- GemFair. n.d. "GemFair." <https://gemfair.com/> (accessed September 1, 2023).
- GemFair. 2019a. *Artisanal and Small-Scale Mining Standards: Requirements 2019*. Koidu, Sierra Leone: GemFair. [https://gemfair-website.s3.amazonaws.com/media/documents/GemFair\\_ASM\\_Requirements\\_2019\\_v2.pdf](https://gemfair-website.s3.amazonaws.com/media/documents/GemFair_ASM_Requirements_2019_v2.pdf) (accessed September 1, 2023).
- GemFair. 2019b. *GemFair Responsible Artisanal and Small-Scale Mining Assurance Programme Manual 2019*. Koidu, Sierra Leone: GemFair. [https://gemfair-website.s3.amazonaws.com/media/documents/GemFair\\_Manual\\_Nov\\_2019.pdf](https://gemfair-website.s3.amazonaws.com/media/documents/GemFair_Manual_Nov_2019.pdf) (accessed September 1, 2023).
- GemFair. 2019c. "The GemFair Way." Koidu, Sierra Leone: GemFair. [https://gemfair.com/static/files/The\\_GemFair\\_Way\\_2019.pdf](https://gemfair.com/static/files/The_GemFair_Way_2019.pdf) (accessed September 1, 2023).
- GemFair. 2019d. "Response to Synergy Audit." [https://gemfair-website.s3.amazonaws.com/media/documents/GemFair\\_response\\_Synergy\\_pilot\\_audit.pdf](https://gemfair-website.s3.amazonaws.com/media/documents/GemFair_response_Synergy_pilot_audit.pdf) (accessed September 1, 2023).
- GoSL. 2018. *Artisanal Mining Policy for Sierra Leone*. Freetown: Government of Sierra Leone (GoSL). [www.nma.gov.sl/wp-content/uploads/2019/05/Artisanal-Mining-Policy-for-Sierra-Leone.pdf](http://www.nma.gov.sl/wp-content/uploads/2019/05/Artisanal-Mining-Policy-for-Sierra-Leone.pdf)
- Hart, Matthew. 2001. *Diamond: A Journey to the Heart of an Obsession*. New York: Walker Publishing Company.
- Hilson, Gavin, Abigail Hilson, and James McQuilken. 2016. "Ethical Minerals: Fairer Trade For Whom?" *Resources Policy* 49: 232–247. <https://doi.org/10.1016/j.resourpol.2016.05.002>
- IGF. 2017. *Global Trends in Artisanal and Small-Scale Mining (ASM): A Review of Key Numbers and Issues*. Winnipeg: International Institute for Sustainable Development (IISD) for Intergovernmental

- Forum on Mining, Minerals, Metals and Sustainable Development (IGF). [www.iisd.org/system/files/publications/igf-asm-global-trends.pdf](http://www.iisd.org/system/files/publications/igf-asm-global-trends.pdf)
- Le Billon, Philippe and Samuel Spiegel. 2022. "Cleaning Mineral Supply Chains? Political Economies of Exploitation and Hidden Costs of Technical Fixes." *Review of International Political Economy* 29 (3): 768–791. <https://doi.org/10.1080/09692290.2021.1899959>
- Maconachie, Roy and Gavin Hilson. 2011. "Safeguarding Livelihood or Exacerbating Poverty? Artisanal Mining and Formalization in West Africa." *Natural Resource Forum* 35 (4): 293–303.
- Mantz, J. W. 2018. "The Slow Road to Tartarus: Technological Fetishism, Materiality, and the Trafficking in 'Conflict Minerals' in the Eastern DR Congo." In *Linguistic and Material Intimacies of Cell Phones*, edited by J. Bell and J. Kuipers, pp. 33–51. London: Routledge.
- McQuilken, James. 2018. "Small-Scale Mining and Production Networks in Sub-Saharan Africa: Reconceptualising a Framework for 'Pro-Poor' Ethical Mineral Certification." PhD thesis, University of Surrey.
- Mining Journal. 2018. "GemFair has the Potential to Significantly Transform the Sector," *Mining Journal*, April 19, [www.mining-journal.com/other/news/1336514/gemfair-potential-significantly-transform-sector](http://www.mining-journal.com/other/news/1336514/gemfair-potential-significantly-transform-sector) (accessed September 1, 2023).
- Mintz, Sidney. 1985. *Sweetness and Power: The Place of Sugar in Modern History*. New York: Penguin Books.
- Mueller, Milton. 2015. "Hyper-Transparency and Social Control: Social Media as Magnets for Regulation." *Telecommunications Policy* 39. <http://dx.doi.org/10.1016/j.telpol.2015.05.001>
- Mutersbaugh, Tad and Sarah Lyon. 2010. "Transparency and Democracy in Certified Ethical Commodity Networks." *Geoforum* 41 (1): 27–32. <https://doi.org/10.1016/j.geoforum.2009.11.013>
- Olivetti, Elsa, Gerbrand Ceder, Gabrielle G. Gaustad, and Xinkai Fu. 2017. "Lithium-Ion Battery Supply Chain Considerations: Analysis of Potential Bottlenecks in Critical Metals." *Joule* 1: 229–243. <https://doi.org/10.1016/j.joule.2017.08.019>
- RMI. 2020. *Responsible Minerals Initiative Blockchain Guidelines*, 2nd ed. Alexandria, VA: Responsible Minerals Initiative. [www.responsiblemineralsinitiative.org/media/docs/RMI%20Blockchain%20Guidelines%20-%20Second%20Edition%20-%20March%202020%20FINAL.pdf](http://www.responsiblemineralsinitiative.org/media/docs/RMI%20Blockchain%20Guidelines%20-%20Second%20Edition%20-%20March%202020%20FINAL.pdf) (accessed September 1, 2023).
- Smillie, Ian. 2014. *Diamonds*. Cambridge: Polity.
- Smith, James. 2021. *The Eyes of the World: Mining the Digital Age in the Eastern DR Congo*. Chicago: University of Chicago Press.
- UNGC and BSR. 2014. *A Guide to Traceability: A Practical Approach to Advance Sustainability in Global Supply Chains*. New York: United

- Nations Global Compact (UNGC) and BSR. [www.bsr.org/reports/BSR\\_UNGC\\_Guide\\_to\\_Traceability.pdf](http://www.bsr.org/reports/BSR_UNGC_Guide_to_Traceability.pdf) (accessed September 1, 2023).
- Van Bockstael, Steven. 2018. "The Emergence of Conflict-Free, Ethical, and Fair-Trade Mineral Supply Chain Certification Systems: A Brief Introduction." *Extractive Industries and Societies* 5 (1): 52–55. <https://doi.org/10.1016/j.exis.2017.12.014>
- Zack-Williams, Alfred. 1995. *Tributors, Supporters and Merchant Capital: Mining and Underdevelopment in Sierra Leone*. Aldershot: Avebury.