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Regulating sustainable minerals in electronics supply chains: local power struggles and the 'hidden costs' of global tin supply chain governance

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Voluntary supply chain regulation has proliferated in recent decades in response to concerns about the social and environmental impacts of global production and trade. Yet the capacity of supply chain regulation to influence production practices on the ground has been persistently questioned. Through empirical analysis of transnational regulatory interventions in the Indonesian tin sector—centered on a multi-stakeholder Tin Working Group established by prominent global electronics brands—this paper explores the challenges and limits of voluntary supply chain governance as it interacts with an entrenched 'extractive settlement' in Indonesia's major tin producing islands of Bangka and Belitung. Although the Tin Working Group has introduced localized initiatives to tackle issues such as worker safety and improved land rehabilitation, it has also contributed in diffuse and largely unintended ways to consolidating the power of political and economic elites who benefit from centralized control over resource extraction. In this sense, supply chain governance has generated 'hidden costs' through unintended effects on power struggles between competing social groups at national and sub-national levels—generating marginal benefits for ameliorating specific regulatory 'problems', while consolidating and reproducing barriers to deeper transitions towards inclusive or sustainable regimes of extractive governance.

Keywords: supply chain governance; multi-stakeholder business regulation; Indonesia; sustainable minerals; electronics; tin; extractive settlement.

Introduction

Recent decades have witnessed rising concern about the social and environmental impacts of global commodity production and trade, particularly in extractive sectors where sustainability risks are often acute. While voluntary supply chain governance continues to be widely promoted in response to these concerns, its capacity to drive sustainable production practices in the face of powerful state and market pressures for intensive resource extraction has been widely questioned.[1]

Critics of supply chain governance have highlighted the limited capacity of such initiatives to mitigate large-scale social and environmental harms that are more deeply grounded in structural relations of power and production within the international political economy (LeBaron & Lister, this issue). By also presenting themselves as 'solutions' to harmful social or environmental practices, critics worry that supply chain governance schemes may crowd out potentially stronger forms of social mobilization or state regulation (Cheynes & Riisgaard, 2014).

Critical attention has also focused on the challenges that supply chain governance initiatives frequently confront at national and sub-national production sites, when efforts to promote compliance with regulatory standards or broader diffusion of regulatory norms encounter resistance from local actors who defend established regimes of production and regulation (Bartley 2018; Foley & Havice, 2016). Tensions between global regulatory norms and the interests of powerful local elite actors are often pronounced in contexts highly dependent on natural resource extraction, in which there are strong incentives to defend 'business as usual'. Amidst the rise of domestic resource nationalism in a number of emerging market economies, resistance to transnational regulatory agendas has become increasingly confident (Haslam & Heidrich 2018). Such challenges have generated resurgent interest in exploring how supply chain governance initiatives navigate dynamics of regulatory contestation in sites of production (Strambach & Surmeier, 2018; Hospes, 2014).

[1] While the term governance is sometimes used as a means of abstracting from the powerful ideological and material power relations that underpin institutional processes, we use the concept to foreground dynamics of power and distributive conflict. This use of the term is consistent with scholarship on private governance on which this collection draws, and which has often used the concept of governance with the critical aim of exposing public consequences of private systems of power and authority that liberal ideologies often conceal (eg see Cutler et al., 1999; Cashore et al. 2004).

Despite increasing interest, explicit frameworks to guide analysis of interactions between global supply chain governance and local regulatory contests remain underdeveloped within existing scholarship. This paper aims to address this gap by asking: *through what pathways* do global supply chain governance initiatives exercise regulatory influence, and what are the *effects of such influence* on contested processes of regulatory change in sites of natural resource extraction? We understand regulatory influence to encompass both “purposeful efforts of institutions and actors … to steer policy and behavior” in line with intended trajectories of regulatory change (Bernstein & Cashore, 2012, p.586), and more indirect and sometimes unintended pathways of causal influence linked to regulatory interventions (Dallas et al., 2019). We therefore explore both direct effects of supply chain governance on specified regulatory ‘problems’, and indirect and often unacknowledged effects on wider struggles between competing interest groups in sites of resource extraction.

Scholarship on global value chain governance and business power offers important insights regarding the sources and consequences of transnational regulatory influence within global supply chains (Gellert, 2003; Foley, 2017; Dallas et al., 2019; Fuchs, 2007). However, such frameworks have rarely drawn on insights from comparative political economy, political ecology and critical development studies regarding distinctive configurations of power and interest in local sites of resource extraction, and their effects on enabling and constraining global regulatory influence. This paper’s central theoretical intervention brings such local political economy perspectives into more explicit engagement with debates on global supply chain governance, to enrich understanding of the multiple channels of direct and indirect influence exerted by supply chain governance interventions on social and environmental practices on the ground.

Such dynamics of contested regulatory influence are explored through a case study of supply chain governance initiatives in the Indonesian tin sector, which analyses interactions between the multi-stakeholder Tin Working Group (TWG) – established by prominent global electronics brands – and a range of economic and political actors within the Indonesian tin sector. The strategic significance of tin production for both the global electronics sector and the Indonesian economy makes this an ideal case for exploring contested encounters between global and local regulatory systems. Our analysis draws on information collected through 35 formal interviews and extensive informal discussions with key local and international participants in the TWG, government, industry, civil society and community actors, and regular visits and collaborative activities in sites of production between 2016-2019.

The paper demonstrates that while efforts to exert *direct* regulatory influence over social and environmental practices have struggled to motivate engagement from established economic and political powerholders in Indonesia, global regulatory pressures have exercised *indirect* and largely unintended forms of influence over local struggles to control tin supply chains and capture associated benefits. Both pathways and effects of global regulatory influence have varied between key sites of production in the islands of Bangka and Belitung, as a result of contrasting livelihood strategies, elite coalitions and mobilization of environmental and developmental discourses. The effects of global supply chain governance on 'sustainable' tin production have been deeply ambiguous. While the TWG has made small, micro-level contributions to ameliorating specific regulatory 'problems' such as worker safety and improved land rehabilitation, efforts to extend impact beyond localized pilots have foundered amidst deep tensions between social and environmental safeguards, and protection of artisanal mining livelihoods. Moreover, the TWG has generated hidden costs at the institutional meso-level and political economy macro-level (LeBaron and Lister, this issue), through largely unintended effects on local power struggles—supporting the reproduction of a local extractive settlement in which both elite strategies of accumulation and grassroots livelihood strategies continue to depend on socially and environmentally unsustainable practices of resource extraction.

Bringing local political economy perspectives into analysis of supply chain governance

We first review key insights from established scholarship on global supply chain governance, then explore how such insights can be enriched by drawing more explicitly on intersecting traditions of comparative political economy, political ecology and critical development studies, which have received relatively little emphasis in existing debates about transnational business regulation.

Transnational business regulation and value chain perspectives

Many influential accounts of transnational private regulation have focused on relatively *direct* and intentional channels of influence exercised by supply chain regulators, through grounding global regulatory influence in coercive enforcement capacity, market leverage, or the mobilization of regulatory competencies as sources of bargaining power (e.g. Haufler, 2003; Abbott & Snidal, 2009; Vogel, 2010). Scholars have also highlighted the capacity of regulators to establish moral or epistemic authority over regulatory targets as a central precondition for exercising direct regulatory influence (Buthe, 2004; Krisch, 2017), while discursive power has been identified as an important means through which global regulators can promote social and environmental regulatory agendas that align with their interests and values (van der Ven, 2018; Fuchs, 2007; Levy & Newell, 2002; Moog et al., 2015; Cheyns & Riisgaard, 2014). Theories of inter-firm power relations derived from global value chain scholarship have further underscored the significance of material and strategic resources underpinning the production of economic value as potential sources of regulatory leverage or bargaining power (Dallas et al. 2019; Levy, 2008; Cutler et al., 1999; Gereffi et al., 2005; Kaplinsky & Morris, 2000).

Indirect pathways of global regulatory influence, grounded in more diffuse causal influencing processes, have received particular attention from sociological and constructivist theorists of global governance. Such scholars have emphasized the potential role of transnational regulators in supporting complex socialization processes involving strategic bargaining, moral consciousness-raising and persuasion, the construction of shared forms of knowledge, and associated processes of habitualization and institutional change (Checkel, 1997; 1998; Keck & Sikkink, 1998; Risse-Kappen et al., 1999; Ruggie, 2002). Others focus on the value of capacity-building amongst regulatory targets as an important basis for supporting compliance with global regulatory norms (Parker, 2000). Political-institutional scholars have further stressed the potential importance of *network, coalition or alliance-building* with local regulatory actors as means of underpinning transnational regulatory influence (Bartley, 2014; Fransen, 2011; Bostrom et al., 2015; Malets, 2013).

A number of propositions about mechanisms and enabling conditions of transnational regulatory influence can be drawn from these interconnected strands of work. Transnational regulatory influence can be understood as occurring through both *direct* channels of influence within supply chains, and through more *indirect* channels of influence, mediated via relationships with wider networks of actors and more diffuse processes of normative and cognitive change. In turn, transnational regulatory influence can be viewed as depending on several factors: global *regulatory authority and leverage*, *capacity to comply* on the part of local regulatory targets, and the capacity of global regulators to interact with key gatekeepers within local power structures in ways that *stimulate processes of socialization, build local collaborative alliances*, and *counter organized resistance to global regulatory agendas*.

Bringing in a local political economy perspective

While such theories have developed rich frameworks for analyzing potential pathways (and barriers) to global regulatory influence, they have rarely focused critical attention on how regulatory efforts to build alliances with local actors are enabled and constrained by deeply embedded configurations of power and interest at sites of resource extraction. Scholars of extractivism and development have demonstrated how social power relations underpinning production and trade of extractive commodities are inter-twined with configurations of state-society relations, involving close ties between state actors and extractive sectors of the economy (Bebbington, 2010; Bebbington, 2015; Gellert, 2010a). The high degree of "physical, topographical and locational specificity" of such power relations demands highly contextual analyses of specific commodities and territorial locations (Gellert, 2003, p.54). Yet, while natural resource commodities are inherently 'localized' in territorial sites of extraction, they are also linked to global production and trading networks, creating a political economy shaped by intersections between configurations of power and interest at local and global scales.

Accordingly, there is significant potential to advance understanding of global supply chain governance by elaborating a more explicit framework for analyzing how power struggles within local social orders shape and constrain the influence of global governance processes (Foley, 2017; McCarthy, 2012; Vandergeest & Unno, 2012). This facilitates analysis of the scope and limits of transnational regulatory influence and associated distributional outcomes. To this end, we draw on insights from 'local political economy' perspectives that draw from a range of theoretical and disciplinary traditions, which share a view of global governance interventions as "inherently political, seeking to (re)allocate power and resources and shift political outcomes" (Hameiri & Jones, 2017, p.55), and recognize that configurations of power and interest within particular local contexts help determine the scope of possible institutional arrangements and associated distributional outcomes (Bebbington et al., 2017; Ponte, 2008).

One political economy approach well suited to our purposes is the political settlements framework. Influential amongst critical development studies scholars, the framework emphasizes that institutions need to be aligned with wider configurations of social and political power if political institutions are to perform as intended (Di John & Putzel, 2009; Kelsall, 2016). A political settlement is broadly understood as a bargaining outcome among contending elites and non-elite social groupings, reflecting the balance or distribution of power between these groups (Di John & Putzel, 2009; Khan, 1995).[2] A political settlement emerges when "the distribution of benefits supported by its institutions are consistent with the distribution of power in society, and the economic and political outcomes of these institutions are sustainable over time" (Khan, 2010, p.1; Di John & Putzel, 2009). This framework is grounded in a long line of thinking in historical political economy that views "the balance of power between contending groups and classes as a central factor in exploring the formation and change of institutions" (Di John & Putzel, 2009, p.4).[3] Processes of power struggle are understood to be shaped by both

[2] A political settlements approach emphasizes the importance of bargaining between competing *elite* coalitions, in recognition of the disproportionate capacity of powerful groups to adjust institutions and policy in their favour (Parks & Cole, 2010). Elites are understood broadly to refer to the minority of individuals or groups that wield substantial power over: valued assets in key productive sectors, the distribution and allocation of property rights, and/or other important social, political and cultural institutions and ideas (Bebbington et al., 2018; di John & Putzel, 2009). However, it is also widely recognised that distributions of power between different kinds of elite and non-elite social groups vary widely between political settlements of different kinds (Dressel & Dinnen, 2014), requiring elites who are party to a given settlement to manage relationships with both excluded elites and subordinated social groupings (Bebbington et al., 2018; Parks & Cole, 2010).
[3] While the political settlements approach is oriented most explicitly in relation to historical political economy traditions, it resonates strongly also with critical political economy concepts such as hegemony and pacts of domination, which similarly emphasize the stabilization of ensembles of social and economic

institutional structures of the state and by broader structures of property rights and entitlements within a particular social order, giving some social actors more distributional advantages than others.

Because distributional outcomes are viewed as being more decisively shaped by configurations of power and interest within the established political settlement than by the design of formal institutional rules, structural distributions of power display significant stability in the face of external institutional interventions. The dynamic character of political settlements is, however, also recognized, with emphasis given to the fluid processes through which political settlements adapt and are subject to renegotiation and contestation (Dressel & Dinnen, 2014; Parks & Cole, 2010; c.f. Levy & Newell, 2002).

Increasingly, scholars have identified the potential value of this lens in analyzing how transnational regulatory norms can be brought in line with "power structures and interests" in particular sites of resource extraction (McCarthy, 2012, p.1885; Bebbington et al., 2017; Hickey & Izama, 2016). Bebbington et al. (2017), for example, use the framework to help explain variation across countries in the scope and limits of the Extractive Industries Transparency Initiative (EITI) in exerting transnational influence. The EITI has primarily shaped the incentives and preferences of established powerholders, rather than disrupting or transforming established configurations of power amongst politico-economic elites. Such work highlights the significance of *indirect*

power that systematically advantage certain groups (Cardoso, 1978; Levy & Newell, 2002). However, while such critical political economy traditions tend to view social power relations as grounded centrally in capitalist relations of production and associated systems of ideological legitimation (e.g. Cardoso 1978, Foley, 2019), a political settlements view places greater emphasis also on sources of power located in pre-capitalist production relations, and in forms of social and cultural power that interact with but are not reducible to capitalist social relations (Khan, 2010; di John & Putzel, 2009; Dressel & Dinnen, 2014; Parks & Cole, 2010).

mechanisms of regulatory influence and the interaction of governance institutions with deeper, spatially and historically specific configurations of power and interest.

Applying the political settlement concept to analysis of extractive sector governance demands an explicit focus on how political settlements are grounded in social relations of production and (economic) resource distribution, and in the elite and social alliances and ideational structures that stabilize and reproduce such social orders. To help elaborate such analysis, it is productive to draw on intersecting bodies of work in critical political economy and geography that explore how natural resource extraction is embedded within social and political orders in particular territorial spaces.

Drawing on inter-disciplinary traditions of spatial political economy, scholars of global production networks demonstrate how power relations underpinning extractive commodities production are influenced by location-specific social conditions such as established patterns of producer and worker organization, informal patronage networks controlling artisanal producers, or broader social relations of gender and ethnicity (Phillips, 2011; Barrientos & Smith, 2007; Levy, 2008; Henderson et al., 2002; Bridge 2008; Smith, 2015). From distinct but complementary traditions, structural and historical political economists and neo-Gramscian scholars of global business governance also underscore the importance of the political processes through which power relations in supply chains are grounded in "the deep structures of capitalist accumulation and distribution" within which the power and interests of political and economic elites in sites of resource extraction are constituted (Gellert 2010b, p.539; Foley 2017; Foley & Havice, 2016). They also emphasize the variegated character of economic and institutional dynamics that emerge when global supply chain governance initiatives interact with "inherited institutional landscapes" in specific historical and territorial contexts (Levy and Newell, 2002; Foley, 2019). Such scholarship helps us understand how territoriallygrounded power relations contribute to shaping regulatory struggles between non-governmental organizations, governments and commercial actors.

Critical and anthropological scholarship on the state complements such approaches through its focus on formations of power and interest inside and outside the state. Informal systems of institutional order involving fluid relationships between public and private actors and “complex entanglements of legalities and illegalities” play an important role in shaping the governance of extractive production (Peluso, 2018, p.400; Spiegal, 2012). Attention to the intimate intertwining of the interests of state and non-state actors within “joint institutions of extraction” helps to explain the “sociopolitical stability built around joint extraction regimes”, as powerful economic and political actors with interests in regime continuity harness the coercive and legitimizing capacities of state institutions to stabilize and reproduce extractive regimes(Verbrugge, 2015, p.177).

Synthesizing insights from these different traditions can deepen understanding of how social power relations are tied to the material environment, and how place, time and scalar or territorial relations shape the contestation and stabilization of political settlements (Bebbington et al., 2018, Goodhand & Meehan, 2018; Foley, 2019). We use the concept of an ‘extractive settlement’ to bring together insights from these varying local political economy perspectives—highlighting the distinctive features of political settlements that often emerge in the presence of strong economic and political dependencies on the extraction and trade of natural resource commodities. The concept of an ‘extractive’ settlement emphasizes the distinctive features of settlements that emerge when the power and interests of key elites are linked centrally to their control over natural resources and rents. We employ this concept to foreground the centrality of power relations situated in spatial and historical contexts in shaping the structure and dynamics of extractive settlements, while also emphasizing the heightened salience of spatiality and temporality in contexts dominated by extractive resource sectors, as a result of the geographical specificity of resource deposits and associated histories of land use, territorial claims and center-periphery relations (Bebbington et al., 2018).

This extractive settlements framework generates two central propositions: first, that global regulatory influence depends crucially on *the capacity of global regulatory agendas to accommodate configurations of power and interest at the local level;* and second, that in a given site of resource extraction, these power relations are shaped not only by *structural distributions of social and economic power,* but also by *dynamic power struggles between competing alliances of public and private actors* who seek to use regulatory institutions as means of controlling distributions of benefits associated with local extractive economies.

Regulatory struggles over Indonesian Tin

We next explore how this framework is useful for analyzing processes of how mechanisms of global regulatory influence interact with contested regulatory politics in sites of resource extraction, helping us to understand the potential, limits and hidden costs of global supply chain governance in the Indonesian tin sector. We explore not only how global regulatory interventions respond to pressures and constraints produced within local settlements, but also how these global interventions themselves influence the dynamics and outcomes of these local power struggles.

Our case study analyses transnational efforts to promote ‘sustainable’ tin production in Indonesia’s key tin-producing islands, Bangka and Belitung, which form Bangka Belitung province. Around a third of global tin production is located in Indonesia, and approximately 90% of Indonesia’s tin production comes from Bangka Belitung province (Hodal, 2012). Tin mining is the mainstay of the provincial economy, particularly on Bangka island where the state-owned mining company, PT Timah, conducts its industrial-scale operations, and where many tin smelters are located. Tin production provides an important source of government revenues through taxes, royalties and other fees, while also supporting livelihoods of artisanal miners, company employees, and downstream industries such as smelting.

Tin mining dates back to pre-colonial times, with larger-scale extraction commencing under Dutch colonial rule; this long history has generated a strong cultural attachment to tin mining and trade in the region (Erman, 2007). The Indonesian tin industry was nationalized at independence and continued to be controlled centrally by the national government department PN Tambang Timah—reorganized in 1976 as the State-Owned Enterprise (SOE) PT Timah, which had a monopoly on tin production under Suharto's authoritarian regime (Baldwin, 1983). Since Indonesia's democratic transition and associated processes of decentralization, governance of the tin sector has become embroiled in wider struggles for political control between national and subnational governments, and associated contests over market share between the state-owned company PT Timah and its private competitors. As we will see, transnational efforts to regulate tin supply chains in accordance with sustainability standards intervene in a complex political economy at national and subnational scales.

The transnational regulatory problem: 'unsustainable' tin in global supply chains

The transnational politicization of regulatory processes within global tin supply chains has been centrally grounded in debates surrounding the sourcing practices of high-profile global electronics brands that are responsible for producing smartphones, electronic devices, computers and other consumer products. Tin is a key component of solder and wiring, with around half of all tin mined globally used to produce solder for the global electronics industry.

Apple sources tin from Bangka Belitung directly via PT Timah (FoE, 2012, p.12), and also indirectly via the parts provided to Apple by Samsung, and via Foxconn, which assembles iPhones and other products for Apple and buys solder made of Indonesian tin from the Taiwanese companies Shenmao Technology and Chernan Technology—two of the top solder makers in Asia (FoE, 2012, p.21).

Tin mining is a relatively straightforward process at both artisanal and industrial scales as tin deposits are often close to the surface on land and in the shallow waters surrounding Bangka Belitung, and require limited processing. Onshore and offshore mining are both widespread in Bangka Belitung, with each generating distinct social and environmental impacts. Onshore mining has produced drastic changes to landscapes, including loss of soil fertility in farmland areas, pollution of drinking water, and progressive incursion of mining activities into protected forests and conservation areas (Impact Assessor and observers, September 2018). Such problems have been compounded by the lack of land reclamation once land has been mined, despite such reclamation being required under Indonesian law (District official, September 2017).

Social impacts have been associated with occupational health and safety (OHS) concerns, particularly child labor and unsafe mining practices amongst artisanal miners that often result in fatal accidents (FoE, 2012). Silt and sludge from offshore mining boats near Bangka island have produced serious environmental impacts for the ocean environment and fisheries, killing coral, sea grass and mangroves, threatening endangered turtles, and impacting fish, crab and shrimp catches—in turn harming the livelihoods of local fishermen (Interviews, July 2017; September, 2018). Such forms of environmental damage have raised concerns that offshore mining near Belitung island could undermine the emergent tourism industry, generating significant tensions between competing livelihood strategies and development models, and different understandings of 'sustainability'.

Transnational responses: demands for 'sustainable' tin sourcing

Central to catalyzing the emergence of transnational regulatory responses was a transnational campaign targeting unsustainable practices within the supply chains of major global electronics brands sourcing tin from Bangka Belitung. This campaign was spearheaded by a 2012 report by the UK-based NGO Friends of the Earth (FoE), supported by the Indonesian branch of FoE (known as WAHLI), and bolstered by extensive media coverage from The Guardian, BBC and CNN. The report documented social and environmental impacts of tin production as a means of pressuring global electronics brands to strengthen sustainability safeguards within their supply chains (FoE, 2012). Such public pressure came at a time when electronics companies were already facing demands to increase traceability of minerals in supply chains as a result of NGO campaigning and regulatory changes in key jurisdictions, responding to concerns about the risk of revenues from natural resource extraction being used to fund armed conflict (Global Witness, 2015, November 15; OECD, 2016).

In response to these interacting pressures, a number of global electronics companies worked together with FoE to convene the multi-stakeholder TWG, which sought to create a new source of normative and institutional authority through which global regulatory agendas around sustainable tin production could be promoted. Participants at the international level initially included FoE and a number of major electronics companies, metals manufacturers and industry associations, convened by the Sustainable Trade Initiative (IDH) (FoE, n.d). Within Indonesia, TWG's work has drawn on multi-stakeholder engagement from tin producing companies, the Indonesian Tin

Exporters Association (AETI), various government officials[4], and some civil society organizations (Interviews, August 2019).

During the initial stage of the project's life, under IDH's direction, the program articulated relatively ambitious aims to bring about "transformation" of sustainability practices in the sector, though such aims were constrained from the outset by an overarching commitment to protecting rather than challenging prevailing models of resource extraction. The companies involved made clear early on that their aim was to support their supply chain partners to continue sourcing tin from Indonesia, both onshore and offshore, while emphasizing that such partners needed to adhere to sustainable growth and mining practices (FoE, n.d.).[5] Subsequently, coordination of the TWG's activities was led by the Responsible Business Alliance, with more limited civil society involvement. This shift saw some dilution of the initiative's aims, with the focus progressively narrowed around a delimited set of pilot projects (discussed further below).

In line with these objectives, the TWG initiated a number of strategies to try and influence sustainability practices within tin supply chains. It undertook some efforts to expand efforts to increase traceability, transparency and sustainability of sourcing practices amongst international companies involved in purchasing tin (Aidenvironment, 2017, p.6). However, despite intensified pressure on participating companies to strengthen their internal systems of social and environmental 'risk management', such efforts were implemented unevenly across companies, and proved difficult to sustain over time when immediate sources of public pressure dissipated. Moreover, while international TWG members made direct financial contributions during the early years of the TWG's

[4] These included the Ministries of Energy and Mineral Resources, Maritime Affairs and Fisheries, Home Affairs, Trade, and Economy (Aidenvironment, 2017).

[5] The TWG's stated aims were to "identify and mitigate … the sustainability challenges of tin mining and smelting in Indonesia, while recognising the economic benefits of the sector" (Responsible Minerals Initiative, n.d.).

operation, these were subsequently phased out. Such developments weakened the degree to which these changes to corporate sourcing practices generated significant or sustained pressure on upstream suppliers to adopt altered production practices (TWG, 2015, p.13).

Beyond these direct forms of supply chain pressure, another important dimension of the TWG's work has focused on efforts to 'localize' global sustainability norms through convening discussions amongst local tin producers, NGOs and governments to try and construct "a common understanding of the root causes of unsustainable practices" in the Bangka Belitung context (Aidenvironment, 2017, p.2). During the early stages of the TWG's operation, workshops were held to raise awareness of sustainability issues amongst industry, government and civil society actors, particularly at provincial and district levels. Such efforts generated some effects, with one observer noting that "TWG activities have raised awareness among policy makers on the importance of sustainable mining and increased some knowledge on how to do this" (August, 2019; Nurtjahya & Agustina, 2015).

A range of commissioned research on social and environmental impacts of tin production further informed the creation of a 'roadmap' document that identified the challenges and pathways to sustainable tin production in Bangka Belitung (TWG, 2015; NGO representative, October, 2019). Specific efforts were made to engage key Indonesian government actors to support the implementation of the 'Roadmap' and facilitate broader dialogue on policies impacting social and environmental practices in tin production, including those governing land tenure, mining licenses and the financing of land reclamation (NCEA, 2015). Such activities produced some effects, in the form of endorsement letters from a number of national ministries,[6] participation of provincial and

[6] Letters indicating formal endorsement were obtained from the Trade, Mining and Mineral Resources, Marine Affairs and Fisheries, Environment and Forestry, and Economy Ministries (Aidenvironment, 2017, p.8, 10).

district government officials in a learning group on regulation and law enforcement (Aidenvironment, 2017, p.10), and collaboration with the civil society umbrella organization Kemitraan to support subnational governments to integrate the sustainable tin mining Roadmap into their five year development plans. Nonetheless, there were no funds clearly earmarked and sufficient to operationalize these plans (TWG participant, August, 2019) and the TWG found it difficult to build sustained engagement with government on targeted policy issues (Aidenvironment, 2017, p.10). Knowledge of the TWG's activities remained limited both in key national ministries, [7] and among subnational government officials (District officials, September 2018; NGO official, June 2019).

The TWG also developed a small number of pilot projects to rehabilitate former onshore tin mines and improve miner OHS. The plan was originally to target smaller private smelters working with artisanal and small-scale miners (Aidenvironment, 2017, p.8), and to use these pilots to facilitate "uptake and scaling" (EICC, n.d. p.2) of improved land restoration and OHS practices amongst private tin smelters. However, Indonesian regulatory changes subsequently led to the closure of many of the smaller private smelters the TWG had originally planned to target. While the large state-owned tin producer PT Timah was initially reluctant to engage with the TWG, amidst significant competition between the company and rival tin producers, it later became more willing to engage on sustainability issues and became an important partner in TWG's pilot initiatives (TWG member, October, 2019).

Overall, while transnational efforts to promote the localization of sustainability norms have made small contributions to building awareness and capacity around specific

[7] Officials from key national agencies (Energy and Mineral Resources, and Trade) said they were responsible for environmental regulation but had no involvement in TWG activities (June 2019).

sustainability issues, such impacts have been limited in scope, and difficult to sustain within a highly dynamic local political environment. Such shifts can be attributed in part to limits of the strength and continuity of commitments by electronics firms to pressure their suppliers or finance working group activities, but these also interacted with shifting configurations of power and interest amongst key actors at national and subnational scales in Indonesia. Unravelling these variables demands more in-depth analysis of the local political economy of the sector, to which we now turn.

Potential for transnational regulatory influence within the national political economy

A political economy framework assists analysis of shifting opportunities and constraints for transnational regulatory influence in two related ways. First, it provides an important foundation for analyzing how the interests of key actors with whom transnational regulators attempt to engage are constituted within local extractive settlements—shaping and constraining opportunities for securing their support of transnational regulatory agendas. Second, contextualizing transnational regulatory interventions within the broader terrain of shifting local political and economic dynamics aids understanding of the indirect and sometimes unintended pathways through which transnational regulatory interventions contribute to wider processes of regulatory change.

To begin, it is important to place transnational regulatory interventions into the context of longstanding struggles for control over the tin sector between national and subnational governments, and between PT Timah and its competitors. Suharto's authoritarian regime – in power for 32 years until 1998 – designated the mineral as a strategic resource, providing the central government with significant powers to issue licenses, control mining activities and revenue flows, and draw on security actors to enforce the decisions of the regime. With the end of the regime, the tin sector was deregulated in 1998/1999, and its strategic status was lifted in 1999 (Ministerial Decree No.146/1999). While issuing large-scale mining licenses remained the purview of the central government, the newly-introduced decentralization laws (No.22 & 25/1999) initially devolved authority over small-scale mining licenses and downstream activities such as smelting to district governments.[8]

These changes led to a significant restructuring of tin supply chains, with control shifting toward subnational governments, and tin production becoming increasingly deregulated. District politicians in Bangka and Belitung moved quickly in 2001 to introduce local regulations on 'Inkonvensional' (artisanal) mining that allowed for local artisanal miners to gain local licenses—activities that had previously been deemed illegal. This stimulated the explosion of artisanal mining—compounding environmental damage but bringing some 130,000 people into the tin sector who had long been locked out of formal employment (Erman, 2008, p.102). The number of companies involved in mining, smelting and trading activities also increased—many with links into international trading networks and strong links to powerful supporters in Jakarta (Erman, 2008).

Decentralization and deregulation had significant implications for the position of both Indonesia's national government and PT Timah within tin supply chains. There was a significant rise in illicit tin exports via long-established trading networks to Malaysia, Singapore and China that grew alongside the increased number of actors involved in tin production. This destabilized the global tin price, and undermined Indonesian central government revenues through loss of royalty payments and customs duties (Erman, 2007, 2008). Deregulation exposed PT Timah to competition from newly-established smelters

[8] Control over licences shifted from the District to Provincial level in 2014 (Law No. 23, revised in Law No.9/2015).

and other license holders, leading it to lose market share and associated revenues to rivals with stronger connections to informal miners and trading networks.[9] In the first decade after the sector's deregulation, PT Timah's profits fell, while Malaysia and Singapore's tin exports reportedly grew (Interviews, January 2017; Erman 2008).

In response to these changes, the central government passed the Law on Mineral and Coal Industries (No.4/2009), with the aim of re-centralizing control over tin supply chains, after years of trying to wrestle back control from districts through technical regulations (Erman, 2008). The Law banned the export of unprocessed tin to try and impede informal trade in unprocessed tin sands, although it took years for this law to come into effect through implementing regulations. The clamp-down was further supported by a series of Trade Ministerial Decrees on Tin Exports (in 2014, 2015 and 2018), which helped guide implementation of the Mining Law. The latest iteration of these Decrees (No.53/2018) requires companies to declare where they source their tin ores, significantly increasing national government control over supply chains by requiring that sources of tin are certified against reserves and verified by one of two centrally endorsed certification companies.[10] Central control has also been periodically asserted through crackdowns on illegal trade networks (see Erman, 2008; Manggala, 2014).

This push towards recentralization has facilitated the reassertion of PT Timah's control over Indonesian tin supply chains, since it is one of the only companies with the requisite scale, know-how and administrative capacity to comply with these requirements

[9] Such control of artisanal trade networks by local patrons has also been documented in other parts of Indonesia, e.g. see. Kusumawati et al. (2013).

[10] The Energy and Mineral Resources Ministry controls large-scale mining licences and issues Clear and Clean (C&C) Status certification of companies (to demonstrate that they have met a number of regulatory requirements) to apply for export permits.

while also maintaining competitive tin prices.[11] The new export regulations make it almost impossible for local smelters to export tin legally—only a few companies, such as PT Timah and PT Refined Bangka Tin, have been able to meet the regulatory and supply chain verification requirements to date (Taylor, 2015).[12] These new requirements have assisted PT Timah's efforts to re-capture market share via the closure of a number of competing smelters and operators, and by pressuring smelter owners and artisanal miners to sell their tin to PT Timah as a means of accessing export approvals.

The national government's push towards re-centralization and re-regulation of tin supply chains has been bolstered in important ways by resurgent resource nationalist discourses. Retaining domestic ownership of mineral wealth and associated revenues has long been popular in national political discourse, particularly when framed with reference to the growth of Indonesia's nearest neighbors such as Malaysia, or the global economic dominance and higher standards of living of the West (Warburton, 2014). The introduction of the new Mining Law during the campaign for the 2009 presidential elections bolstered public support for President Yudhoyono's re-election campaign. Resource nationalism has further strengthened since that time, both in the campaigns that led President Joko Widodo (known as Jokowi) to power in 2014 and again in 2019.

These intersecting dynamics are important in explaining how opportunities and constraints for transnational regulatory influence shifted over time. The Jokowi administration's efforts to balance discourses and policies of resource nationalism with efforts to attract foreign investment played helped shape the central government's

[11] Also contributing to PT Timah's resurgent strength was the failure of PT Timah's largest competitor, Malaysan-controlled PT Koba Tin, to have its contract of work renewed by the Indonesian government in 2013 (Interviews, January 2017).

[12] Companies seeking export certification must have a report prepared on source verification mechanisms by a Competent Person Indonesia (CPI) who is certified by one of only a few recognised professional associations. The CPI report must be verified by an independent body; either Sucofindo and Surveyor Indonesia.

response to transnational pressures for strengthened sustainability standards in tin supply chains. In 2015, newly inaugurated, Jokowi visited Bangka Belitung and vowed to outlaw illegal artisanal mining practices (Rusmana & Sadmoko, 2015), although in practice such a change was not implemented.[13] During his first US trip as President in 2015, Jokowi also visited Apple headquarters and met with CEO Tim Cook "to discuss [Apple's] investment in Indonesia's tin industry [and] to ensure the metal used in iPhones and other Apple products is produced in legal mines" (CNBC, 2015; Kompas, 2015). After Jokowi's visit, a moratorium on new tin mining licenses and extensions of existing permits was introduced by Bangka Belitung's Provincial Governor in 2016 (Interviews, June 2017).

To the extent that the central government invoked transnational sustainability discourses – often articulated with reference to tackling the negative environmental or safety impacts of 'illegal' mining and exports – they used these as a further means of justifying their assertion of central control over the supply chain (National government officials, June 2019; Manggala, 2014). In turn, the TWG explicitly endorsed some of these central government policies in their own public communications – representing these as important efforts to protect legality and traceability within tin supply chains (TWG, 2015, p.10; NCEA, 2015). Although the government's assertion of centralized control over tin supply chains was primarily motivated by domestic concerns, transnational pressures for supply chain traceability have thus aligned with and *amplified* efforts by the national government to tackle informal mining practices and illicit exports. These opportunities for transnational influence represented an unusual political moment

[13] The minister tasked with overhauling the sector said such practices would not be outlawed immediately because "regardless of all else, illegal miners are part of our society" (Jegho, 2015).

in which opportunity structures opened as a result of the convergence of global consumer pressure for sustainable mining with the election of a new civilian president in 2014.[14]

Meanwhile, there was strong resistance to any perception that the government was giving in to international pressure or responding to external initiatives or directives. Indonesian government officials spoke explicitly of their market share (as the world's largest exporter of tin), claiming that foreign buyers could "not tell Indonesia what to do" (September, 2018). One national government official stated that "tin is an important commodity needed everywhere but it is in limited supply, so international pressure to meet desired 'sustainability' approaches would only indirectly influence governance in Indonesia, when it was shown to clearly benefit Indonesian industry" (September, 2018). The high political salience of resource nationalist discourses helps make sense of the central government's reluctance to engage *directly* with the TWG's activities, at the same time that they pursued a number of mutually reinforcing initiatives.[15] These domestic political shifts coincided temporally with the significant receding of transnational market influence and civil society pressure, and in turn with the scaling back of the ambition of the regulatory or transformative goals of the TWG program.

The wider dynamics of political and economic power struggles within the Indonesian tin sector also help to explain the significant shift over time in PT Timah's

[14] The importance of the broader macro-political environment in shaping the potential influence of transnational governance interventions can be appreciated also through a counterfactual reflection on political opportunities for transnational regulatory influence during previous time periods. Under Indonesia's authoritarian regime, tight interconnections between state owned enterprises, private enterprise and the regime's national and military elites, who shared interests in sustaining access to resource rents, seriously constrained the influence of external regulatory interventions. During the early years of democratization, although established elite power networks proved remarkably resilient (Hadiz & Robinson, 2005), domestic pressures for reform aligned with material and discursive pressures from foreign entities to open significant political opportunities for transnational promotion of liberal good governance agendas (Diprose et. al, 2019).

[15] Entrenched and predominantly centralised interests had already begun to reorganise prior to this, as illustrated by the resurgence in resource nationalism that culminated in 2009 Mining Law (Winanti & Diprose, 2019).

willingness to engage with the TWG. While PT Timah initially resisted engagement with the TWG's activities, this later substantially increased for several reasons. First, as the TWG evolved it increasingly focused on what were perceived to be less 'risky' issues for companies, concerning reclamation and OHS pilots, compared with a focus on legality or traceability of tin (Local NGO, October, 2019). Second, they benefited from new national government policies on export regulation and source verification mechanisms, being one of the few companies that could meet the procedural requirements to verify tin sources (TWG participant, September, 2019). Third, pressure from the central government to accommodate artisanal mining (Rambu Energy, 2015), and a change in company leadership, provided a catalyst for a revised approach to engagement with the TWG. Such pressure from the central government resonated with the company's longstanding interests in reasserting control over trading links with artisanal miners (PT Timah staff, September 2018) – providing a legitimizing narrative for the company's efforts to re-capture market share and draw artisanal supply chains under its control.

Such shifting pressures have had ambiguous effects on sustainable tin production. PT Timah has responded via various efforts to strengthen traceability of its tin sources, to strengthen compliance with OHS standards, and support the establishment of smallholder cooperatives. Nonetheless, it has proved challenging for PT Timah to comply with traceability and sustainability requirements without excluding artisanal miners from supply chains (PT Timah staff, September, 2018).[16] The company has also struggled to ensure social safeguards are met within their sourcing chains without driving artisanal miners back to rival smelters and informal trading networks. Thus, while the TWG has contributed to ameliorating certain specific dimensions of social and environmental harm

[16] Such constraints are unsurprising, given the diverse needs within communities, and thus the inherently political effects of transnational sustainability governance interventions (c.f. Milne & Adam, 2012).

associated with extractive activities, the effects of its interventions have continued to be constrained by entrenched configurations of power and interest within local 'extractive' political settlements.

Transnational regulatory influence and sub-national struggles over livelihood transitions

At the sub-national level also, a political economy analysis of shifting configurations of power and interest between key elite actors and social constituencies helps us to understand both sub-national variations in opportunities for transnational regulatory influence over 'sustainable' tin production, and the ways in which such opportunities and constraints have shifted over time.

Bangka: It's all about tin

Tin mining is central to the Bangka political economy, with important implications for the ways both grassroots social interests and those of political and economic elites are constituted. Within Bangka's prevailing extractive settlement, elite economic and political interests and community livelihoods depend on tin mining activities (in the big mines, artisanal mining, and downstream industries such as smelting), making it difficult for transnational regulatory schemes to build support for environmental regulatory agendas that are perceived to threaten these interests.

While depletion of tin reserves on Bangka has generated periodic discussion of post-extractive economic development options, a recent push into lucrative rare earth mining that can generate a value 10 times higher than tin has bolstered confidence in ongoing dependence on an extractive economy (Lubis & Cahyafitri, 2015; Marjaya, 2018; Interviews, September, 2019). District governments receive taxes and levies (PAD) from mining activities and a share of nationally-collected royalties; this increases funds for district-level economic development initiatives (BPS Bangka, 2018). The provincial government benefits directly from mining since the 2014 Local Government Law strengthened their authority to issue licenses. Local governments have also benefited from access to funds collected (but often not spent) for the purpose of land reclamation (TWG participant, September, 2018).[17] PT Timah staff also hold senior leadership positions in political parties and use this to push for support of large-scale mining in the region. Civil society actors who might otherwise challenge these elite networks hold off in light of concerns about community livelihoods and a desire to protect opportunities for artisanal mining. Convergence of these multiple pressures generates strong interests for industry and government elites in Bangka to defend an extractivist local economy.

The TWG has nonetheless made some inroads in building awareness and engagement around the sustainability agenda at the provincial level. Most of the TWG's activities have occurred in Bangka, where the provincial capital, PT Timah's local headquarters and the main site for the pilot land reclamation are located. A number of provincial and Bangka district government officials attended the TWG's initial provincial seminars (Nurtjahya & Agustina, 2015), and TWG has subsequently built some collaborative alliances with local government in support of agendas of sustainable tin production (Interviews, September, 2019). Provincial politicians have publicly invoked concerns about social and environmental impacts with increasing frequency, albeit under the rubric of addressing the impacts of 'illegal' tin mining and smuggling on tin prices and government revenues (e.g. Fadli, 2014).

[17] Broader political support for the sector is further bolstered by campaign financing and other illicit payments to state actors from powerfully networked business actors in the local tin sector (Interviews, June, September, 2017).

Yet, incentives for Bangka island actors to engage with agendas for strengthened social and environmental sustainability continue to be weakened by perceptions that the sustainability agenda threatens the established extractive settlement. One Bangka district official expressed suspicion of 'Western agendas' underlying sustainability initiatives, suggesting that China would be a preferable partner in the region (September, 2018). Other interviewees reported widespread distrust of national and international NGO advocacy concerning worker safety in artisanal mining, given strong local support for such livelihoods, and noted the challenges of promoting strengthened land reclamation while political elites continue to benefit from diverting official reclamation funds for other purposes (Interviews, January & July, 2017, September 2018). Meanwhile, new forms of hyper-extractivism involving rare earth production provide a reinvigorated developmental discourse to legitimize the perpetuation of a local extractive political economy and corresponding disengagement from transnational sustainability agendas.

Belitung: Indirect effects on coalitions promoting environmental protection and alternative livelihoods

Although tin mining also plays an important role in the local economy of Belitung, there are opportunities on this island for global regulatory influence to support environmental sustainability agendas, reflecting greater contestation surrounding the island's history of extractivism, and correspondingly greater pluralism of elite and social interests than in Bangka.

Such pluralism is a product of the distinctive history of tin mining in Belitung. Until the early 1990s, PT Timah operated tin mines on Belitung island but withdrew its operations between 1990-92 when large reserves had depleted (Interviews, June 2017). The abrupt withdrawal of PT Timah saw livelihoods lost, the local economy severely disrupted, and mine sites abandoned. The company paid little, if any, compensation to those that lost their jobs or for mine-site rehabilitation. This gave rise to protracted disputes between Belitung islanders and PT Timah, generating an ongoing legacy of resentment towards the company (Interviews, June 2017). Following PT Timah's departure from Belitung, artisanal miners continued mining in pits abandoned by PT Timah, often using unsafe mining practices, then on-selling this tin to PT Timah (or its rivals) who no longer had responsibility for structured employment and OHS (Bloomberg, 2015; Interviews, December, 2016).

While artisanal mining *onshore* has continued to be supported by both grassroots and elite constituencies in Belitung, the exit of PT Timah led to diversification of livelihood options away from tin, towards tourism, fishing, and small plantations of agricultural commodities (e.g. pepper and oil palm). Increasing social and political interests in these new sectors heightened the salience and legitimacy of policy discourses surrounding environmental restoration and conservation, given their potential to protect agricultural land, fisheries and the pristine beaches around which the expanding tourist sector has developed. This created opportunities for the TWG to build support for its agenda of strengthened land reclamation and environmental conservation. Government officials from Belitung attended the initial TWG awareness raising events, and outreach activities promoting environmental conservation have since continued to a limited extent through local NGO partners of the TWG.

Nonetheless, although sustainability discourses more readily gained traction in Belitung, the TWG has undertaken few efforts to build active alliances with local environmental coalitions. Instead, environmental sustainability discourses have been mobilized by local actors in ways that transnational actors did not intend or control, bolstering local resistance to recent efforts by PT Timah to scale-up *offshore* tin mining. While PT Timah has argued it has a legitimate right to mine offshore in the region under its existing license, in the eyes of the local populace offshore tin mining has a negative impact on the environment and marine life, the fishing industry and new tourism-based livelihoods (Interviews with government officials, community members and activists, June-July, 2017).

Such concerns have generated active, organized resistance to mining from a range of local groups. On 14 October 2016, some two thousand people from Belitung and East Belitung districts protested the operation of offshore suction boats, demanding that the government protect tourism and fisheries. The District Heads of Belitung and East Belitung joined the demonstrators and signed a petition addressed to the provincial and national governments to halt the offshore mining licenses for several companies operating in Belitung (Community Coalition representative, June 2017). District-level political support for interests opposed to offshore mining were further bolstered by political ‘pacts’ between social organizations and candidates for district head, in which votes are conditional on a candidate’s opposition to offshore mining (Pos Belitung, 2016; Activist, June, 2017). The Provincial Government also provided some support for the campaign against offshore mining.[18] While many central government actors have strongly supported large-scale mining, local anti-offshore mining groups recruited support from the powerful former national Minister for Maritime and Fishing Affairs, who publicly threatened to sink suction boats that ventured into fishing areas (Aryandi, 2015; Interviews, June, 2017).

[18] In August 2017, the new Provincial Governor issued a moratorium on new licenses for tin mining (Republika, 2017), stating PT Timah could only operate its offshore mining for a period of two years (Nurhayati, 2017). The provincial government has sought a compromise between mining and tourism by proposing a Provincial Regulation on a Sea Zoning Plan to determine the zoning between offshore mining and tourism areas.

Insofar as the transnational sustainability agenda promoted by the TWG has had a discernible effect in Belitung, it has been to *amplify* and *legitimize* local environmental coalitions, supporting the efforts of these groups to shift away from tin production, and towards alternative (post-extractive) livelihoods. Both community-level fishing groups and a representative of the Belitung Tourism Association explained that external discourses of environmental sustainability had provided useful support for their arguments against offshore mining (interviews, June, 2017).

Nonetheless, this local environmental conservation agenda remains at significant odds with the desire of tin buyers to push into offshore mining in response to dwindling reserves onshore, and their corresponding focus on promoting sustainability safeguards in ways that secure sustained processes of tin extraction. As a result, while the TWG has had some indirect, unacknowledged and largely unintended effects on supporting local environmental coalitions, its effects on supporting more *sustainable tin production* of the kind promoted by transnational electronics brands have remained very limited. Moreover, despite distinctive opportunities in Belitung for the TWG to support local coalitions seeking to challenge and transform the established extractive settlement, the lack of direct engagement with these groups has limited the TWG's impact on distributions of power between the competing social groups that ultimately shape patterns of continuity and change in the local extractive settlement.

Discussion and conclusion

The above analysis has generated a number of insights about the mechanisms through which global supply chain governance can influence 'sustainable' production practices in sites of resource extraction—and the scope and limits of such influence. There is some evidence that the TWG has mobilized support for elements of global regulatory agendas from select political and economic powerholders at national and sub-national levels, contributing in modest and gradual ways to the creation and dissemination of ideas, practices and capacities supportive of specific 'sustainability' practices within the Indonesian tin sector. To this extent, established theories of the regulatory influence of global supply chain governance play an important role in illuminating direct mechanisms of regulatory influence, through which transnational actors draw on transnational market power and institutional authority as entry and leverage points to support the construction of wider pro-regulatory coalitions in sites of production.

By extending such frameworks to incorporate insights from 'local political economy' perspectives our analysis has further facilitated more explicit scrutiny of the scope and limits of transnational regulatory influence. This includes the potential for indirect mechanisms of regulatory influence that operate via effects on the wider regulatory environment in which the supply chain actors directly targeted by global regulatory initiatives are embedded.

The scope of transnational regulatory influence was shown to be constrained in accordance with the extent to which the demands of global regulatory agendas could be reconciled with the interests of established elite political and economic actors and their wider social constituencies at national and subnational levels. Because direct regulatory influencing efforts depend on the capacity to recruit established powerholders into pro-regulatory coalitions, regulatory initiatives are more likely to succeed if they offer some opportunity for these actors to benefit from regulatory changes, even if such gains are for reasons that relate only indirectly to intended regulatory purposes.

The extent to which such alignment was possible within the prevailing extractive settlements in the Indonesian tin sector was shown to vary sub-nationally between Bangka and Belitung islands, reflecting varied histories and technologies of resource extraction, the spatial concentration (and depletion) of resources, livelihood strategies, elite and social coalitions, and associated mobilization of environmental and developmental discourses as a basis for stabilizing or contesting established extractive settlements. The degree of such alignment also varied across regulatory issues, with the local extractive settlement proving more accommodating of regulatory norms that could be readily reconciled with local livelihood and wealth generation strategies (such as increased investment in land reclamation), and more resistant to norms that (if implemented) would threaten local livelihoods. The opportunities for transnational regulatory influence were also shown to expand and shrink significantly over time, in response to changing political dynamics at transnational, national and sub-national scales. Such findings suggest the value of deploying a local political economy framework to help guide more systematic comparative analysis of varying transnational regulatory effectiveness across contrasting national and sub-national contexts and regulatory issues.

Indirect regulatory influencing mechanisms were shown to operate by influencing the incentives and opportunity structures faced by a range of influential domestic actors—not only those directly targeted by the supply chain governance initiatives. Pressure for more 'sustainable' tin production from international NGOs and media, and lead firms within global electronics supply chains enabled powerful actors in Indonesia's national government and the national tin company, to strengthen their position within domestic power struggles over both regulatory authority, and control over market share and associated revenue flows from tin production. This had the effect of reinforcing efforts to strengthen formalization and traceability within tin supply chains, though for reasons that had little to do with strengthened commitments to sustainability standards.

At the same time, sub-national actors in the island of Belitung who already had their own reasons for wanting to resist offshore and large-scale tin mining were able to draw on transnational sustainability discourses to strengthen their position within local regulatory struggles. Although transnational regulatory pressures generated a number of indirect effects at the local level, such dynamics generated deeply ambiguous impacts on the sustainability of tin production. Transnational regulatory interventions were to a degree trapped between commitments to tackle recognized problems of social and environmental harm, and risks of contributing to broader dynamics of social conflict through disruption of long-established livelihood and wealth-generation strategies.

These findings generate a number of lessons for this special issue's central questions concerning the hidden costs of supply chain governance. Our analysis has highlighted difficult trade-offs between environmental and social dimensions of 'sustainability' that arose within the prevailing extractive settlement, as re-centralized control over tin supply chains offered the potential to strengthen social and environmental safeguards, while threatening to intensify distributional inequalities through risking artisanal mining livelihoods (c.f. Ponte, this issue). In response to such trade-offs, global regulatory interventions have relied heavily on localized pilots that make small contributions to narrowly defined regulatory 'problems', while failing to curtail broader patterns of environmental and social harm. At a deeper level, supply chain governance interventions have generated 'hidden costs' in the form of diffuse effects on consolidating and in some ways intensifying the power of elites within the extractive settlement—in turn reproducing structural limits to more narrowly-conceived problem-solving capabilities of supply chain governance interventions. Such effects have remained unacknowledged, and do not appear to be intended by architects of the TWG intervention, though the consolidation of the prevailing extractive settlement is consistent with the interests of international tin buyers who depend on the stability of this settlement to secure tin supply. The effects are also perverse insofar as they undermine the capacity of the TWG intervention to achieve deeper shifts towards sustainable resource management in Bangka Belitung.

Despite the significant limits of the TWG, its impacts on ameliorating some social and environmental harms associated with tin extraction are not without value for the workers and communities directly impacted by these interventions. By acknowledging these small and localized benefits of the TWG intervention, our argument has sought to differentiate itself from claims that the failure of voluntary supply chain initiatives to support deeper systemic change necessarily carries the prescriptive implication that such initiatives should be wholly rejected in favor of more traditional state-based regulatory approaches. Notwithstanding the significant challenges that the TWG has encountered, there is little evidence that its interventions in the Indonesian tin sector have actively displaced state policy solutions more strongly aligned with global regulatory norms.

In contrast, the existing extractive settlement remains firmly defended by precisely the national and sub-national actors within Indonesia who would need to support any such state-led regulatory alternatives. While voluntary supply chain governance systems draw on very different sources of power and authority to state regulators, in many ways they confront "the same problems as formal legal regimes and governance agendas [if they] … attempt to institutionalize an order that provides for a distribution of benefits that is not in line with local constellations of power and interest" (McCarthy, 2012, p.1885; c.f. Cutler and Lark, this issue, on the failures of domestic and international law as tools of corporate regulation and accountability). In this sense, our analysis has highlighted not only limits within voluntary supply chain regulatory systems, but also more fundamental tensions between competing understandings of 'sustainable' social and environmental practices that need to be confronted by state as well as non-state efforts to govern the sustainable production of extractive commodities.

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